Environmental Product Declaration

In accordance with ISO 14025 and EN 15804+A2:2019/AC:2021 for:

LIP Sealing Grouts

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-09196
Publication date:	30-11-2023
Valid until:	30-11-2028

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

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Declaration issued: 30-11-2023

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Standards: EN 15804 and ISO 14025.
EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

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 EPD contains multiple products and the results refer to the worst case product of the group, LIP Grout Dark Brown. This LCA study is intended to be used in a cradle-to-gate with options EPD covering the life cycle sub-modules A1-A3, A4, A5, C1-C4, and D and the following Grouts in table 1, all produced by LIP Bygningsartikler A/S at the same production site. The EPD will be accessible on http://www.lip.dk/ together with safety data sheets and product information, providing information for business-to-business communication. The Geographical scope is Europe and all products follow 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 Grouts, 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

Products represented

LIP Grout Manhattan, LIP Grout Grey, LIP Grout Pearl, LIP Grout Jasmin, LIP Grout Dark Brown, LIP Grout Bahamabeige, LIP Grout White, LIP Grout Black.

Figure 1: Picture of the eight LIP products covered in this EPD.

Product description

These products are manufactured by LIP Bygningsartikler A/S in the production plants located in Nørre Aaby, Denmark. These products are 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 the 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 products are 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 eight products covered by this EPD.

Product name		Article no.	Description
Danish	English		
LIP Fugemasse Manhattan	LIP Grout Manhattan	5 kg - Article no. 2914604 20 kg - Article no. 210019	5 and 20 kg bags Cement based 0.2L water per kg
LIP Fugemasse Grå	LIP Grout Grey	5 kg - Article no. 1557305 20 kg - Article no. 210033	5 and 20 kg bags Cement based 0.2L water per kg
LIP Fugemasse Perlehvid	LIP Grout Pearl	5 kg - Article no. 3433521 20 kg - Article no. 210026	5 and 20 kg bags Cement based 0.2L water per kg
LIP Fugemasse Jasmin	LIP Grout Jasmin	5 kg - Article no. 2914612	5 kg bags Cement based 0.2L water per kg
LIP Fugemasse Mørk Brun	LIP Grout Dark Brown	5 kg - Article no. 1557347	5 kg bags White cement based 0.2L water per kg
LIP Fugemasse Bahamabeige	LIP Grout Bahamabeige	5 kg - Article no. 2334183	5 kg bags Cement based 0.2L water per kg
LIP Fugemasse Hvid	LIP Grout White	5 kg - Article no. 2004380 , 20 kg - Article no. 210002	5 kg bags and 20 kg White cement based 0.2L water per kg
LIP Fugemasse Sort	LIP Grout Black	5 kg - Article no. 4019635	5 kg bags Cement based 0.2L 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 Grout. 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 Grouts 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 products are designed, produced and CE marked according to DS/EN 13888 (grouts for ceramic tiles - Requirements, conformity assessment, classification and designations).
They are classified as seen in table 2 according to DS/EN 13888 (grouts for ceramic tiles - Requirements, conformity assessment, classification and designations). The CE marking information can be found directly on LIPs website here:
https://lip.dk/produkter/fugning-af-fliser-og-klinker/lip-fugemasse/.

Table 2: Performance information for the eight products according to DS/EN 13888.

	LIP Grout Manhattan	**LIP Grout Grey**	**LIP Grout Pearl**	**LIP Grout Jasmin**	**LIP Grout Dark Brown**	**LIP Grout Bahamabeige**	**LIP Grout White**	**LIP Grout Black**
Standard	DS/EN 13888	DS/EN 13888	DS/EN 13888	DS/EN 13888	DS/EN 13888	DS/EN 13888	DS/EN 13888	DS/EN 13888
	CG2WA	CG2WA	CG2WA	CG2WA	CG2WA	CG2WA	CG2WA	CG2WA
Bend's tearing strength	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2
Bend's tearing strength after freeze-thaw cycles	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2	≥ 3.5 N/mm2
Crushing strength	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2
Crushing strength after freeze-thaw cycles	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2	≥ 15 N/mm2

Air emission

All the eight Grouts 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 attached for GEV-EMICODE.

Content declaration

In Table 3 the range of % weights of the materials/components including packaging are presented for all the eight LIP Grouts included products in this EPD. The results refer to the worst case product of the group, LIP Grout Dark Brown.

Table 3: Content declaration, which covers the eight LIP products.

LIP Grouts				
Product components		**Weight%**	**Post-consumer material, weight-%**	**Renewable material, weight-%**
Silica Sand		35 - 60	0%	0%
Cement		25 - 30	0%	0%
Dolomite		0 - 30	0%	0%
Additives		1 - 10	0%	0%
Packaging materials		**Weight, kg**	**Weight-% (versus the product)**	
Bags	Paper	12 g/kg (for 5 and 20kg bag) 14.5 g/kg for 20kg bag 0.3312g/kg for 5 kg bag	12 % (for 5 and 20kg bag) 14.5 % for 20kg bag 3.3% for 5 kg bag	

	PE-film	0.5 g/kg product	0.05 %
Transport packaging	PE-film	0.6 g/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 3.8. 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 i.e. cement, dolomite/GCC the supplier of these raw materials were contacted and specific EPD 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 The International EPD® 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 9.5 The connection between impact categories and indicators covered in this study along with the disclaimers for some indicators can be seen in Table 5.

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.

The production energy used in this LCA study, is derived by the total energy consumption at the location of LIP Bygningsartikler A/S divided by the total production volume of all their products . However, there are no co-products, and therefore no allocation between products beside the energy. 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.

Description of system boundaries

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

Table 4: 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			A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Production of commodities, raw materials		Product manufacture														
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	<10%. The potential results of a representative product LIP Grout Dark Brown are declared in this EPD.	-
Variation – sites	Manufactured in one site	-

Figure 2 (system figure) includes a box that includes the specific EPD data, which are used for main raw materials, such as grey cement. For all the other materials, such as for silica sand and chemical additives, the generic processes retrieved from the Ecoinvent database 2021 are used to describe these ingredients in the LIP products. A sensitivity analysis has been conducted in Life Cycle Interpretation section to investigate the potential environmental impacts.

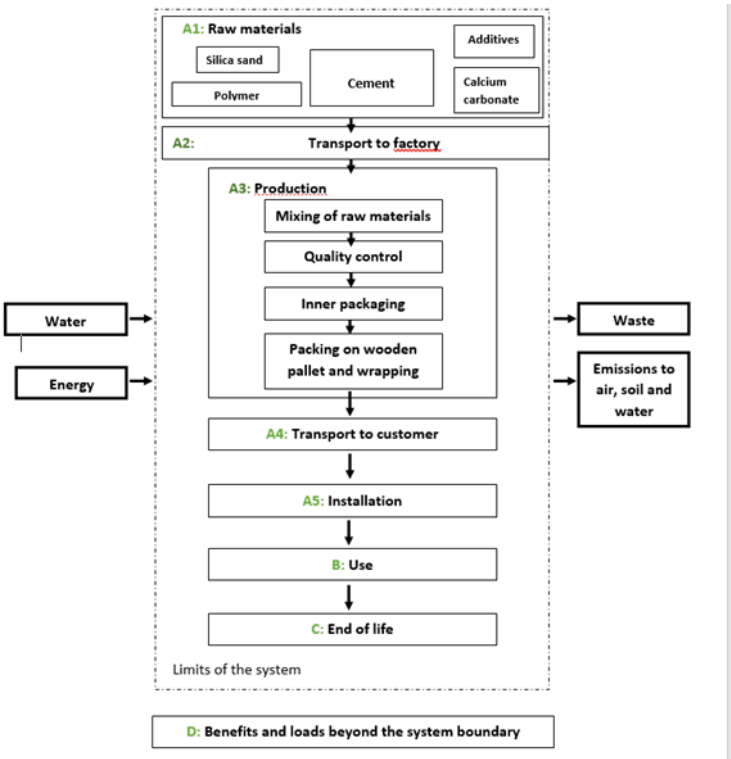

Figure 2: Limits of the system in this study

Product stage (A1-A3):

- A1-A2: extraction, supply and transport of raw materials and packaging to LIP Bygningsartikler A/S. Raw materials are purchased from European suppliers.
- A3: manufacturing process of product and its packaging and waste management from the same process. All the electricity comes 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 Bygningsartikler A/S with the total production volume of all their products. In order to apply economic allocation, the total site revenue and total site electricity were obtained, and the mass allocation percentage was multiplied with the revenue percentage factors in order to receive economic allocation. This step has been applied consistently for all LIP products, including floor screeds, grouts, wall plasters, tile mortars and primers for transparency. Revenue and production figures were provided by LIP and extensive search on the revenue of each LIP product was performed. After applying economic allocation by revenue, approximately 0.305 MJ is used for the production of 1kg LIP Sealing Grout. A3 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. 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 in Denmark, 4 percent in Sweden, 2 percent in Norway and 1 percent in both 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 0.216 MJ/kg. 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: Justification comes from the product sheet: https://lip.dk/produkter/fugning-af-fliser-og-klinker/lip-fugemasse/. 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 service life, if professionally used and properly installed.

End of life stage (C1-C4):

- C1: deconstruction and demolition of the product into the building. Grouts 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 these applications 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 as landfill after end of life, so waste processing is negligible.
- C4: Waste disposal in landfill 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 5: 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

LIP Grout Dark Brown

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 6: Core environmental impact results for the product LIP Grout Dark Brown

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP- total	kg CO_2 eq.	4,59E-01	4,35E-02	2,63E-02	0	4,35E-03	0	5,28E-03	0
GWP-fossil	kg CO_2 eq.	4,63E-01	4,35E-02	1,94E-02	0	4,35E-03	0	5,27E-03	0
GWP-biogenic	kg CO_2 eq.	-3,94E-03	4,34E-05	6,89E-03	0	4,62E-06	0	5,72E-06	0
GWP- luluc	kg CO_2 eq.	2,35E-04	1,63E-05	4,06E-06	0	1,63E-06	0	4,97E-06	0
ODP	kg CFC 11 eq.	3,22E-08	1,08E-08	1,13E-09	0	1,08E-09	0	2,13E-09	0
AP	mol H^+ eq.	2,35E-03	1,39E-04	4,96E-05	0	1,39E-05	0	4,95E-05	0
EP-freshwater	kg P eq.	5,84E-05	2,83E-06	7,25E-06	0	2,83E-07	0	4,82E-07	0
EP- marine	kg N eq.	3,55E-04	3,10E-05	1,45E-05	0	3,10E-06	0	1,72E-05	0
EP-terrestrial	mol N eq.	3,75E-03	3,39E-04	1,19E-04	0	3,39E-05	0	1,88E-04	0
POCP	kg NMVOC eq.	1,53E-03	1,34E-04	3,22E-05	0	1,33E-05	0	5,48E-05	0
ADP-minerals&metals**	kg Sb eq.	3,37E-06	1,04E-07	1,28E-07	0	1,04E-08	0	1,20E-08	0
ADP-fossil**	MJ	4,26E+00	7,08E-01	5,46E-01	0	7,08E-02	0	1,47E-01	0
WDP **	m^3	3,02E+00	2,44E-03	8,14E-04	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 7: Additional environmental impact results for the product LIP Grout Dark Brown

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG	kg CO_2 eq.	4,63E-01	4,35E-02	1,94E-02	0	4,35E-03	0	5,27E-03	0
PM	disease inc.	1,07E-08	5,05E-09	3,19E-10	0	5,05E-10	0	9,97E-10	0
IRP*	kBq U235 eq	1,22E-02	3,58E-03	2,05E-02	0	3,58E-04	0	6,53E-04	0
ETP-fw**	CTUe	2,02E+00	5,53E-01	3,46E-01	0	5,53E-02	0	9,29E-02	0
HTP-c**	CTUh	4,75E-10	1,51E-11	6,56E-12	0	1,51E-12	0	2,36E-12	0
HTP-nc**	CTUh	7,13E-09	5,83E-10	2,21E-10	0	5,83E-11	0	6,15E-11	0
SQP**	Dimensionless	1,44E+00	8,10E-01	5,65E-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 8: Resource use - LIP Grout Dark Brown

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5,96E-01	9,12E-03	3,00E-02	0	9,00E-04	0	1,25E-03	0
PERM	MJ	6,08E-02	0	0	0	0	0	0	0
PERT	MJ	6,57E-01	9,12E-03	3,00E-02	0	9,00E-04	0	1,25E-03	0
PENRE	MJ	2,43E+00	7,52E-01	5,63E-01	0	7,52E-02	0	1,56E-01	0
PENRM	MJ	1,29E-01	0	0	0	0	0	0	0
PENRT	MJ	2,56E+00	7,52E-01	5,63E-01	0	7,52E-02	0	1,56E-01	0
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	m3	4,35E-02	2,45E-03	7,77E-04	0	2,45E-04	0	6,63E-03	0
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 Grouts are non-hazardous building waste. The waste from packing material is also assumed to be non-hazardous waste.

Table 9: Waste - LIP Grout Dark Brown

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	5,02E-03	0	0	0	0	0	0	0
Non-hazardous waste disposed	kg	1,02E-01	0	0	0	0	0	0	0
Radioactive waste disposed	kg	2,99E-05	0	0	0	0	0	0	0

Output flows

Table 10: Output flows - LIP Grout Dark Brown

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	4,50E-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 11: Biogenic Carbon - LIP Grout Dark Brown

	Unit	**Quantity**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	1,66E-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 1100 MWh per year.

Information related to Sector EPD

This is an individual EPD.

Differences versus previous versions

This is the first version of the EPD.

References

Project Report - LIP Grouts, LIP Bygningsartikler A/S, 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 1.2.5
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.
DS/EN 13888 (Grout wall plasters for ceramic tiles - Requirements, conformity assessment, classification and designations).

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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

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-09196
Published:	30-11-2023
Valid until:	30-11-2028

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. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact
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. Accredited by: SWEDAC
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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3rd party verifier(s)	First version: Bureau Veritas Certification Sverige AB Viktor Hakkarainen, Axel Cullberg Fabriksgatan 13, 412 50, Göteborg,Sweden https://www.bureauveritas.se/	BUREAU VERITAS Shaping a World of Trust