

Environmental Product Declaration

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



LK Heat Distribution Plate

LK Systems AB

Programme:	The International EPD [®] System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-08005
Publication date:	2023-02-22
Valid until:	2028-02-22

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

Company information

Owner of the EPD:	LK Systems AB Johannesfredsvägen 7 168 69 Bromma Sweden
Contact:	info@lksystems.se https://www.lksystems.se/
Name and location of production site:	Johanssons Plåt Örnsköldsvik

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 information

Programme:	The International EPD® System
Address:	EPD International AB
	Box 210 60
	SE-100 31 Stockholm
	Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)	
Product category rules (PCR): 2019:14, Construction products (EN 15804:A2) (1.2)	
PCR review was conducted by: Claudia A. Peña, The Technical Committee of the International EPD® System.	
Contact: info@environdec.com	
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	
<input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification	
Third party verifier: Daniel Böckin, PhD	
Miljögiraff AB, daniel@miljogiraff.se	
Approved by: The International EPD® System.	

Company information

LK Systems is the leading manufacturer of easy-to-install systems for heating and tap water distribution in the Nordics. Through our prefabrication factory, we also provide tailor-made solutions that simplify the installation process even further. From idea to final solution, you can be sure of the smartest answers for your everyday challenges, today and tomorrow.

For the simpler, smarter everyday

Simpler. Smarter. More sustainable. At LK, we believe there's a better way to do everything. That's why – from water, heating and hydronic solutions to pipe extrusion – we push for innovation over status quo and simplicity over complexity. It's a belief all of us at LK apply to every product and solution we create

Product information

Heat distribution plate of aluminium for laying between cross battening, for LK Under Floor Heating pipes. The plate can be shortened by snapping across the three break lines. The plates are sold in different dimensions to suit various floor heating systems.

Further information can be found at <https://www.lksystems.se/>

The EPD represents several product versions. The EPD is an average EPD and the declared unit is based on LK Heat Distribution Plate 16/190 The result presented in the EPD has the average result of all products declared and the variations between the products stays within 10% (GWP-GHG). See appendix for total weight of the products included in the EPD.

Product	Product number
Heat Distribution Plate 16/190	2418009
Heat Distribution Plate 20	2418089
Heat Distribution Plate 12	2418680
Heat Distribution Plate 16/280	2988870

LCA information

Functional unit / declared unit	In accordance with EN 15804 + A2 the declared unit is mass 1 kg.
Time representativeness:	2022
Database:	Ecoinvent 3.8. - "allocation cut off by classification" is used throughout the study.
LCA software used:	SimaPro 9.4.0.2
Geographical scope	Production: Sweden Construction site: Sweden
LCA Report	LK Systems AB, Report no. 10

Description of system boundaries:

The scope of the EPD is a cradle to gate with options, including A4, A5, C and D. See Table 1 for the modules declared. The system boundary mean that all processes needed for raw material extraction, transport, manufacturing and disposal are included in the study. Figure 1. gives an overview of the included processes.

Table 1, Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

	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
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D					
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	X	X	X	X	
Geography	SE	SE	SE	SE	SE								SE	SE	SE	SE		SE	SE	SE	SE	
Specific data used	24%					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Variation – sites	0%					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
X = Modules included in the analysis ND = Module not declared O= Optional modules																						

Content information

Table 2, shows the weight for the raw material of the declared product.

Product components	Weight, kg	Pre-consumer material, weight-%	Post-consumer material, weight-%	Renewable material, weight-%
Aluminium	0,985	73	27	0
Adhesive strip	0,015	0	0	0
TOTAL	1	73	27	0

Packaging materials	Weight, kg	Weight-% (versus the product)
Cardboard box	0,110	11
Plastic	0,001	0,1
Pallet	0,001	0,1
TOTAL	0,112	11,2

Declared product contains no dangerous substances from the candidate list of SVHC for Authorization.

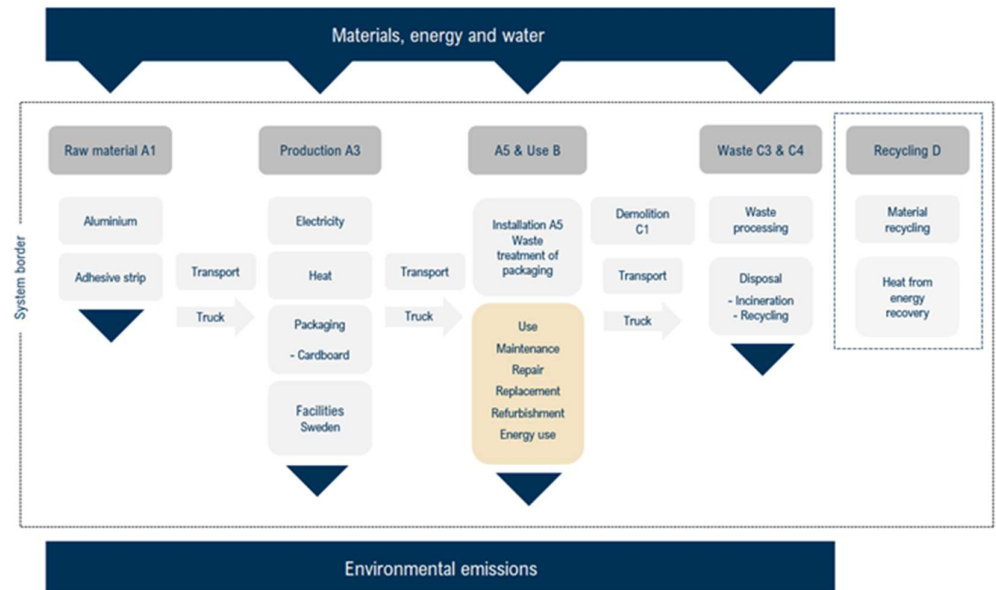


Figure 1, overview of the included processes. Light gray represents modules included, yellow represent models not declared.



Product life-cycle

Raw material supply, transport, manufacturing and packaging (A1-A3)

The aluminium that accounts for 98,5% of the product is produced in Sweden. The adhesive strip accounts for the rest of the product and generic global market data is used. The aluminium that is used is 100% recycled with 73% pre-consumer and 27% post-consumer waste.

Manufacturing takes place in Sweden and includes manufacturing of the different components used for the final product and the process to assemble the product. After the manufacturing of the product is completed it is packed in cardboard box, which is then stacked on a pallet.

See figure 2 below for the process flow step by step.



Figure 2, Production process flow.

Transport & installation (A4-A5)

Transportation impacts represent the transport from the final product's delivery to the construction site. The transport distance is based on average distance. The transportation is performed by truck with fuel. It is assumed that there are no environmental aspects during installation of the product, except the waste management of packaging after installation.

Product end of life (C1-C4, D)

The product end of life (C1) is assumed that there are no environmental aspects during demolition of the product. Aluminium is a fully recyclable material and has a strong market position, therefore assumptions has been made that the product will end up in material recycling at 95% (SGU ,2022) when the building, where the product is installed, is demolished and that the adhesive strip end up in combustible waste afterwards.

The cardboard box is assumed to be material recycling. The aluminium that does not end up in recycling go to combustible waste. The product is assumed to be sent to the nearest waste facility. The benefits in the resource recovery stage will be mostly material recycling and a smaller part energy recovery.

Cut-off rules

Life cycle inventory data shall according to EN 15804 include a minimum of 95% of total inflows (mass and energy) per module. In addition, if less than 100% of the inflows are accounted for, proxy data or extrapolation should be used to achieve 100% completeness.

Background data

The data quality of the background data is considered good. All specific data that includes processes, volume of different materials, energy usage and transport distance has been collected by questionnaire and personal contact with the manufacturer. Ecoinvent database has been used. Ecoinvent is the world's biggest LCI data library and contains data for the specific geographical regions relevant for this study, which have been analysed to be the most suitable for the various steps in the process. Information on biogenic carbon content is calculated with the formula from EN 350-2 and information from IVL. Collected data represent average yearly data for 2022 and assumed to be representative for the EPDs period of validity of 5 years.

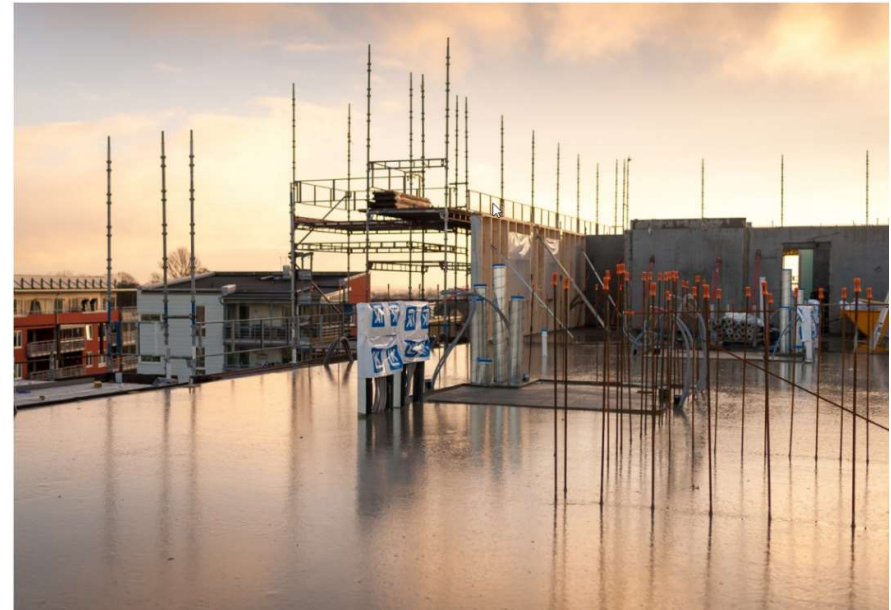
Electricity data

The electricity used is a modulated mix from "Vattenfall" in Sweden (2021), where 54% is renewable primary energy and 46% is nuclear. The electricity in A3 accounts for less than 30% of the total energy use in stage A1-A3.

Allocation and assumptions

The declare unit values for 1 kg of product that is used in this study and is calculated, based on the total product weight produced during the year studied. The content of raw material can vary slightly between the different dimensions of the product and are examined with high accuracy that they variation of GWP-GHG stays within 10%. Data is allocated for the energy use of the declared unit. The allocation is based on production rate with complexity and high accuracy. The raw material necessary for the manufacturing and the amount of packaging is allocated to product, based on the amount of material used to manufacture the declare unit, including waste. Allocation is made with complexity and high accuracy. The declared unit is based on LK Heat Distribution Plate 16/190. The variance of the declared products is less than 10%, that is based according to data quality requirements outlined in PCR 2019:14.

The used product is assumed to be transported 50 km to the nearest waste disposal facility. The waste treatment assumption has resulted in that the product will get material recycle as metal. The waste treatment builds and presupposes that the product is installed in the building and that it is de-construct when the building demolished. The product is assumed to be material recycled at 95% and the cardboard box is assumed to be material recycled at 78%. The plastic part in the product and in the packaging are assumed to be incinerated with energy recovery efficiency at 61%.



Recycling of packaging and product

Within the framework of producer responsibility, LK are affiliated with FTI, the Packaging and Newspaper Collection, which is the business community's collection system for recycling packaging. Packaging shall be recycled as carton and plastic. None of the packaging material are classified as hazardous waste. The product shall be material recycled as metal.

Environmental information

Potential environmental impact – mandatory indicators according to EN 15804.

Results of declared unit of the study.

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	9,42E-01	1,72E-01	2,44E-03	0	6,56E-03	5,73E-04	8,13E-04	-6,94E-02
GWP-biogenic	kg CO2 eq.	-2,32E-02	1,55E-04	3,82E-02	0	6,41E-06	4,70E-06	9,94E-04	8,79E-03
GWP-luluc	kg CO2 eq.	2,94E-03	6,75E-05	5,10E-07	0	2,67E-06	6,90E-07	2,89E-07	-7,69E-04
GWP-total	kg CO2 eq.	9,22E-01	1,72E-01	4,07E-02	0	6,57E-03	5,78E-04	1,81E-03	-6,14E-02
ODP	kg CFC 11 eq.	1,02E-07	3,98E-08	3,07E-10	0	1,54E-09	2,35E-10	1,88E-10	-1,66E-08
AP	mol H+ eq.	4,75E-03	6,98E-04	1,38E-05	0	3,72E-05	6,46E-06	8,56E-06	-6,40E-04
EP-freshwater	kg PO43- eq	1,12E-03	3,40E-05	4,22E-07	0	1,36E-06	6,03E-07	4,66E-07	-1,32E-04
EP-freshwater	kg P eq.	3,65E-04	1,11E-05	1,37E-07	0	4,43E-07	1,96E-07	1,52E-07	-4,28E-05
EP-marine	kg N eq.	1,16E-03	2,10E-04	6,29E-06	0	1,35E-05	2,42E-06	4,66E-06	-2,65E-04
EP-terrestrial	mol N eq.	1,13E-02	2,30E-03	6,10E-05	0	1,47E-04	2,74E-05	3,97E-05	-1,95E-03
POCP	kg NMVOC eq.	3,12E-03	7,03E-04	1,61E-05	0	4,21E-05	7,31E-06	1,05E-05	-4,30E-04
ADP-minerals&metals ²	kg Sb eq.	9,40E-05	5,98E-07	4,53E-09	0	2,20E-08	5,69E-09	2,58E-09	-2,28E-06
ADP-fossil ²	MJ	1,32E+01	2,60E+00	2,00E-02	0	1,01E-01	6,76E-03	1,50E-02	-1,62E+00
WDP ²	m3	1,04E+00	7,78E-03	2,13E-04	0	3,32E-04	4,13E-04	1,37E-04	-3,82E-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 in 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

Potential environmental impact – additional mandatory indicators according to EN 15804.

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	disease inc.	4,68E-08	1,48E-08	8,51E-10	0	7,26E-10	5,46E-11	1,52E-10	-8,86E-09
Ionising radiation ¹	kBq U-235 eq	1,21E-01	1,34E-02	9,85E-05	0	5,21E-04	5,56E-05	6,46E-05	-1,24E-02
Ecotoxicity, freshwater ²	CTUe	4,53E+01	2,03E+00	6,32E-02	0	8,00E-02	1,12E-02	3,38E-01	-3,73E+00
Human toxicity, cancer ²	CTUh	1,32E-09	6,57E-11	2,14E-12	0	3,19E-12	4,56E-12	3,71E-12	-6,40E-11
Human toxicity, non-cancer ²	CTUh	3,64E-08	2,13E-09	8,20E-11	0	9,23E-11	9,65E-12	7,57E-11	-1,57E-09
Land use ²	Pt	1,09E+01	1,79E+00	1,18E-02	0	8,62E-02	1,92E-03	1,96E-02	-5,95E+00

Disclaimer 1 – 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 2 – 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.

Climate impact IPCC 2013 GWP 100

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq.	9,43E-01	1,71E-01	2,40E-03	0	6,51E-03	5,64E-04	7,96E-04	-7,35E-02

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

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,09E+00	3,66E-02	4,49E-04	0	1,45E-03	6,27E-04	3,58E-04	-1,32E+00
PERM	MJ	1,60E+00	0	0	0	0	0	0	0
PERT	MJ	3,69E+00	3,66E-02	4,49E-04	0	1,45E-03	6,27E-04	3,58E-04	-1,32E+00
PENRE	MJ	1,42E+01	2,76E+00	2,13E-02	0	1,07E-01	7,22E-03	1,60E-02	-1,74E+00
PENRM	MJ	0	0	0	0	0	0	0	0
PENRT	MJ	1,42E+01	2,76E+00	2,13E-02	0	1,07E-01	7,22E-03	1,60E-02	-1,74E+00
SM	kg	9,96E-01	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	5,76E-01	4,35E-04	4,33E-05	0	1,87E-05	1,92E-05	1,21E-05	-2,70E-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 and output flows

Waste production

Indicator	Unit	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	0	0	0	0	0	0
Non-hazardous waste disposed	kg	0	0	0	0	0	0	0	0
Radioactive waste disposed	kg	0	0	0	0	0	0	0	0

Note: Ecoinvent database include all waste treatment processes within the system boundaries, i.e. there are no waste flows exiting the system boundaries and the waste indicators to be declared are therefore zero.

Output flows

Indicator	Unit	Tot.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	0	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

Results per functional or declared unit

BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	3,23E-2

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Additional information

Product	Product number	Weight (kg)	Weight with packaging (kg)
Heat Distribution Plate 16/190	2418009	0,31	0,34
Heat Distribution Plate 20	2418089	0,33	0,36
Heat Distribution Plate 12	2418680	0,22	0,25
Heat Distribution Plate 16/280	2988870	0,42	0,45

References

General Programme Instructions of the International EPD® System. Version 4.0.

PCR Construction Products. 2019:14, version 1.2.5, the International EPD System, Date 2022-11-01.

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

EN ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures, Edited in 2010

EN ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework, 2006.

EN ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines, 2006.

PRé Consultants, "SimaPro 9.4.0.2" (PRé Consultants, 2019), <http://www.pre-sustainability.com/simapro>

Ecoinvent, 'Ecoinvent' <<https://www.ecoinvent.org/database/database.html>

Eriksson, E. et al., (2010) Carbon Footprint of Cartons in Europe – Carbon Footprint methodology and biogenic carbon sequestration, IVL.
[Carbon footprint of cartons in Europe – Carbon Footprint methodology and biogenic carbon sequestration \(ivl.se\)](#)

EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>

Electricity Mix Vattenfall 2021 (2022-12-30)
<https://www.vattenfall.se/elavtal/energikallor/elens-ursprung/>

Material recycling <https://www.sgu.se> (2022-08-22) <https://www.sgu.se>
(SGU – Stål- och metallindustriavfall & SGU – Metall- och mineralåtervinning)

Energy content for Aluminium: Metallkompetens (2022-12-30)
<https://metallkompetens.se/handbok/om-aluminium/energi-och-miljo/energiutvinning/>

Material recycling paper: Fråne, A. et al., (2021) Sveriges återvinning av förpackningar och tidningar, Naturvårdsverket.
https://www.naturvardsverket.se/contentassets/568ba7678ce94e25b99cfc1b02ad7e2a/forpackningsrapport_2020_211027.pdf