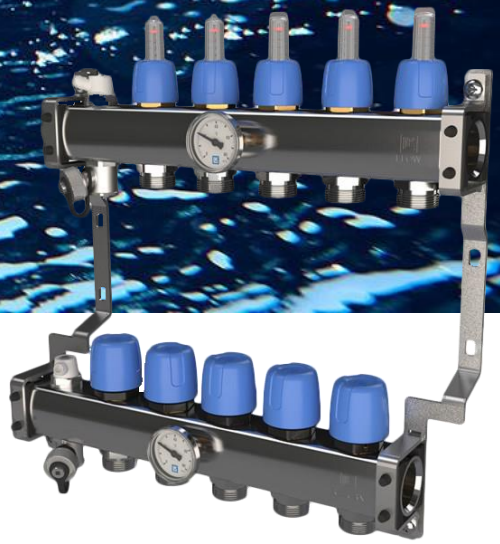
Environmental Product Declaration

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



LK Manifold RF 1-12 circuits

LK Systems AB

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-07218
Publication date:	2022-12-02
Valid until:	2027-12-02

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/
Location of production site:	China

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

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

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) (1.11)

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:

☐ EPD process certification ☒ EPD verification

Third party verifier: Daniel Böckin, PhD, under guidance of Pär Lindman, 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

LK Manifold RF products are primarily intended to simplify heating systems. LK Manifold RF is made of stainless steel, the variants having 1 to 12 floor heating circuits. The manifold is delivered pre-mounted in brackets. The manifold has thermometers on the supply and return, manual air-bleed valves and filling/drain valves*.
(*Manifold RF 1 is supplied without thermometer or filling/drain valve)

The EPD represents several product versions. The EPD is an average EPD and the declared unit is based on LK Manifold RF with 2 circuits. 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.

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

Product	No. of circuits	Product number
LK Manifold RF	1	2410258
	2	2419350
	3	2419351
	4	2419352
	5	2419353
	6	2419354
	7	2419355
	8	2419357
	9	2419358
	10	2419359
	11	2419360
	12	2419361

LCA information

Functional unit / declared unit	In accordance with EN 15804 + A2 the declared unit is mass 1 kg.
Time representativeness:	2021
Database:	Ecoinvent 3.8. - "allocation cut off by classification" is used throughout the study.
LCA software used:	SimaPro 9.4.0.2
Geographical scope	Global Production: China Construction site: Sweden
LCA Report	LK Systems AB, Report no. 7

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
Geog-raphy	CN	CN	CN	GLO	SE								SE	SE	SE	SE	SE
Specific data used	Specific data 25% Partly specific 48%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	-					-	-	-	-	-	-	-	-	-	-	-	-

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	Post-consumer material, weight-%	Renewable material, weight-%
Brass	0,383	80	0
Steel	0,509	0	0
Rubber	0,038	0	0
Plastic	0,0389	0	0
Glass fibre	0,031	0	0
Ferronickel	0,0001	0	0
TOTAL	1	31	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Cardboard box	0,42	42	
TOTAL	0,42	42	

Declared product contains dangerous substances, lead, from the candidate list of SVHC for Authorisation. The content of lead is ≤0,9%.

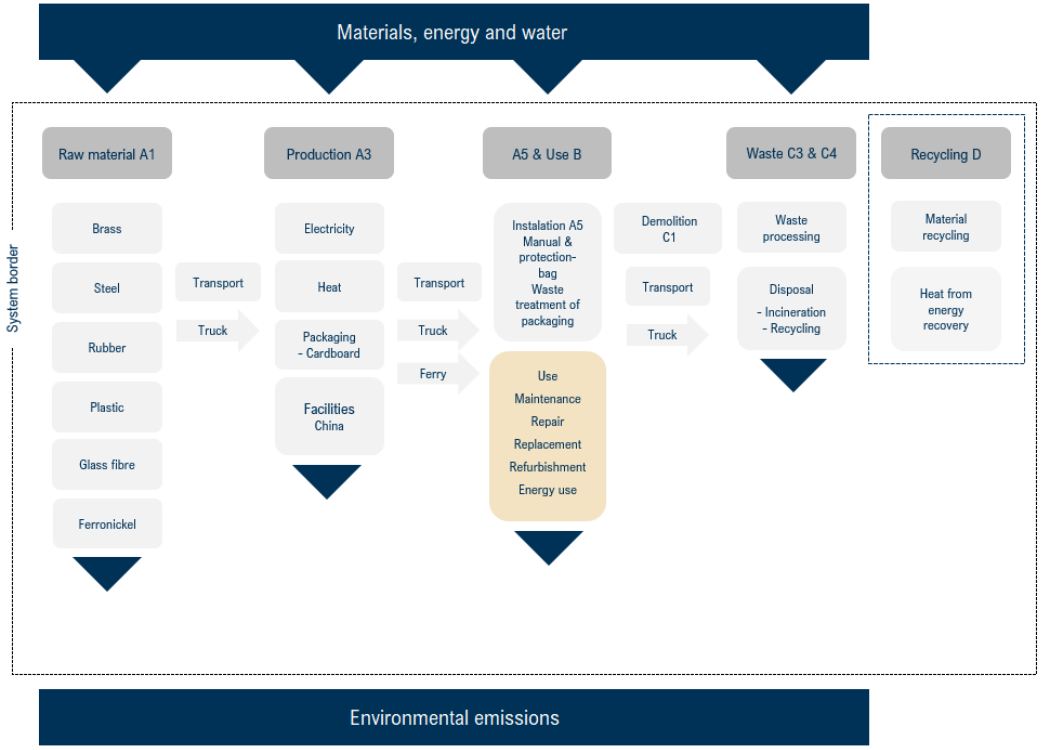


Figure 1, overview of the included processes. Light gray represents modules included, yellow represent models not declared.

Product life-cycle

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

The raw materials that are included and calculated in the EPD are the material content for the product and the packaging materials for the raw materials.

Manufacturing takes place in China 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 and pressure tested, it is packed in cardboard box, which is then stacked on a pallet.

Energy consumption for manufacturing was estimated by dividing the company's annual energy consumption by the average number products produced annually.

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 and ferry. It is assumed that there are no environmental aspects during installation of the product, except the manual and protection bag that is used during installation and 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 installation of the product. Brass and steel are fully recyclable materials and has a strong market position, therefore assumptions have taken that the product will end up in material recycling at 95% when the building, where the product is installed, is demolished and that the plastic parts end up in combustible waste afterwards. For the packaging, it has been assumed that the cardboard box is material recycled at 78%. The finished products are packed on a wooden pallet with packaging film. It has been assumed that the wooden pallet is reused and that the plastic ends up in combustible waste with energy recovery efficiency at 61%. The product 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 & water 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 2021 and assumed to be representative for the EPDs period of validity of 5 years.

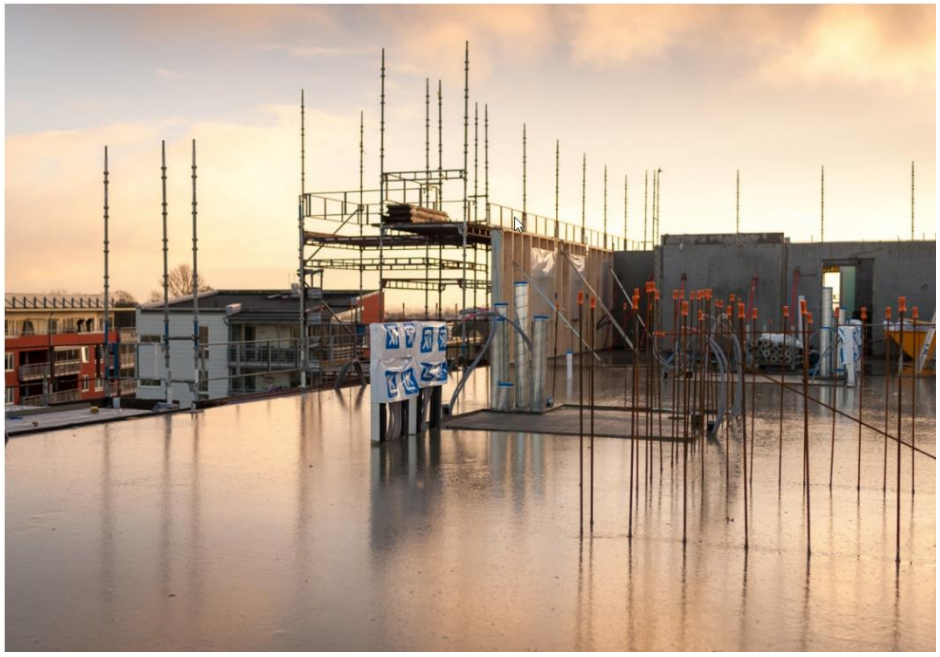
Electricity data

The electricity consumption in the A3 module accounts for less than 30% of the total energy use in module A1-A3. The electricity used is an electricity mix from China, used by Ecoinvent 3.8.

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 the LK Manifold RF with 2 floor heating circuits. 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 recycle as carton and plastic. None of the packaging material are classified as hazardous waste. The product shall be material recycled as metal.

EPD®
THE INTERNATIONAL EPD® SYSTEM

Environmental information

Potential environmental impact – mandatory indicators according to EN 15804.
Results of declared unit of the study.

Results per declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	3,17E+00	6,81E-02	9,12E-01	4,15E+00	3,78E-01	1,12E-01	0	6,56E-03	3,67E-03	5,96E-06	-2,46E+00
GWP-biogenic	kg CO2 eq.	1,35E-02	3,99E-05	-1,14E-01	-1,00E-01	7,46E-05	-2,54E-02	0	6,41E-06	3,01E-05	3,70E-08	8,46E-02
GWP-luluc	kg CO2 eq.	3,24E-03	2,78E-05	2,69E-03	5,96E-03	2,37E-04	5,07E-04	0	2,67E-06	4,42E-06	2,07E-09	-5,82E-03
GWP-total	kg CO2 eq.	3,18E+00	6,82E-02	8,00E-01	4,05E+00	3,78E-01	8,75E-02	0	6,57E-03	3,71E-03	6,00E-06	-2,38E+00
ODP	kg CFC 11 eq.	1,92E-07	1,50E-08	4,17E-08	2,48E-07	7,85E-08	5,60E-09	0	1,54E-09	1,51E-09	2,74E-12	-1,51E-07
AP	mol H+ eq.	4,14E-02	2,82E-04	4,72E-03	4,64E-02	8,98E-03	4,80E-04	0	3,72E-05	4,14E-05	4,75E-08	-3,79E-02
EP-freshwater	kg PO_4^{3-} eq.	9,45E-03	1,57E-05	7,79E-04	1,02E-02	4,97E-05	8,04E-05	0	1,36E-06	3,86E-06	1,03E-07	-8,90E-03
EP-freshwater	kg P eq.	3,08E-03	5,12E-06	2,54E-04	3,34E-03	1,62E-05	2,62E-05	0	4,43E-07	1,26E-06	3,37E-08	-2,90E-03
EP-marine	kg N eq.	4,23E-03	8,31E-05	1,62E-03	5,93E-03	2,24E-03	1,08E-04	0	1,35E-05	1,55E-05	6,49E-06	-4,27E-03
EP-terrestrial	mol N eq.	4,71E-02	9,08E-04	1,24E-02	6,04E-02	2,48E-02	1,11E-03	0	1,47E-04	1,75E-04	1,82E-07	-4,50E-02
POCP	kg NMVOC eq.	1,54E-02	2,76E-04	2,98E-03	1,87E-02	6,50E-03	3,37E-04	0	4,21E-05	4,68E-05	5,31E-08	-1,33E-02
ADP-minerals&metals[2]	kg Sb eq.	7,34E-04	2,32E-07	3,46E-06	7,38E-04	7,59E-07	3,75E-07	0	2,20E-08	3,65E-08	1,77E-11	-6,95E-04
ADP-fossil[2]	MJ	3,91E+01	1,00E+00	9,53E+00	4,96E+01	5,09E+00	1,55E+00	0	1,01E-01	4,33E-02	1,83E-04	-3,05E+01
WDP[2]	m3	1,73E+00	3,47E-03	1,96E-01	1,93E+00	1,11E-02	5,63E-02	0	3,32E-04	2,65E-03	6,64E-07	-1,22E+00

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

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

Results per declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter	disease inc.	2,69E-07	5,80E-09	7,62E-08	3,51E-07	1,81E-08	8,40E-09	0	0,00E+00	7,26E-10	3,50E-10	9,57E-13
Ionnising radiation[1]	kBq U-235 eq	2,11E-01	4,58E-03	2,70E-02	2,42E-01	2,39E-02	6,22E-03	0	0,00E+00	5,21E-04	3,56E-04	9,09E-07
Ecotoxicity, freshwater[2]	CTUe	3,26E+02	8,74E-01	3,16E+01	3,59E+02	3,43E+00	2,41E+00	0	0,00E+00	8,00E-02	7,19E-02	5,30E-01
Human toxicity, cancer[2]	CTUh	4,28E-08	2,56E-11	4,47E-10	4,33E-08	2,02E-10	4,41E-11	0	0,00E+00	3,19E-12	2,92E-11	1,58E-11
Human toxicity, non-cancer[2]	CTUh	4,28E-07	8,41E-10	1,15E-08	4,40E-07	2,76E-09	1,09E-09	0	0,00E+00	9,23E-11	6,19E-11	3,30E-10
Land use[2]	Pt	2,07E+01	6,82E-01	1,71E+01	3,84E+01	1,64E+00	2,59E+00	0	0,00E+00	8,62E-02	1,23E-02	6,37E-04

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

Results per declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq.	3,09E+00	6,76E-02	9,21E-01	4,08E+00	3,75E-01	1,11E-01	0	6,51E-03	3,61E-03	5,89E-06	-2,44E+00

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

Results per declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	5,97E+00	1,16E-02	3,72E+00	9,70E+00	4,65E-02	4,88E-01	0	1,45E-03	4,02E-03	5,78E-06	-9,57E+00
PERM	MJ	0	0	6,09E+00	6,09E+00	0,	0	0	0	0	0	0
PERT	MJ	5,97E+00	1,16E-02	9,81E+00	1,58E+01	4,65E-02	4,88E-01	0	1,45E-03	4,02E-03	5,78E-06	-9,57E+00
PENRE	MJ	4,16E+01	1,07E+00	1,02E+01	5,29E+01	5,41E+00	1,66E+00	0	1,07E-01	4,63E-02	1,94E-04	-3,25E+01
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	4,16E+01	1,07E+00	1,02E+01	5,29E+01	5,41E+00	1,66E+00	0	1,07E-01	4,63E-02	1,94E-04	-3,25E+01
SM	kg	3,06E-01	0	2,80E-04	3,06E-01	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m3	3,32E-02	1,73E-04	1,35E-02	4,69E-02	6,07E-04	7,84E-04	0	1,87E-05	1,23E-04	1,94E-07	-3,75E-02

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-re- newable 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

Results per declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	0	0	0	0	0	0	0	0	0
Non-hazardous waste disposed	kg	0	0	0	0	0	0	0	0	0	0	0
Radioactive waste disposed	kg	0	0	0	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

Results declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0	0
Material for recycling	kg	0	0	0	0	0	0	0	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	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	1,23E-01

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

Additional information - declared products

Product	No. of circuits	Product number	Weight (kg)	Weight with packaging (kg)
LK Manifold RF	1	2410258	0,92	1,44
	2	2419350	1,64	2,56
	3	2419351	2,03	2,95
	4	2419352	2,41	3,33
	5	2419353	2,80	4,02
	6	2419354	3,18	4,41
	7	2419355	3,57	4,79
	8	2419357	3,96	5,48
	9	2419358	4,34	5,86
	10	2419359	4,72	6,24
	11	2419360	5,11	6,73
	12	2419361	5,49	7,11

References

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