Environmental Product Declaration

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

LK PushFit Fittings and Manifolds

LK Systems AB

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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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
Product-related or management system-related certifications:	TG 1131

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 PushFit products are primarily intended for heating, water, and cooling systems and must not be used for gas distribution systems. All LK PushFit parts that come into contact with water are manufactured from dezincification-resistant brass.

LK PushFit fittings are type-approved for all LK Universal PE-X and PAL pipes dim. 16-25. LK PushFit fittings are only suitable for use with LK PE-X Universal and LK PAL Universal pipe. The designation AX means that the fitting is suitable for both LK Universal PE-X and PAL pipes.

The EPD represents several product versions. The EPD is an average EPD and the declared unit is based on LK Ball Valve. The result presented in the EPD has the highest result of all products declared and the variations between the products stays within 10% (GWP-GHG). See additional information for total weight of the products included in the EPD.

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

Product name	**Product number**
LK PushFit AX Straight fitting	1882448; 1882449; 1882450; 1882451; 1882452
LK PushFit AX Straight fitting male	1882453; 1882454; 1882455; 1882456; 1882457; 1882458; 1882459; 1882460
LK PushFit AX Straight fitting female	1882461; 1882462; 1882463; 1882464; 1882465; 1882466; 1882467
LK PushFit AX Straight fitting with loose nut	1882468; 1882469; 1882470
LK PushFit AX Elbow fitting 90°	1882471; 1882472; 1882473
LK PushFit AX Elbow fitting 90° male	1882474; 1882475; 1882476; 1882477
LK PushFit AX Elbow fitting 90° female	1882478; 1882479; 1882480; 1882481
LK PushFit AX Elbow fitting 90° with loose nut	1882482; 1882483; 1882484
LK PushFit AX T-piece	1882485; 1882486; 1882487; 1882488; 1882489; 1882490
LK PushFit AX T-piece female	1882491; 1882492; 1882493
LK PushFit AX Cap	1882494; 1882495; 1882496
LK PushFit AX Connection	1882526; 1882527; 1882528; 1882529
LK PushFit AX Straight Fitting AX16xCu10	1882530
LK Ball Valve UNI PushFit AX16xCu10	1882551
LK Ball Valve UNI PushFit AX16	1882395
LK PushFit AX Wall Elbow	1882497
LK Pushfit AX Plug 16 mm	1882498
LK Pushfit Connection PV	2410317
Product name	**Product number**
LK Manifold UNI PushFit AX	1882499; 1882500; 1882501; 1882523; 1882524; 1882525
LK Manifold UNI PushFit AX Valve	1882502; 1882503

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. 6

Description of system boundaries:

The scope of the EPD is a cradle to gate with options, including A4, 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			Construc-tion 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	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geog-raphy	CN	CN	CN	GLO									SE	SE	SE	SE	SE
Specific data used	Specific data 28% Partly specific 62%					-	-	-	-	-	-	-	-	-	-	-	-
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	0,9107	70	0
Steel	0,0054	85	0
Rubber	0,0042	0	0
Plastic	0,0139	0	0
Glass fibre	0,0119	0	0
Aluminium alloy	0,0539	0	0
TOTAL	1	64,1	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Cardboard box	0,032	3,2	
Wood	0,027	2,7	
Plastic	0,006	0,6	
TOTAL	0,065	6,5	

Declared product contains dangerous substances, lead, from the candidate list of SVHC for Authorisation. The content of lead is ≤1,5%.

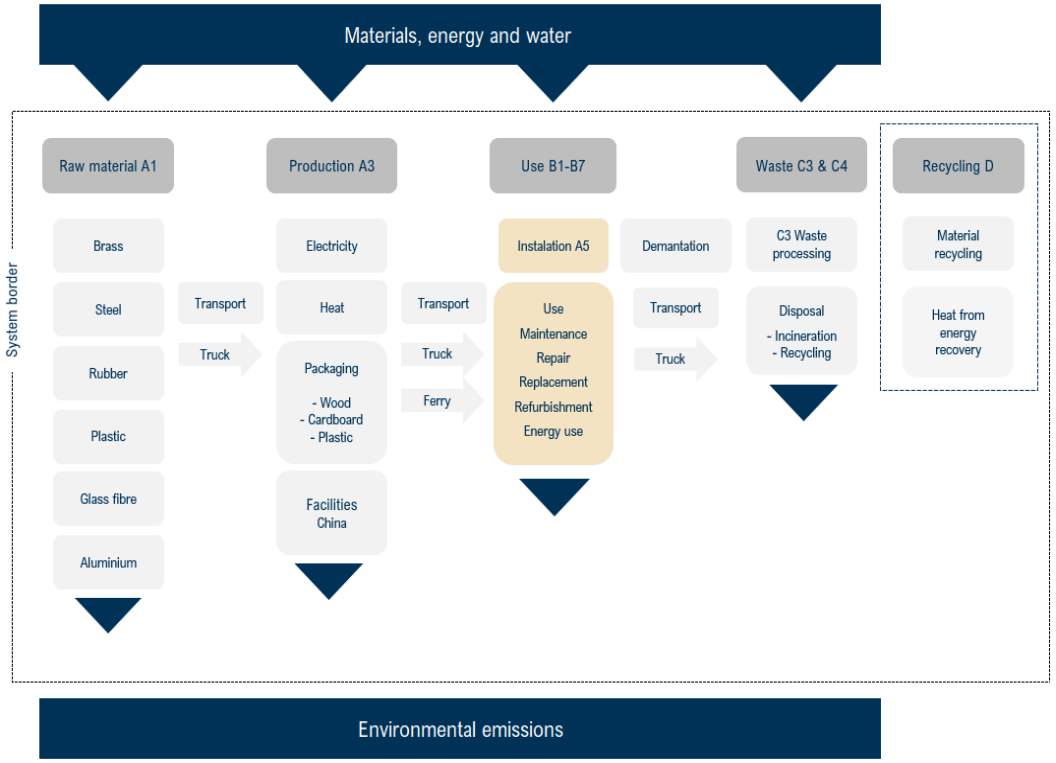


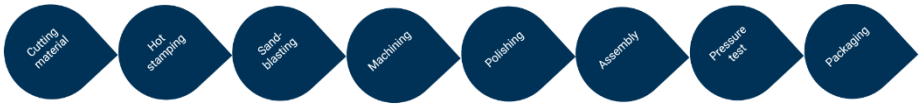
Figure 1, overview of the included processes. Light gray represents modules included, yellow represent models not declared.

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.

The Pushfit consist mostly of brass and smaller parts of steel, rubber, plastic, glass fibre and aluminium alloy. The brass deliverers in bars that are cut in a machine and then hot stamped to the right shape. After the correct shape is made, the product is sandblasted to smooth the surface. When the shape of the product is completed, it is machining and then polished. When the polishing of the brass is completed, the other components are assembled to the final 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.



Transport (A4)

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.

Product end of life (C1-C4, D)

The product end of life (C1) is assumed zero since the installation takes place behind the walls and takes down by hand. 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 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 coardbox is material recycled and that the plastic ends up in combustible waste. 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. Transport of waste packaging to waste treatment has excluded from the study, since it is outside the system boundary (A5).

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 Ball Valve UNI PushFit AX16. 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 and the cardboard box are assumed to be material recycled at 95%. 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.

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	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	2,27E+00	6,65E-02	7,85E-01	3,12E+00	3,94E-01	*0*	6,56E-03	8,12E-04	1,15E-06	-1,37E+00
GWP-biogenic	kg CO2 eq.	-2,57E-02	3,89E-05	-1,25E-02	-3,81E-02	7,79E-05	*0*	6,41E-06	5,84E-06	7,13E-09	-7,46E-03
GWP-luluc	kg CO2 eq.	5,33E-03	2,71E-05	3,15E-04	5,67E-03	2,47E-04	*0*	2,67E-06	8,61E-07	3,99E-10	-3,37E-03
GWP-total	kg CO2 eq.	2,25E+00	6,66E-02	7,72E-01	3,09E+00	3,95E-01	*0*	6,57E-03	8,19E-04	1,16E-06	-1,38E+00
ODP	kg CFC 11 eq.	1,55E-07	1,47E-08	2,83E-08	1,98E-07	8,20E-08	*0*	1,54E-09	3,13E-10	5,27E-13	-8,38E-08
AP	mol H+ eq.	1,05E-01	2,75E-04	3,47E-03	1,08E-01	9,38E-03	*0*	3,72E-05	9,07E-06	9,15E-09	-9,47E-02
EP-freshwater	kg PO_4^{3-} eq.	2,52E-02	1,53E-05	4,01E-04	2,56E-02	5,19E-05	*0*	1,36E-06	7,54E-07	1,99E-08	-2,32E-02
EP-freshwater	kg P eq.	8,22E-03	5,00E-06	1,31E-04	8,35E-03	1,69E-05	*0*	4,43E-07	2,46E-07	6,48E-09	-7,56E-03
EP-marine	kg N eq.	6,32E-03	8,12E-05	7,83E-04	7,19E-03	2,34E-03	*0*	1,35E-05	3,47E-06	1,25E-06	-5,07E-03
EP-terrestrial	mol N eq.	8,08E-02	8,86E-04	7,97E-03	8,97E-02	2,59E-02	*0*	1,47E-04	3,91E-05	3,50E-08	-6,84E-02
POCP	kg NMVOC eq.	2,28E-02	2,70E-04	2,13E-03	2,52E-02	6,79E-03	*0*	4,21E-05	1,05E-05	1,02E-08	-1,87E-02
ADP-minerals&metals[2]	kg Sb eq.	2,51E-03	2,27E-07	2,18E-06	2,51E-03	7,93E-07	*0*	2,20E-08	7,08E-09	3,40E-12	-2,37E-03
ADP-fossil[2]	MJ	2,82E+01	9,81E-01	8,33E+00	3,75E+01	5,32E+00	*0*	1,01E-01	9,78E-03	3,53E-05	-1,78E+01
WDP[2]	m3	2,11E+00	3,39E-03	8,85E-02	2,21E+00	1,16E-02	*0*	3,32E-04	5,12E-04	1,28E-07	-1,72E+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	C1	C2	C3	C4	D
Particulate matter	disease inc.	3,20E-07	5,66E-09	4,75E-08	3,73E-07	1,89E-08	*0*	7,26E-10	3,35E-10	1,84E-13	-2,20E-07
Ionnising radiation[1]	kBq U-235 eq	2,33E-01	4,47E-03	1,37E-02	2,51E-01	2,50E-02	*0*	5,21E-04	7,51E-05	1,75E-07	-1,85E-01
Ecotoxicity, freshwater[2]	CTUe	8,57E+02	8,53E-01	1,72E+01	8,75E+02	3,59E+00	*0*	8,00E-02	1,47E-02	1,02E-01	-7,91E+02
Human toxicity, cancer[2]	CTUh	2,01E-08	2,50E-11	2,05E-10	2,04E-08	2,11E-10	*0*	3,19E-12	5,66E-12	3,04E-12	-1,81E-08
Human toxicity, non-cancer[2]	CTUh	1,37E-06	8,21E-10	7,48E-09	1,38E-06	2,89E-09	*0*	9,23E-11	1,25E-11	6,35E-11	-1,27E-06
Land use[2]	Pt	4,02E+01	6,66E-01	2,57E+00	4,34E+01	1,72E+00	*0*	8,62E-02	2,55E-03	1,23E-04	-3,32E+01

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	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq.	2,24E+00	6,60E-02	7,64E-01	3,07E+00	3,92E-01	0	6,51E-03	8,00E-04	1,13E-06	-1,35E+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	C1	C2	C3	C4	D
PERE	MJ	6,39E+00	1,13E-02	8,19E-01	7,22E+00	4,86E-02	0	1,45E-03	7,82E-04	1,11E-06	-4,82E+00
PERM	MJ	0	0	7,19E-01	7,19E-01	0	0	0	0	0	0
PERT	MJ	6,39E+00	1,13E-02	1,54E+00	7,94E+00	4,86E-02	0	1,45E-03	7,82E-04	1,11E-06	-4,82E+00
PENRE	MJ	3,00E+01	1,04E+00	8,91E+00	4,00E+01	5,65E+00	0	1,07E-01	1,04E-02	3,74E-05	-1,90E+01
PENRM	MJ	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	3,00E+01	1,04E+00	8,91E+00	4,00E+01	5,65E+00	0	1,07E-01	1,04E-02	3,74E-05	-1,90E+01
SM	kg	6,41E-01	0	0	6,41E-01	*0*	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m3	6,95E-02	1,68E-04	3,09E-03	7,28E-02	6,29E-04	0	1,84E-05	2,33E-05	3,88E-09	-5,92E-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-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

Results per declared unit

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	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
Radioactive waste disposed	kg	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	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0
Material for recycling	kg	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
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	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	0,02

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

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Additional information - declared products

Product name	Product number	Weight (kg)
LK PushFit AX Straight fitting	1882448	0,061
	1882449	0,1
	1882450	0,154
	1882451	0,083
	1882452	0,13
LK PushFit AX Straight fitting male	1882453	0,064
	1882454	0,088
	1882455	0,082
	1882456	0,111
	1882457	0,148
	1882458	0,119
	1882459	0,124
	1882460	0,171
LK PushFit AX Straight fitting female	1882461	0,06
	1882462	0,077
	1882463	0,078
	1882464	0,102
	1882465	0,106
	1882466	0,114
	1882467	0,145
LK PushFit AX Straight fitting with loose nut	1882468	0,07
	1882469	0,095
	1882470	0,142
LK PushFit AX Elbow fitting 90°	1882471	0,076
	1882472	0,124
	1882473	0,194
LK PushFit AX Elbow fitting 90° male	1882474	0,087
	1882475	0,109
	1882476	0,139
	1882477	0,196
LK PushFit AX Elbow fitting 90° female	1882478	0,079
	1882479	0,105
	1882480	0,128
	1882481	0,173
LK PushFit AX Elbow fitting 90° with loose nut	1882482	0,083
	1882483	0,111
	1882484	0,158

Product name	Product number	Weight (kg)
LK PushFit AX T-piece	1882485	0,105
	1882486	0,169
	1882487	0,264
	1882488	0,153
	1882489	0,162
	1882490	0,233
LK PushFit AX T-piece female	1882491	0,108
	1882492	0,147
	1882493	0,234
LK PushFit AX Cap	1882494	0,035
	1882495	0,057
	1882496	0,089
LK PushFit AX Connection	1882526	0,08
	1882527	0,094
	1882528	0,104
	1882529	0,124
LK PushFit AX Straight Fitting AX16xCu10	1882530	0,056
LK Ball Valve UNI PushFit AX16xCu10	1882551	0,139
LK Ball Valve UNI PushFit AX16	1882395	0,13
LK PushFit AX Wall Elbow	1882497	0,108
LK Pushfit AX Plug 16 mm	1882498	0,027
LK Pushfit Connection PV	2410317	0,13
Product name	**Product number**	**Weight**
LK Manifold UNI PushFit AX	1882499	0,341
	1882500	0,441
	1882501	0,469
	1882523	0,176
	1882524	0,185
	1882525	0,197
LK Manifold UNI PushFit AX Valve	1882502	0,587
	1882503	0,751

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