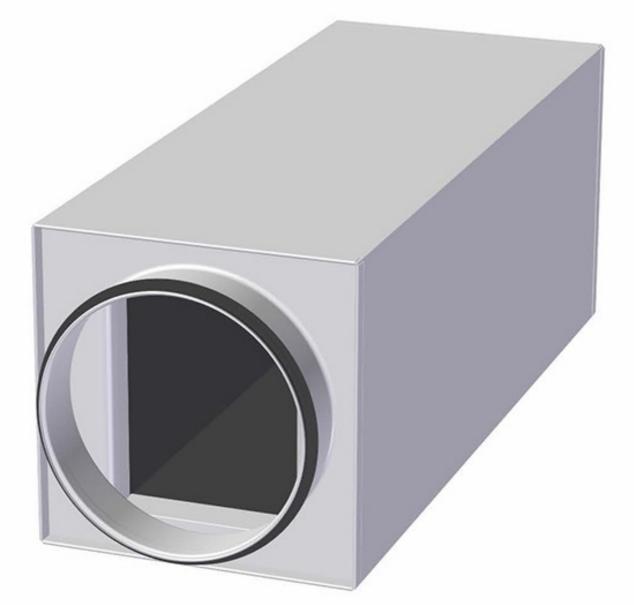


Environmental product declaration

In accordance with 14025 and EN15804+A2

Lydfelle LKR - 160-600





Owner of the declaration: TROX Auranor Norge AS

Product: Lydfelle LKR - 160-600

Declared unit: 1 pcs

This declaration is based on Product Category Rules: CEN Standard EN 15804:2012+A2:2019 serves as core PCR NPCR 030:2021 Part B for ventilation components

The Norwegian EPD Foundation EPD Software: LCA.no EPD generator **Program operator:** The Norwegian EPD Foundation

Declaration number:

NEPD-4039-3073-EN

Registration number:

NEPD-4039-3073-EN Issue date: 20.12.2022

Valid to: 20.12.2027

System ID:

56181



General information

Product Lydfelle LKR - 160-600

Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway The Norwegian EPD Foundation Phone: +47 23 08 80 00 web: post@epd-norge.no

Declaration number: NEPD-4039-3073-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR NPCR 030:2021 Part B for ventilation components

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Declared unit:

1 pcs Lydfelle LKR - 160-600

Declared unit with option:

A1-A3,A4,C1,C2,C3,C4,D

Functional unit:

LKR is a square sound attenuator with circular end spigots. LKR is space-saving due to its low height.

General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Individual third party verification of each EPD is not required when the EPD tool is i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPDNorway, and iii) the process is reviewed annualy. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools.

Verification of EPD tool:

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Alexander Borg, Asplan Viak (no signature required)

Owner of the declaration:

TROX Auranor Norge AS Contact person: Magnus Myrvold Phone: +47 61 31 35 00 e-mail: firmapost@auranor.no

Manufacturer:

TROX Auranor Norge AS

Place of production:

TROX Auranor Norge AS Auranorvegen 6, 2770 Jaren Norway

Management system: Miljøfyrtårn

Organisation no:

976 699 963

Issue date: 20.12.2022

Valid to: 20.12.2027

Year of study:

2021

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway.

Developer of EPD:

Magnus Myrvold

Reviewer of company-specific input data and EPD:

Svein Hvalstad

Approved:

Harry Håkon Hauan

Managing Director of EPD-Norway



Product

Product description:

LKR is a square sound attenuator with circular end spigots. LKR is space-saving due to its low height.

For more information: https://www.trox.no/en/sound-attenuators/lkr-6dc7da4b4ba1944b

Product specification

This EPD is applicable for LKR with the dimension 160-600, which is the most commonly used dimension for this product.

If you need an EPD for another dimension/variant of this product, please contact us via email: office-no@troxgroup.com

For more information:

https://www.trox.no/en/sound-attenuators/lkr-6dc7da4b4ba1944b

Materials	kg	%
Adhesive and sealant	0,03	0,66
Insulation - glass wool	0,50	10,96
Metal - Steel	4,00	87,68
Rubber, synthetic	0,03	0,70
Total	4,56	
Packaging	kg	%
	ку	70
Packaging - Pallet	0,41	98,80
Packaging - Plastic	0,01	1,20
Total incl. packaging	4,98	

Technical data:

In order to ensure the optimum choice of LKR, please use the "Attenuator Selection" computer program available for download from our website: www.trox.no

For more information:

https://www.trox.no/en/sound-attenuators/lkr-6dc7da4b4ba1944b

Market:

Norway

Reference service life, product

30 years

Reference service life, building or construction works

60 years

LCA: Calculation rules

Declared unit:

1 pcs Lydfelle LKR - 160-600

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

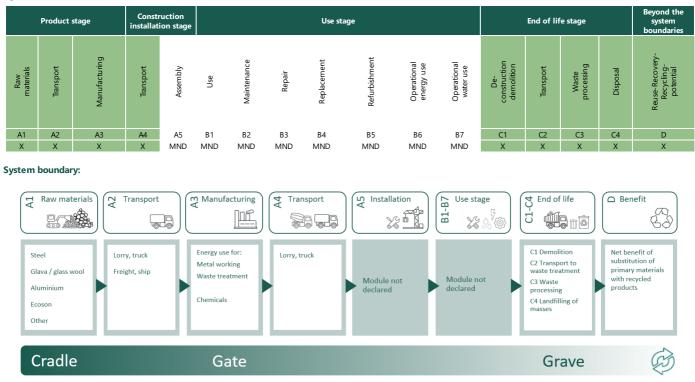
Data quality:

Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

Materials	Source	Data quality	Year
Adhesive and sealant	ecoinvent 3.6	Database	2019
Insulation - glass wool	ecoinvent 3.6	Database	2019
Metal - Steel	ecoinvent 3.6	Database	2019
Packaging - Pallet	ecoinvent 3.6	Database	2019
Packaging - Plastic	ecoinvent 3.6	Database	2019
Rubber, synthetic	ecoinvent 3.6	Database	2019



System boundaries (X=included, MND=module not declared, MNR=module not relevant)



Additional technical information:

TROX Auranor Norge AS has documentation proving that all electricity used is 100% renewable.



LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	300	0,043	l/tkm	12,90
De-construction demolition (C1)	Unit	Value			
Demolition of building per kg of ventilation product (kg) - C1	kg/DU	4,60			
Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km)	36,7 %	85	0,043	l/tkm	3,66
Waste processing (C3)	Unit	Value			
Materials to recycling (kg)	kg	3,60			
Waste treatment per kg Hazardous waste, incineration (kg)	kg	0,02			
Waste treatment per kg Rubber, municipal incineration with fly ash extraction (kg)	kg	0,03			
Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of Rubber, municipal incineration with fly ash extraction (kg)	kg	0,00			
Landfilling of ashes from incineration per kg Hazardous waste, from incineration (kg)	kg	0,00			
Waste, hazardous waste, to landfill (kg)	kg	0,02			
Waste, mineral wool, to landfil (kg)	kg	0,50			
Waste, scrap steel, to landfill (kg)	kg	0,40			
Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,04			
Substitution of primary steel with net scrap (kg)	kg	2,54			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	0,66			



LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environ	Environmental impact									
	Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D	
P	GWP-total	kg CO ₂ -eq	2,06E+01	2,44E-01	6,07E-03	6,92E-02	1,34E-01	8,99E-03	-2,80E+00	
P	GWP-fossil	kg CO ₂ -eq	2,08E+01	2,44E-01	6,07E-03	6,91E-02	1,34E-01	8,95E-03	-2,80E+00	
P	GWP-biogenic	kg CO ₂ -eq	-2,28E-01	1,01E-04	1,14E-06	2,86E-05	8,60E-05	6,61E-06	-1,55E-03	
P	GWP-luluc	kg CO ₂ -eq	2,70E-02	8,68E-05	4,78E-07	2,46E-05	8,79E-06	2,95E-05	-1,38E-03	
Ò	ODP	kg CFC11 -eq	1,82E-06	5,52E-08	1,31E-09	1,57E-08	3,99E-09	2,16E-09	-2,80E-04	
Ê	AP	mol H+ -eq	2,15E-01	7,01E-04	6,35E-05	1,99E-04	6,26E-05	5,96E-05	-1,39E-02	
	EP-FreshWater	kg P -eq	1,28E-03	1,95E-06	2,21E-08	5,52E-07	8,16E-07	1,99E-07	-1,72E-04	
	EP-Marine	kg N -eq	2,43E-02	1,39E-04	2,80E-05	3,93E-05	1,54E-05	1,87E-05	-2,88E-03	
	EP-Terrestial	mol N -eq	7,16E-01	1,55E-03	3,07E-04	4,40E-04	1,72E-04	2,05E-04	-2,95E-02	
	POCP	kg NMVOC -eq	8,41E-02	5,94E-04	8,45E-05	1,68E-04	4,62E-05	6,57E-05	-1,40E-02	
B	ADP-minerals&metals ¹	kg Sb -eq	1,77E-02	6,74E-06	9,31E-09	1,91E-06	1,26E-07	6,05E-08	-4,82E-05	
Ð	ADP-fossil ¹	MJ	2,73E+02	3,69E+00	8,35E-02	1,04E+00	1,49E-01	1,71E-01	-2,36E+01	
%	WDP ¹	m ³	2,16E+03	3,57E+00	1,77E-02	1,01E+00	6,01E-01	3,30E-01	1,44E+02	

GWP total Global Warming Potential total; GWP fossil Global Warming Potential fossil fuels ; GWP biogenic Global Warming Potential biogenic; GWP luluc Global W Potential land use change; ODP Ozone Depletion; AP Acidification; EP freshwater Eutrophication aquatic freshwater; EP marine Eutrophication aquatic marine; EP terrestrial Eutrophication terrestrial ;POCP Photochemical zone formation; ADPE Abiotic Depletion Potential minerals and metals; ADPf Abiotic Depletion Potential fossil fuels;

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009" *INA Indicator Not Assessed

1. 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

Remarks to environmental impacts



Additional	Additional environmental impact indicators									
li li	ndicator	Unit	A1-A3	A4	C1	C2	C3	C4	D	
	PM	Disease incidence	2,12E-06	1,49E-08	1,68E-09	4,23E-09	8,13E-10	1,14E-09	-2,34E-07	
(im) B	IRP ²	kgBq U235 -eq	1,18E+00	1,61E-02	3,58E-04	4,57E-03	6,65E-04	6,32E-04	9,68E-03	
	ETP-fw ¹	CTUe	7,94E+02	2,73E+00	4,56E-02	7,75E-01	8,54E-01	1,81E-01	-1,56E+02	
48-* ****	HTP-c ¹	CTUh	1,20E-07	0,00E+00	0,00E+00	0,00E+00	3,30E-11	1,70E-11	-1,34E-08	
*	HTP-nc ¹	CTUh	1,10E-06	2,99E-09	4,10E-11	8,46E-10	2,60E-10	1,88E-10	2,92E-07	
	SQP ¹	dimensionless	1,69E+02	2,58E+00	1,06E-02	7,31E-01	5,71E-02	4,61E-01	-2,13E+00	

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 Soil Quality (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009" *INA Indicator Not Assessed

1. 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

2. 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.



Resource use	Resource use									
	ndicator	Unit	A1-A3	A4	C1	C2	C3	C4	D	
i se	PERE	MJ	5,29E+01	5,28E-02	4,52E-04	1,50E-02	2,59E-02	1,46E-02	-2,25E+00	
S.	PERM	MJ	5,69E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
° ⊼ ₁	PERT	MJ	5,86E+01	5,28E-02	4,52E-04	1,50E-02	2,59E-02	1,46E-02	-2,25E+00	
B	PENRE	MJ	2,71E+02	3,69E+00	8,35E-02	1,04E+00	1,49E-01	1,71E-01	-2,36E+01	
4	PENRM	MJ	1,35E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
IA	PENRT	MJ	2,73E+02	3,69E+00	8,35E-02	1,04E+00	1,49E-01	1,71E-01	-2,38E+01	
	SM	kg	2,74E+00	0,00E+00	4,10E-05	0,00E+00	6,52E-05	3,60E-04	1,32E+00	
L.	RSF	MJ	1,25E+00	1,89E-03	1,11E-05	5,35E-04	5,72E-04	7,27E-05	1,01E-01	
Ū.	NRSF	MJ	-9,13E+00	6,75E-03	1,63E-04	1,91E-03	-1,19E-04	3,16E-03	2,92E+00	
۲	FW	m ³	3,30E-01	3,94E-04	4,30E-06	1,12E-04	2,30E-04	1,75E-04	-6,29E-03	

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; PERT Total use of non renewable primary energy resources used as raw materials; PENRT Total use of non renewable primary energy resources used as raw materials; PENRT Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; FW Use of net fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009" *INA Indicator Not Assessed



End of life - Waste									
In	dicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
A	HWD	kg	1,72E-01	1,90E-04	2,46E-06	5,39E-05	3,47E-05	1,62E-02	-1,45E-02
Ū	NHWD	kg	6,73E+00	1,79E-01	9,88E-05	5,08E-02	3,94E-03	9,05E-01	-1,14E+00
®	RWD	kg	1,09E-03	2,51E-05	5,80E-07	7,12E-06	8,26E-07	9,62E-07	7,42E-06

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed;

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009" *INA Indicator Not Assessed

End of life - Output flow									
Indicat	or	Unit	A1-A3	A4	C1	C2	C3	C4	D
¢۵	CRU	kg	0,00E+00						
\$\$	MFR	kg	1,46E+00	0,00E+00	4,03E-05	0,00E+00	3,60E+00	3,54E-04	1,32E+00
DB	MER	kg	8,75E-04	0,00E+00	1,25E-07	0,00E+00	5,01E-06	8,49E-07	8,41E-04
50	EEE	MJ	7,23E-03	0,00E+00	4,28E-07	0,00E+00	4,38E-02	8,23E-06	-9,60E-04
DÐ	EET	MJ	1,09E-01	0,00E+00	6,47E-06	0,00E+00	6,63E-01	1,24E-04	-1,45E-02

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported energy Thermal

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009" *INA Indicator Not Assessed

Biogenic Carbon Content								
Indicator	Unit	At the factory gate						
Biogenic carbon content in product	kg C	0,00E+00						
Biogenic carbon content in accompanying packaging	kg C	1,70E-01						

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



Additional Norwegian requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Electricity mix	Data source	Amount	Unit
Electricity, Norway (kWh)	ecoinvent 3.6	24,33	g CO2-eq/kWh

Dangerous substances

The product contains no substances given by the REACH Candidate list or the Norwegian priority list.

Indoor environment

Additional Environmental Information

Environmental impact inc	Environmental impact indicators EN 15804+A1 and NPCR Part A v2.0								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D	
GWP	kg CO ₂ -eq	2,02E+01	2,42E-01	5,99E-03	6,84E-02	1,34E-01	8,68E-03	-2,62E+00	
ODP	kg CFC11 -eq	1,83E-06	4,48E-08	1,04E-09	1,27E-08	3,74E-09	1,75E-09	-9,03E-08	
POCP	kg C ₂ H ₄ -eq	9,01E-03	2,95E-05	9,22E-07	8,35E-06	2,35E-06	3,42E-06	-1,73E-03	
AP	kg SO ₂ -eq	8,06E-02	4,82E-04	8,86E-06	1,36E-04	4,85E-05	2,84E-05	-1,05E-02	
EP	kg PO ₄ ³⁻ -eq	1,16E-02	5,13E-05	9,85E-07	1,45E-05	9,12E-06	3,53E-06	-1,56E-03	
ADPM	kg Sb -eq	1,77E-02	6,74E-06	9,31E-09	1,91E-06	1,26E-07	6,05E-08	-4,82E-05	
ADPE	MJ	2,27E+02	3,61E+00	8,29E-02	1,02E+00	1,39E-01	1,67E-01	-2,56E+01	
GWPIOBC	kg CO ₂ -eq	2,12E+01	2,44E-01	6,07E-03	6,92E-02	1,34E-01	4,06E-03	-4,19E+00	

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources; GWP-IOBC/GHG Global warming potential calculated according to the principle of instantanious oxidation (except emissions and uptake of biogenic carbon)



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