

Owner: Linolie & Pigment A/S
No.: MD-23216-EN_rev1
EPD tool: Linolie & Pigment EPD Generator (T24002)
Tool version: V.1
Issued: 16-04-2024
Revision date: 30-04-2024
Valid to: 16-04-2029

3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804





Owner of declaration
Linolie & Pigment A/S
ØSBYGADE 46 6100 HADERSLEV
DANMARK
VAT no.: 41189932



LINOLIE & PIGMENT

Programme
EPD Danmark
www.epddanmark.dk



- Industry EPD
- Product EPD

Declared product(s)
1 liter 91/Phnom Penh Retrolak®.

Number of declared datasets/product variations: 1

Production site
ØSBYGADE 46 6100 HADERSLEV DANMARK

Product(s) use
Retrolak® is a colored and opaque oil alkyd varnish useful for surfaces where a high abrasion resistance is required.

Declared or functional unit
1 liter

Year of production site data (A3)
2022

Declaration developed using EPD Danmark Linolie & Pigment EPD Generator (T24002 v. 1)

Issued:
16-04-2024

Valid to:
16-04-2029

Basis of calculation
This EPD is developed in accordance with the European standard EN 15804+A2.

Comparability
EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity
This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use
The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

- EPD type**
- Cradle-to-gate with modules C1-C4 and D
 - Cradle-to-gate with options, modules C1-C4 and D
 - Cradle-to-grave and module D
 - Cradle-to-gate
 - Cradle-to-gate with options

CEN standard EN 15804+A2 serves as the core PCR

Independent verification of the tool on which declaration and data is based, according to EN ISO 14025:2010

internal external

Third party verifier:

Guangli Du

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)

Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X



Product information

Product description

Retrolak® is a colored and opaque oil alkyd varnish useful for surfaces where a high abrasion resistance is required. It provides a surface coverage of 8-10 square meters per liter of varnish.

The main product components are shown in the table below.

Material	Weight-% of declared product
Pigments	15%
Linseed oil	6%
Additives	79%

Product packaging:

The composition of the sales- and transport packaging of the product is shown in the table below.

Material	Weight-% of packaging
Tin bucket	77%
Cardboard	21%
Corn starch	2%

Representativity

This declaration, including data collection and the modelled foreground system including results, represents the production of 1 liter 91/Phnom Penh Retrolak® on the production site located in Haderslev, Denmark. Product specific data are based on average values collected in the period 2022. Background data are based on datasets from the LCA databases: EcoInvent 3.9.1 allocation, Agri-footprint version 6.3, and the Evah Pigment database. The datasets are less than 10 years old. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

Hazardous substances

This Retrolak® is not classified in accordance with the CLP regulation EC No. 1272/2008. The products however contain substances listed in the "Candidate List of Substance of Very High Concern for authorization". Table below lists the substances at levels above 0,1% alongside their CAS number.

(<http://echa.europa.eu/candidate-list-table>)

% w/w	Substance	CAS	REACH
25 - < 50	Hydrocarbons C10-13, n-alkanes, isoalkanes, cyclic, < 2% aromatics	N/A	01-2119457273-39
10 - < 25	Hydrocarbons C11-12, isoalkanes, cyclic, < 2% aromatics	N/A	01-2119472146-39
< 1	Zirconiumoctoat	22464-99-9	01-2119979088-21
< 1	2-Methylpentan-2,4-diol (Hexylenglycol)	107-41-5	N/A

Essential characteristics (CE)

The product declared within this EPD are not covered by any harmonized technical specification.

Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website:

<https://linolie.dk/>



Picture of product





LCA background

Declared unit

The LCI and LCIA results in this EPD relates to 1 liter 91/Phnom Penh Retrolak®.

Name	Value	Unit
Declared unit	1	L
Density	1141,0	kg/m ³
Conversion factor to 1 kg.	1,14	N/A

Functional unit

Not defined.

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804 + A2, and product descriptions adheres to the requirements

outlined in IBU PCR Part B for coating with organic binders.

Guarantee of Origin – certificates

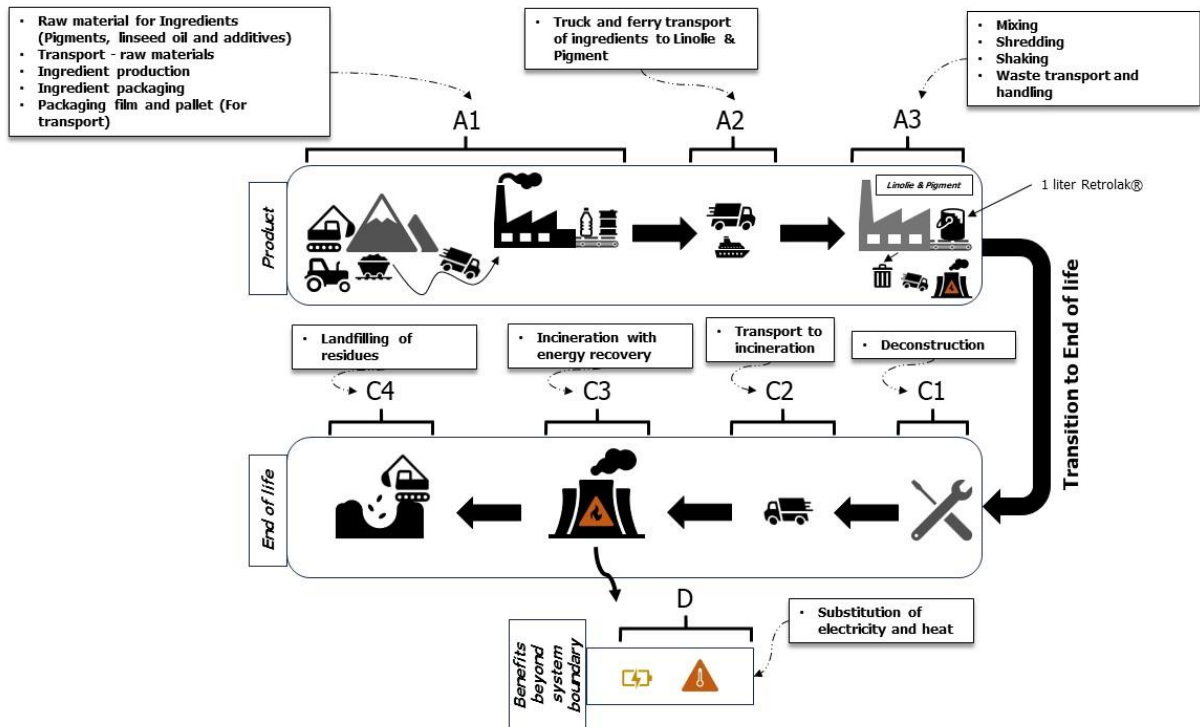
Foreground system:

No use of certified green energy is applied in this study. A residual energy mix from Denmark is used to model the electricity used in the production.

Background system:

Upstream processes are modelled using European average energy mixes and certain country residual mixes. Downstream processes are modelled using European and national average energy mixes.

Flowdiagram





System boundaries

This EPD is based on a cradle-to-gate LCA, in which 100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows 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.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the "end-of-waste" state or final disposal.

In A1, the extraction of the raw materials used for the various ingredients (pigments, linseed oil and additives) is covered alongside transportation of the raw materials to the specific ingredient production site. The module further covers the production of the ingredients and required ingredient product and transport packaging incl. use of pallets.

In A2, the transport requirements for each ingredient used is covered. For most ingredients this includes transport by truck from a European country.

A3 covers the production of the Retrolak® recipe which involves mixing the ingredients in a production bucket, processing the mixture through the processing steps of mixing, shredding, and pouring the finished product into a tin bucket (product packaging). Required transportation packaging for outbound transport to the customer is likewise included. Utility data on electricity, gas for heating, water as well as waste generation for the production year 2022 is allocated and partitioned to the declared products using economic allocation and subdivision based on average and specific recipe masses, water

content and viscosity of recipe mixtures. Lastly A3 includes waste processing of the production bucket used in the production, A1 ingredient and transport packaging and pallet usage, and any remaining waste deducted from the utility data which is allocated to the declared unit. The waste is modelled up to the "end-of-waste" state or final disposal.

End of Life (C1-C4) includes:

The deconstruction/removal of the declared product in C1 are assumed to be done manually, without specialized tools, and are therefore not covered by any processes contributing to the environmental impact of the life cycle.

In module C2, the Transport from the deconstruction/removal site to the waste treatment/recycling facility is estimated to 30 km. based on estimated standard distances to waste treatment sites.

In C3 the product is incinerated with energy recovery. Module D, accounts for the net output flow of said generated energy that substitutes electricity and heat production from conventional sources.

C4 covers the residues from the incineration that are landfilled.

Re-use, recovery and recycling potential (D) includes:

Module D models the benefits tied to the energy recovery of the linseed products through incineration in a municipal solid waste incinerator (MSWI).

Electricity and thermal energy generated from the incineration is assumed to substitute electricity in an average Danish electricity mix and district heating from natural gas.



LCA results

ENVIRONMENTAL IMPACTS PER 1 LITER									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	4,87E+00	2,18E-01	3,47E+00	0,00E+00	6,33E-03	1,47E+00	2,36E-03	-2,39E-01
GWP-fossil	kg CO ₂ eq.	3,87E+00	2,18E-01	3,43E+00	0,00E+00	6,32E-03	1,28E+00	2,35E-03	-2,34E-01
GWP-biogenic	kg CO ₂ eq.	-2,04E-01	2,00E-04	2,77E-02	0,00E+00	5,79E-06	1,93E-01	9,72E-06	-5,33E-03
GWP-luluc	kg CO ₂ eq.	1,21E+00	1,08E-04	4,05E-03	0,00E+00	3,12E-06	6,49E-05	1,63E-06	-2,53E-04
ODP	kg CFC 11 eq.	3,02E-07	4,74E-09	5,79E-08	0,00E+00	1,38E-10	1,04E-08	6,77E-11	-8,83E-09
AP	mol H ⁺ eq.	5,42E-02	4,76E-04	2,79E-02	0,00E+00	1,38E-05	5,54E-04	1,52E-05	-4,21E-04
EP-freshwater	kg P eq.	1,39E-03	1,55E-05	4,91E-03	0,00E+00	4,49E-07	2,40E-05	9,93E-06	-6,28E-05
EP-marine	kg N eq.	8,22E-03	1,20E-04	6,09E-03	0,00E+00	3,49E-06	1,86E-04	5,39E-06	-1,17E-04
EP-terrestrial	mol N eq.	4,73E-02	1,22E-03	7,85E-02	0,00E+00	3,54E-05	1,88E-03	5,75E-05	-1,30E-03
POCP	kg NMVOC eq.	1,92E-02	7,39E-04	1,92E-02	0,00E+00	2,15E-05	5,96E-04	2,12E-05	-4,89E-04
ADPm ¹	kg Sb eq.	1,68E-04	7,12E-07	4,63E-03	0,00E+00	2,07E-08	4,62E-07	4,84E-09	-5,51E-07
ADPF ¹	MJ	7,19E+01	3,09E+00	4,33E+01	0,00E+00	8,98E-02	1,21E+00	5,73E-02	-3,59E+00
WDP ¹	m ³	8,61E+00	1,28E-02	-1,43E+00	0,00E+00	3,70E-04	2,06E-01	2,34E-03	-1,75E-02
Caption	GWP-total = Globale Warming Potential - total; 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 = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication - aquatic freshwater; EP-marine = Eutrophication - aquatic marine; EP-terrestrial = Eutrophication - terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential - minerals and metals; ADPf = Abiotic Depletion Potential - fossil fuels; WDP = water use								
Disclaimer	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								

ADDITIONAL ENVIRONMENTAL IMPACTS PER 1 LITER PRODUCT									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
PM	[Disease incidence]	3,25E-07	1,62E-08	2,82E-07	0,00E+00	4,71E-10	5,96E-09	2,89E-10	-2,77E-09
IRP ²	[kBq U235 eq.]	5,95E-01	4,19E-03	3,63E-01	0,00E+00	1,22E-04	6,35E-03	6,10E-05	-2,92E-02
ETP-fw ¹	[CTUe]	3,81E+02	3,06E+00	1,20E+02	0,00E+00	8,88E-02	4,68E+01	7,39E-02	-7,49E-01
HTP-c ¹	[CTUh]	6,78E-09	1,99E-10	5,50E-09	0,00E+00	5,77E-12	1,53E-10	9,18E-11	-1,19E-10
HTP-nc ¹	[CTUh]	1,91E-07	4,39E-09	3,20E-07	0,00E+00	1,27E-10	4,32E-09	3,19E-09	-2,50E-09
SQP ¹	-	1,01E+02	1,87E+00	2,35E+01	0,00E+00	5,43E-02	8,01E-01	1,81E-01	-1,77E+00
Caption	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								
Disclaimers	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								

**RESOURCE USE PER 1 LITER PRODUCT**

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	[MJ]	3,51E+01	4,86E-02	5,30E+00	0,00E+00	1,41E-03	9,21E-02	6,88E-04	-1,62E-01
PERM	[MJ]	2,77E+00	0,00E+00	4,46E-01	0,00E+00	0,00E+00	-2,73E+00	0,00E+00	0,00E+00
PERT	[MJ]	3,79E+01	4,86E-02	5,74E+00	0,00E+00	1,41E-03	-2,63E+00	6,88E-04	-1,62E-01
PENRE	[MJ]	7,26E+01	3,09E+00	4,33E+01	0,00E+00	8,98E-02	1,21E+00	5,73E-02	-6,06E+00
PENRM	[MJ]	2,20E+01	0,00E+00	-4,14E+00	0,00E+00	0,00E+00	-1,78E+01	0,00E+00	0,00E+00
PENRT	[MJ]	9,46E+01	3,09E+00	3,91E+01	0,00E+00	8,98E-02	-1,66E+01	5,73E-02	-6,06E+00
SM	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	8,54E+00	1,27E-02	-1,40E+00	0,00E+00	3,69E-04	2,17E-01	2,34E-03	-2,54E-02
Caption	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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water								

WASTE CATEGORIES AND OUTPUT FLOWS PER 1 LITER PRODUCT

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
HWD	[kg]	4,25E-03	5,78E-05	3,18E-02	0,00E+00	1,68E-06	8,05E-01	5,55E-07	-4,26E-05
NHWD	[kg]	2,59E+00	1,54E-01	8,91E-01	0,00E+00	4,46E-03	2,23E-01	1,85E-01	-9,38E-03
RWD	[kg]	1,75E-04	1,02E-06	8,88E-05	0,00E+00	2,95E-08	1,62E-06	1,48E-08	-1,37E-05
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	0,00E+00	0,00E+00	1,36E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	5,10E-01	0,00E+00	0,00E+00	1,14E+00	0,00E+00	0,00E+00
EE	[MJ]	0,00E+00	0,00E+00	1,08E+01	0,00E+00	0,00E+00	4,16E+00	0,00E+00	0,00E+00
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy								

BIOGENIC CARBON CONTENT PER 1 LITER PRODUCT

Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0,05
Biogenic carbon content in accompanying packaging	[kg C]	0,01
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂	



Additional information

LCA interpretation

The results of the EPD shows the environmental impact associated with 1 liter 91/Phnom Penh Retrolak®. Through a contribution analysis, the production of ingredients in A1 is the most dominant source of impact in all core environmental impact categories.

End of life (C1-C4)

Processes	Value	Unit
Collected separately	1,14	kg
Collected with mixed waste	0,00	kg
For reuse	0,00	kg
For recycling	0,00	kg
For energy recovery	1,14	kg
For final disposal	0,18	kg

Re-use, recovery and recycling potential (D)

Processes	Value	Unit
Amount	1,14	kg/DU
LHV	10,51	MJ/kg
EET	2,86	MJ/DU
EEE	1,30	MJ/DU
Loss	7,83	MJ/DU



Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.



References

Publisher	epddanmark www.epddanmark.dk Template version 2023.1
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
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	LCA software / backgrounddata <i>SimaPro 9.5.0.0 / Ecoinvent v.3.9.1 Database, Agri-footprint version 6.3 Database, Evah Pigment 2019 Database EN 15804 reference package</i>
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General programme instructions



Version 2.0
www.epddanmark.dk

EN 15804

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

IBU PCR Part B

Requirements on the EPD for Coatings with organic binders v.3-4, June 2023. Institut Bauen und Umwelt e.V. (IBU).

EN 15942

DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025

DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040

DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

ISO 14044

DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"