epddanmark

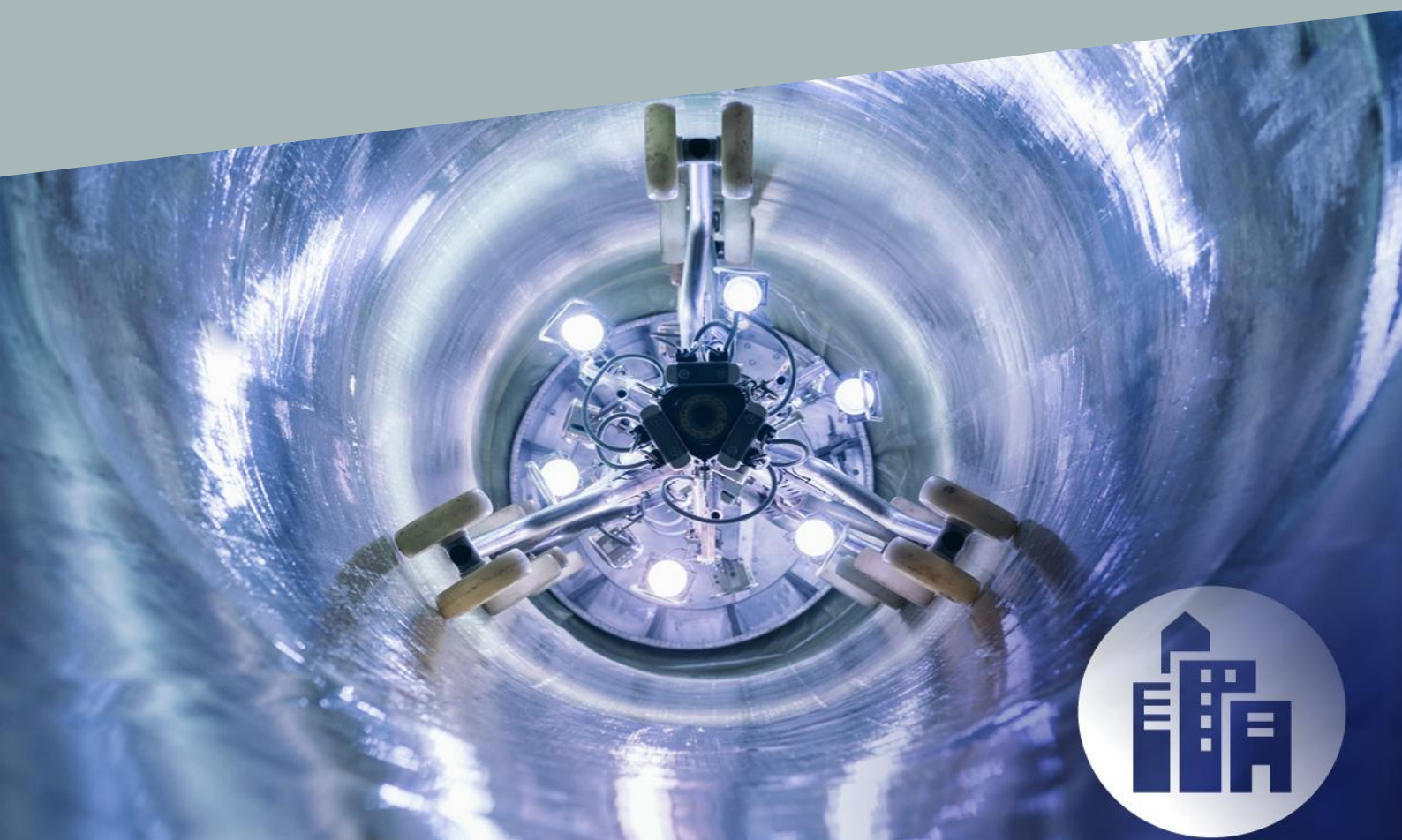
ECO PLATFORM EPD VERIFIED

Owner: SAERTEX multiCom GmbH
No.: MD-24015-EN
Issued: 18-12-2024
Valid to: 18-12-2029

3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804**



Owner of declaration
SAERTEX multiCom GmbH
Brochterbecker Damm 52
48369 Saerbeck
VAT no. DE 812047171

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry -EPD
☒ Product -EPD

Declared product(s)
This EPD covers all the products listed below that are sold under the name SAERTEX-LINER® MULTI (with the exception of type E). The production series is divided into 3 size categories:

Small: declared product ∅ 600 mm/ 5 mm
- Diameter: ∅ 150 mm – ∅ 1000 mm
- Wall thickness: 3 mm – 6,3 mm

Medium: declared product ∅ 800 mm/ 10 mm
- Diameter: ∅ 150 mm – ∅ 1300 mm
- Wall thickness: 6,4 mm – 10,3 mm

Large: declared product ∅ 1200 mm/ 12 mm
- Diameter: ∅ 150 mm – ∅ 1600 mm
- Wall thickness: 10,4 mm - 15 mm

(The wall thickness refers to the combination wall thickness)

Number of declared data records/product variants: 3

Production site
SAERTEX multiCom GmbH
Brochterbecker Damm 52
48369 Saerbeck

Use of Guarantees of Origin
☒ No certificates used
☐ Electricity covered by GoO
☐ Biogas covered by GoO

Declared/ functional unit
1 m³ Liner material.

Year of production site data (A3)
2023

EPD version
This EPD is the original version.

Issued: 18-12-2024
Valid to: 18-12-2029

Basis of calculation
This EPD is developed and verified 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 serves as the core PCR

Product Category Rules (PCR): Construction products, 2019:14, version 1.2.5, valid until 2024-12-20

Independent verification of the declaration and data, according to EN ISO 14025

☐ internal ☒ external

Third party verifier:

Kim Christiansen

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	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Product information

Product description

The main product components are shown in the table below.

Material	Weight-% of declared product
Glass Fibers	43,5 % - 56,1 %
Polyester Resin	34,1 % - 36,6 %
Foils	5,1 % - 11,3 %
Other	2,1 % - 11,0 %
Total	100 %

Product packaging

The composition of the product's sales and transport packaging is shown in the table below. The liners are packed in wooden boxes in all sizes.

Material	Weight of packaging material (kg)	Weight-% of packaging
Wooden Box	120 - 205	100 %

Representativity

The declared unit is 1 m³ of liner material. Transportation and energy consumption (diesel for generators and vehicles on the construction site) for installation and removal were determined and taken into account for a common process.

This declaration, including the data collection, modeling and results, covers the manufacture of the liners at the production site in Saerbeck, Germany. The product-specific data is based on average values collected for the year 2023.

The background data is based on the GaBi LCA software and is less than 10 years old. In general, the background data sets used are of high quality and the majority of the data sets are only a few years old.

Hazardous substances

The products do not contain any substances on the ECHA list of Substances of Very High Concern (SVHC).

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

Product(s) use

The liners considered in this study are used for the trenchless rehabilitation of gravity and pressure sewers.

Essential characteristics

Technical information can be requested from the manufacturer or can be found on the manufacturer's website:

www.saertex-multicom.de

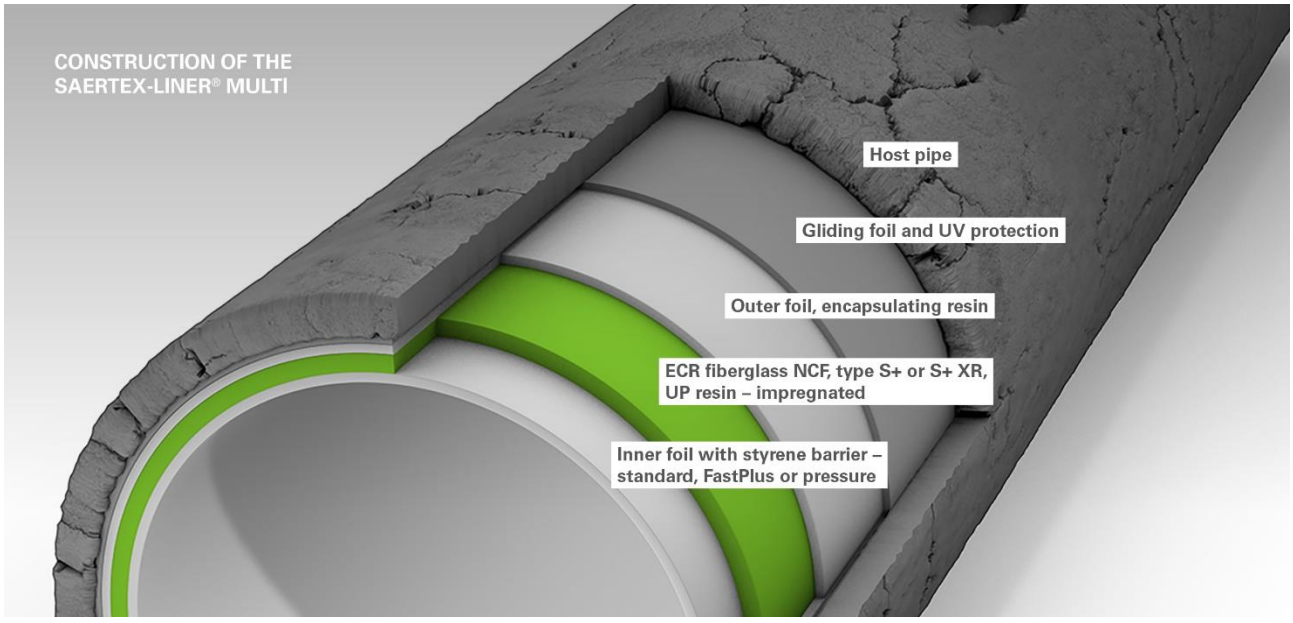
Reference Service Life (RSL)

The expected reference service life is 100 years for gravity liner. To achieve the required product quality, a conformity assessment in accordance with DIN CEN ISO/TS 23818-2 can be carried out. As part of this conformity assessment, tests are carried out in accordance with the quality standards specified in ISO 11296-4.

The expected reference service life is 50 years for pressure liners. To achieve the required product quality, a conformity assessment in accordance with DIN CEN ISO/TS 23818-2 can be carried out. As part of this conformity assessment, tests are carried out in accordance with the quality standards specified in ISO 11297-4.

Picture of product

Structure of the product



LCA background

Declared unit

The results of the life cycle assessment in this study refer to 1 m³ of liner material. The following product specifications indicate the respective diameters 600 mm, 800 mm and 1200 mm and the wall thickness of the liner from 5 mm to 12 mm.

Name	MULTI 600/5	MULTI 800/10	MULTI 1200/12	Unit
Declared unit		1		m³
Density	2.232	2.065	2.025	kg/m³
Conversion factor to 1 kg.	0,00045	0,00048	0,0005	-

The declared products cover the following product spans, which are divided into 3 categories:

Small: declared product ∅ 600 mm/ 5 mm covers the following product sizes

- diameter: ∅ 150 mm – ∅ 1000 mm
- wall thickness: 3 mm – 6,3 mm

Medium: declared product ∅ 800 mm/ 10 mm covers the following product sizes

- diameter: ∅ 150 mm – ∅ 1300 mm
- wall thickness: 6,4 mm – 10,3 mm

Large: declared product ∅ 1200 mm/ 12 mm covers the following product sizes

- diameter: ∅ 150 mm– ∅ 1600 mm
- wall thickness: 10,4 mm - 15 mm

All products within the individual parts of the range deviate by less than 10 % from the declared values/parameters for the environmental parameters.

Functional unit

The functional unit is not defined, therefore a declared unit is used.

PCR

This EPD fulfills the requirements of EN 15804 version A2:2019 for the product category construction products.

Energy modelling principles

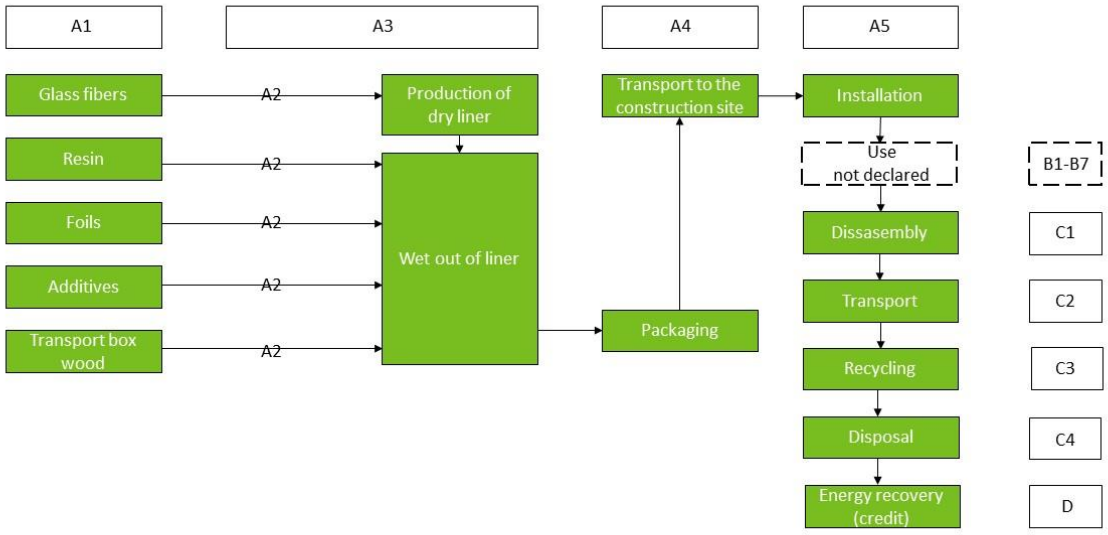
Foreground system:

No "guarantees of origin" are used in production. Electricity consumption is modeled using a mix for electricity that is representative of the Saerbeck production site in Germany.

Background system:

Other processes upstream and downstream of production are modeled with processes from the GaBi background database, which is based on average data.

The process diagram below shows the life cycle of the product under consideration.



System boundary

This EPD is based on a cradle-to-gate life cycle assessment (LCA), in which 100% by weight was taken into account.

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 – Transportation to the production site
A3 – Manufacturing process

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. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

In the first step, the inner and outer liner are produced with the glass fiber mat and combined to form the so-called dry liner.

The dry liner is then impregnated with a special resin mixture. The liner is then given an outer film and UV protection film and prepared for transport.

Construction process stage (A4-A5) includes:

A4 – Transportation to the construction site
A5 – Installation in the building/pipe system

Module A4 considers the transportation of the packaged product to the construction site. A transportation distance of 900 km was assumed at this point. Module A5 covers the energy requirement in the form of diesel for preparatory work and the installation itself, as well as the disposal of the product packaging. A credit for energy substitution through thermal utilization of the packaging material is made in Module D.

End of Life (C1-C4) includes:

In module C1, the energy input in the form of diesel from a machine for dismantling the product was taken into account. Module C2 takes into account the transportation of the demolition material to the disposal company and module C4 the thermal recycling of the material, which was collected before.

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

The potential benefit of substituting fossil fuels in the course of energy generation with thermal utilization of the product at the end of its life cycle is balanced in Module D. The energy generated is credited to the system through substitution processes, whereby it is assumed that the thermal energy would be generated from natural gas and the substituted electricity would correspond to the German electricity mix.

LCA results

The values in the following tables are shown in scientific notation, e.g. 1.04E+02. This value can also be output as 1.04*10² or 104. This is identical for numbers with a negative superscript.
The results of the impact categories of the individual liners do not deviate from each other by more than 10%.

SAERTEX-LINER® MULTI 600/5

ENVIRONMENTAL IMPACTS PER [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	5,79E+03	1,56E+02	8,52E+02	2,64E+02	1,64E+01	0,00E+00	2,83E+03	-7,80E+02
GWP-fossil	[kg CO_2 eq.]	5,78E+03	1,56E+02	6,36E+02	3,83E+02	1,64E+01	0,00E+00	1,08E+03	-7,75E+02
GWP-biogenic	[kg CO_2 eq.]	2,34E-01	-7,01E-01	2,13E+02	-1,35E+02	-7,38E-02	0,00E+00	1,76E+03	-5,36E+00
GWP-luluc	[kg CO_2 eq.]	2,21E+00	9,36E-01	3,76E+00	1,65E+01	9,85E-02	0,00E+00	5,62E-02	-6,95E-02
ODP	[kg CFC 11 eq.]	1,47E-07	3,86E-11	1,90E-10	6,82E-10	4,06E-12	0,00E+00	9,15E-10	-1,06E-08
AP	[mol H^+ eq.]	2,68E+01	1,84E-01	7,21E+00	1,69E+00	1,94E-02	0,00E+00	1,58E+00	-7,85E-01
EP-freshwater	[kg P eq.]	8,74E-03	3,69E-04	1,49E-03	6,51E-03	3,88E-05	0,00E+00	3,74E-04	-2,01E-03
EP-marine	[kg N eq.]	5,13E+00	6,52E-02	3,66E+00	3,90E-01	6,87E-03	0,00E+00	6,07E-01	-2,89E-01
EP-terrestrial	[mol N eq.]	5,59E+01	7,82E-01	4,04E+01	5,06E+00	8,24E-02	0,00E+00	7,20E+00	-3,07E+00
POCP	[kg NMVOC eq.]	1,85E+01	1,61E-01	1,06E+01	1,36E+00	1,70E-02	0,00E+00	1,57E+00	-7,45E-01
ADPm[1]	[kg Sb eq.]	2,42E-03	1,13E-05	4,57E-05	2,00E-04	1,19E-06	0,00E+00	6,63E-06	-6,73E-05
ADPf[1]	[MJ]	1,17E+05	2,13E+03	8,59E+03	3,76E+04	2,24E+02	0,00E+00	1,37E+03	-1,21E+04
WDP[1]	[m^3 world eq. deprived]	7,35E+02	8,21E-01	2,63E+01	1,45E+01	8,65E-02	0,00E+00	3,50E+02	-1,04E+01
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 = Acidifcation; 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 depletion potential								
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 [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	2,76E-04	1,29E-06	1,68E-04	1,33E-05	1,36E-07	0,00E+00	1,05E-05	-5,71E-06
IRP[2]	[kBq U235 eq.]	1,42E+02	3,00E-01	1,39E+00	5,31E+00	3,16E-02	0,00E+00	4,87E+00	-4,95E+01
ETP-fw[1]	[CTUe]	4,55E+04	1,55E+03	6,26E+03	2,74E+04	1,63E+02	0,00E+00	5,25E+02	-1,87E+03
HTP-c[1]	[CTUh]	2,03E-05	3,09E-08	1,26E-07	5,47E-07	3,26E-09	0,00E+00	5,07E-08	-1,47E-07
HTP-nc[1]	[CTUh]	9,15E-05	1,30E-06	5,29E-06	2,29E-05	1,37E-07	0,00E+00	3,85E-06	-4,01E-06
SQP[1]	-	3,96E+04	7,57E+02	3,06E+03	1,34E+04	7,97E+01	0,00E+00	4,61E+02	-3,14E+03
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 (dimensionless)								
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.								
	[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 PER [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	1,20E+04	1,43E+02	5,89E+02	2,52E+03	1,50E+01	0,00E+00	4,50E+02	-4,74E+03
PERM	[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
PERT	[MJ]	1,20E+04	1,43E+02	5,89E+02	2,52E+03	1,50E+01	0,00E+00	4,50E+02	-4,74E+03
PENRE	[MJ]	1,17E+05	2,13E+03	8,61E+03	3,77E+04	2,24E+02	0,00E+00	1,37E+03	-1,21E+04
PENRM	[MJ]	2,69E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	1,44E+05	2,13E+03	8,61E+03	3,77E+04	2,24E+02	0,00E+00	1,37E+03	-1,21E+04
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	[m³]	2,61E+01	1,27E-01	1,05E+00	2,24E+00	1,34E-02	0,00E+00	8,30E+00	-1,64E+00
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 [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	1,36E-04	3,59E-09	1,49E-08	6,35E-08	3,78E-10	0,00E+00	1,36E-08	-7,95E-07
NHWD	[kg]	5,69E+02	3,19E-01	3,44E+00	5,63E+00	3,36E-02	0,00E+00	1,68E+02	-6,59E+00
RWD	[kg]	1,15E+00	2,80E-03	1,30E-02	4,96E-02	2,95E-04	0,00E+00	4,60E-02	-4,74E-01
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[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
EEE	[MJ]	3,88E+02	0,00E+00	2,76E+02	0,00E+00	0,00E+00	0,00E+00	2,60E+03	0,00E+00
EET	[MJ]	9,02E+02	0,00E+00	6,47E+02	0,00E+00	0,00E+00	0,00E+00	6,04E+03	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; EEE = Exported electrical energy; EET = Exported thermal energy								

BIOGENIC CARBON CONTENT PER [m³]		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	kg C	6,73E-08
Biogenic carbon content in accompanying packaging	kg C	1,56E-09
Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2		

SAERTEX-LINER® MULTI 800/10

ENVIRONMENTAL IMPACTS PER [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	5,56E+03	1,46E+02	6,71E+02	1,11E+02	1,52E+01	0,00E+00	2,62E+03	-7,40E+02
GWP-fossil	[kg CO_2 eq.]	5,59E+03	1,46E+02	4,19E+02	1,60E+02	1,52E+01	0,00E+00	9,95E+02	-7,35E+02
GWP-biogenic	[kg CO_2 eq.]	-3,77E+01	-6,57E-01	2,49E+02	-5,66E+01	-6,82E-02	0,00E+00	1,63E+03	-5,09E+00
GWP-luluc	[kg CO_2 eq.]	2,19E+00	8,77E-01	2,44E+00	6,92E+00	9,11E-02	0,00E+00	5,20E-02	-6,59E-02
ODP	[kg CFC 11 eq.]	1,86E-07	3,62E-11	1,41E-10	2,85E-10	3,76E-12	0,00E+00	8,46E-10	-1,01E-08
AP	[mol H^+ eq.]	2,87E+01	1,73E-01	4,71E+00	7,06E-01	1,79E-02	0,00E+00	1,46E+00	-7,45E-01
EP-freshwater	[kg P eq.]	7,75E-03	3,46E-04	9,71E-04	2,73E-03	3,59E-05	0,00E+00	3,46E-04	-1,90E-03
EP-marine	[kg N eq.]	5,35E+00	6,12E-02	2,39E+00	1,63E-01	6,35E-03	0,00E+00	5,61E-01	-2,74E-01
EP-terrestrial	[mol N eq.]	5,84E+01	7,34E-01	2,63E+01	2,12E+00	7,62E-02	0,00E+00	6,66E+00	-2,92E+00
POCP	[kg NMVOC eq.]	1,88E+01	1,51E-01	6,89E+00	5,67E-01	1,57E-02	0,00E+00	1,45E+00	-7,07E-01
ADPm[1]	[kg Sb eq.]	2,74E-03	1,06E-05	2,98E-05	8,37E-05	1,10E-06	0,00E+00	6,13E-06	-6,38E-05
ADPf[1]	[MJ]	1,09E+05	1,99E+03	5,61E+03	1,57E+04	2,07E+02	0,00E+00	1,27E+03	-1,15E+04
WDP[1]	[m^3 world eq. deprived]	8,00E+02	7,70E-01	2,91E+01	6,07E+00	8,00E-02	0,00E+00	3,24E+02	-9,89E+00
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 = Acidifcation; 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 depletion potential								
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 [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	3,00E-04	1,21E-06	1,09E-04	5,56E-06	1,26E-07	0,00E+00	9,70E-06	-5,41E-06
IRP[2]	[kBq U235 eq.]	1,31E+02	2,82E-01	1,00E+00	2,22E+00	2,93E-02	0,00E+00	4,50E+00	-4,69E+01
ETP-fw[1]	[CTUe]	4,00E+04	1,46E+03	4,08E+03	1,15E+04	1,51E+02	0,00E+00	4,85E+02	-1,78E+03
HTP-c[1]	[CTUh]	2,32E-05	2,90E-08	8,25E-08	2,29E-07	3,01E-09	0,00E+00	4,69E-08	-1,40E-07
HTP-nc[1]	[CTUh]	7,89E-05	1,22E-06	3,46E-06	9,59E-06	1,26E-07	0,00E+00	3,56E-06	-3,80E-06
SQP[1]	-	4,40E+04	7,10E+02	2,00E+03	5,60E+03	7,37E+01	0,00E+00	4,27E+02	-2,98E+03
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 (dimensionless)								
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.								
	[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 PER [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	1,11E+04	1,34E+02	3,92E+02	1,05E+03	1,39E+01	0,00E+00	4,16E+02	-4,49E+03
PERM	[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
PERT	[MJ]	1,11E+04	1,34E+02	3,92E+02	1,05E+03	1,39E+01	0,00E+00	4,16E+02	-4,49E+03
PENRE	[MJ]	1,09E+05	2,00E+03	5,62E+03	1,58E+04	2,08E+02	0,00E+00	1,27E+03	-1,15E+04
PENRM	[MJ]	1,38E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	1,23E+05	2,00E+03	5,62E+03	1,58E+04	2,08E+02	0,00E+00	1,27E+03	-1,15E+04
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	[m³]	2,57E+01	1,19E-01	9,65E-01	9,38E-01	1,24E-02	0,00E+00	7,68E+00	-1,55E+00
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 [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	7,22E-05	3,37E-09	9,92E-09	2,66E-08	3,50E-10	0,00E+00	1,25E-08	-7,55E-07
NHWD	[kg]	4,88E+02	2,99E-01	3,47E+00	2,36E+00	3,11E-02	0,00E+00	1,56E+02	-6,25E+00
RWD	[kg]	1,00E+00	2,63E-03	9,38E-03	2,07E-02	2,73E-04	0,00E+00	4,26E-02	-4,50E-01
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[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
EEE	[MJ]	2,78E+02	0,00E+00	3,24E+02	0,00E+00	0,00E+00	0,00E+00	2,40E+03	0,00E+00
EET	[MJ]	6,47E+02	0,00E+00	7,58E+02	0,00E+00	0,00E+00	0,00E+00	5,58E+03	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; EEE = Exported electrical energy; EET = Exported thermal energy								

BIOGENIC CARBON CONTENT PER [m³]		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	kg C	5,40E-08
Biogenic carbon content in accompanying packaging	kg C	1,82E-09
Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2		

SAERTEX-LINER® MULTI 1200/12

ENVIRONMENTAL IMPACTS PER [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	[kg CO_2 eq.]	5,40E+03	1,48E+02	7,66E+02	6,90E+01	1,49E+01	0,00E+00	2,57E+03	-7,69E+02
GWP-fossil	[kg CO_2 eq.]	5,51E+03	1,48E+02	3,98E+02	1,00E+02	1,49E+01	0,00E+00	9,76E+02	-7,63E+02
GWP-biogenic	[kg CO_2 eq.]	-1,06E+02	-6,65E-01	3,66E+02	-3,53E+01	-6,69E-02	0,00E+00	1,60E+03	-5,28E+00
GWP-luluc	[kg CO_2 eq.]	2,18E+00	8,88E-01	2,27E+00	4,31E+00	8,94E-02	0,00E+00	5,10E-02	-6,85E-02
ODP	[kg CFC 11 eq.]	1,84E-07	3,66E-11	1,54E-10	1,78E-10	3,69E-12	0,00E+00	8,30E-10	-1,05E-08
AP	[mol H^+ eq.]	2,85E+01	1,75E-01	4,41E+00	4,40E-01	1,76E-02	0,00E+00	1,43E+00	-7,73E-01
EP-freshwater	[kg P eq.]	7,60E-03	3,50E-04	9,09E-04	1,70E-03	3,52E-05	0,00E+00	3,39E-04	-1,98E-03
EP-marine	[kg N eq.]	5,31E+00	6,19E-02	2,23E+00	1,02E-01	6,23E-03	0,00E+00	5,50E-01	-2,85E-01
EP-terrestrial	[mol N eq.]	5,80E+01	7,43E-01	2,46E+01	1,32E+00	7,47E-02	0,00E+00	6,53E+00	-3,03E+00
POCP	[kg NMVOC eq.]	1,87E+01	1,53E-01	6,43E+00	3,54E-01	1,54E-02	0,00E+00	1,43E+00	-7,35E-01
ADPm[1]	[kg Sb eq.]	3,66E-03	1,07E-05	2,79E-05	5,22E-05	1,08E-06	0,00E+00	6,01E-06	-6,63E-05
ADPf[1]	[MJ]	1,07E+05	2,02E+03	5,25E+03	9,80E+03	2,03E+02	0,00E+00	1,24E+03	-1,20E+04
WDP[1]	[m^3 world eq. deprived]	7,95E+02	7,79E-01	4,15E+01	3,79E+00	7,85E-02	0,00E+00	3,17E+02	-1,03E+01
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 = Acidifcation; 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 depletion potential								
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 [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	3,09E-04	1,22E-06	1,02E-04	3,47E-06	1,23E-07	0,00E+00	9,52E-06	-5,62E-06
IRP[2]	[kBq U235 eq.]	1,30E+02	2,85E-01	1,05E+00	1,38E+00	2,87E-02	0,00E+00	4,42E+00	-4,87E+01
ETP-fw[1]	[CTUe]	3,90E+04	1,47E+03	3,81E+03	7,16E+03	1,48E+02	0,00E+00	4,76E+02	-1,84E+03
HTP-c[1]	[CTUh]	3,32E-05	2,94E-08	7,78E-08	1,43E-07	2,96E-09	0,00E+00	4,60E-08	-1,45E-07
HTP-nc[1]	[CTUh]	7,72E-05	1,23E-06	3,24E-06	5,98E-06	1,24E-07	0,00E+00	3,49E-06	-3,95E-06
SQP[1]	-	6,13E+04	7,18E+02	1,87E+03	3,49E+03	7,23E+01	0,00E+00	4,18E+02	-3,09E+03
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 (dimensionless)								
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.								
	[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 PER [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	1,17E+04	1,35E+02	3,75E+02	6,57E+02	1,36E+01	0,00E+00	4,08E+02	-4,67E+03
PERM	[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
PERT	[MJ]	1,17E+04	1,35E+02	3,75E+02	6,57E+02	1,36E+01	0,00E+00	4,08E+02	-4,67E+03
PENRE	[MJ]	1,07E+05	2,02E+03	5,26E+03	9,82E+03	2,04E+02	0,00E+00	1,24E+03	-1,20E+04
PENRM	[MJ]	1,21E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	1,19E+05	1,35E+03	5,26E+03	9,82E+03	2,04E+02	0,00E+00	1,24E+03	-1,20E+04
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	[m³]	2,53E+01	1,20E-01	1,24E+00	5,85E-01	1,21E-02	0,00E+00	7,53E+00	-1,61E+00
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 [m³]									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	6,08E-05	3,41E-09	9,53E-09	1,66E-08	3,43E-10	0,00E+00	1,23E-08	-7,84E-07
NHWD	[kg]	4,85E+02	3,03E-01	4,67E+00	1,47E+00	3,05E-02	0,00E+00	1,53E+02	-6,49E+00
RWD	[kg]	9,85E-01	2,66E-03	9,83E-03	1,29E-02	2,68E-04	0,00E+00	4,17E-02	-4,67E-01
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[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
EEE	[MJ]	2,61E+02	0,00E+00	4,75E+02	0,00E+00	0,00E+00	0,00E+00	2,36E+03	0,00E+00
EET	[MJ]	6,07E+02	0,00E+00	1,11E+03	0,00E+00	0,00E+00	0,00E+00	5,48E+03	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; EEE = Exported electrical energy; EET = Exported thermal energy								

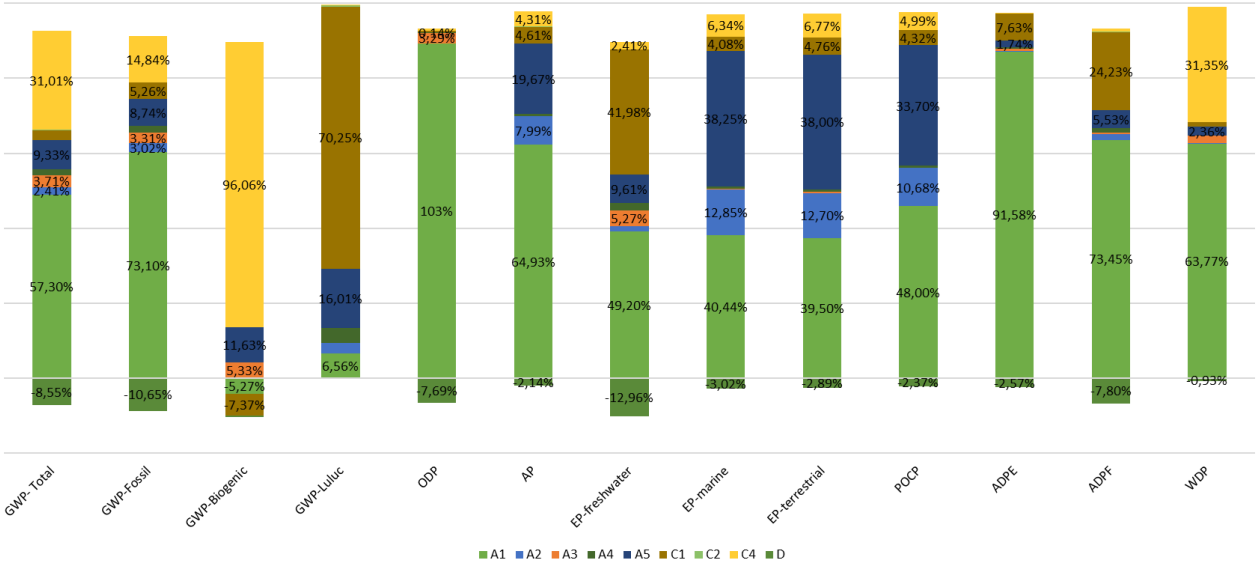
BIOGENIC CARBON CONTENT PER [m³]		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	kg C	5,17E-08
Biogenic carbon content in accompanying packagaing	kg C	2,66E-09
Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2		

Additional information

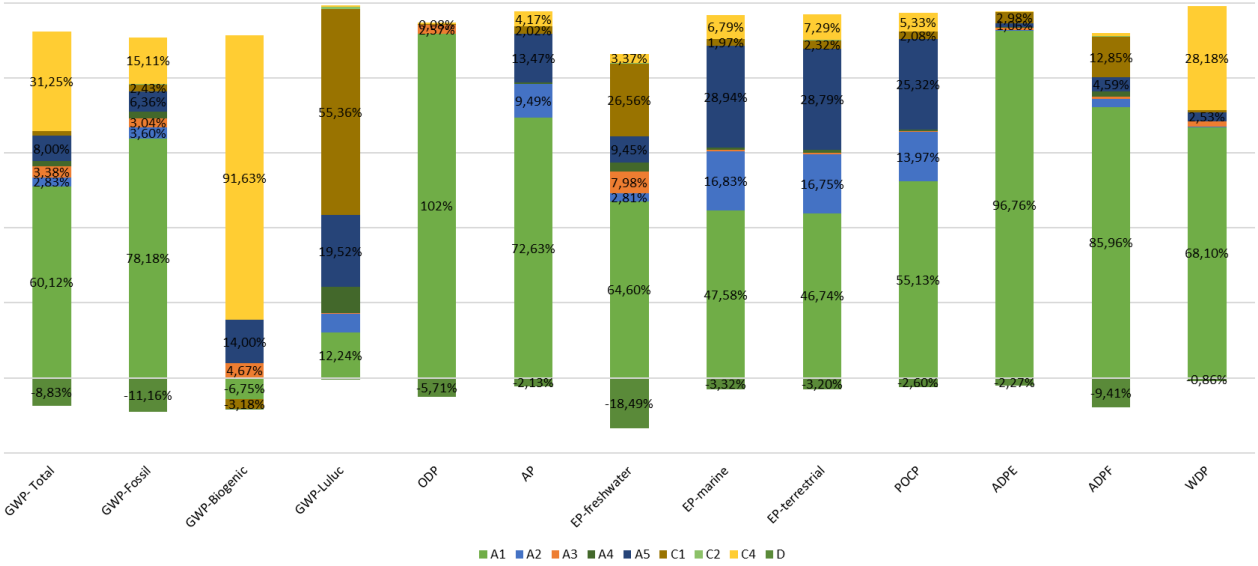
LCA interpretation

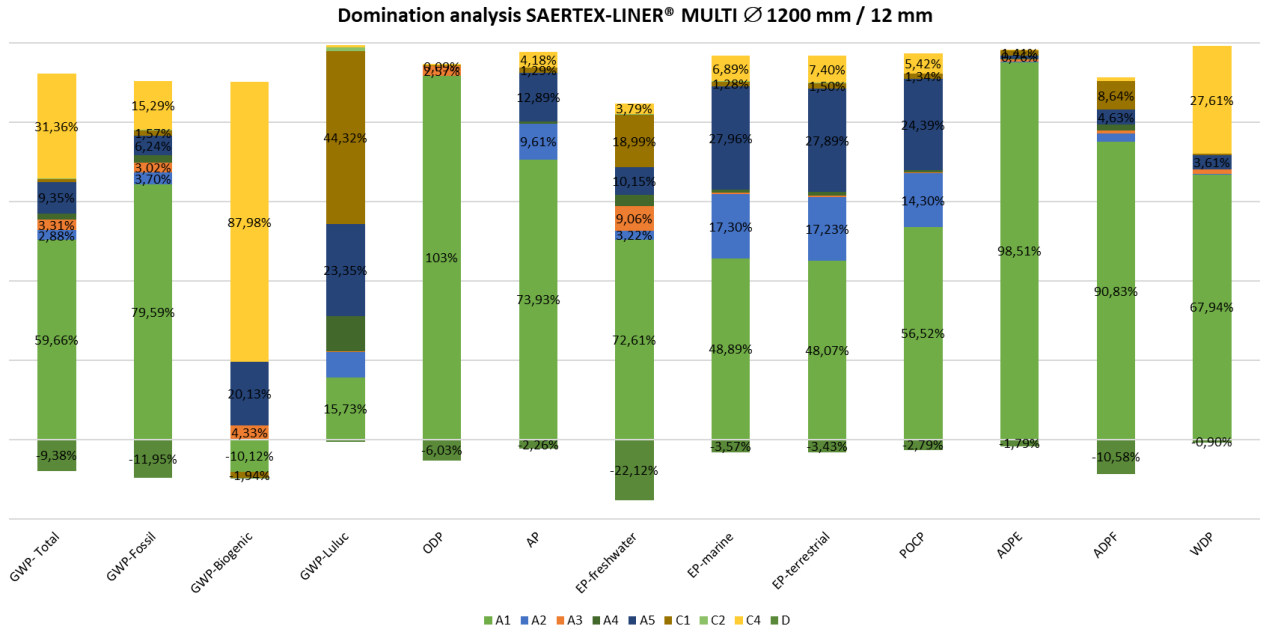
Most of the environmental impact comes from the production of raw materials in module A1, with the production of glass fibers dominating, followed by the production of the resin. In addition to the production of raw materials, the thermal utilization of the product at the end of its life cycle also has a major influence on the overall result. The other indicators largely follow the same pattern. A graphical representation can be found in the diagrams below with the percentage shares of the individual life cycle stages in the overall result.

Domination analysis SAERTEX-LINER® MULTI ∅ 600 mm / 5 mm



Domination analysis SAERTEX-LINER® MULTI ∅ 800 mm / 10 mm





Technical information on scenarios

SAERTEX-LINER® MULTI 600/5

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	LKW Euro 6, 34-40 t Total weight	-
Transport distance	900	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	2.232	kg/m³

Installation of the product in the building (A5)

Scenario information	Value	Unit
Packaging material Wooden transport crate for thermal utilization	120	kg
Support cap for thermal utilization	2,66	kg
Amount of diesel consumed for preparatory work and the actual installation	219	Liter

Reference service life for gravity liners

RSL-Informationen	Unit
Reference service Life	100 Years
Declared product properties	It is assumed that the implementation for installation complies with the manufacturer's recommendations. Technical specifications and instructions can be requested by contacting Saertex multiCom directly. https://www.saertex-multicom.de/de/kontakt
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

Reference service life for pressure liners

RSL-Informationen	Unit
Reference service Life	50 Years

Declared product properties	It is assumed that the implementation for installation complies with the manufacturer's recommendations. Technical specifications and instructions can be requested by contacting Saertex multiCom directly. https://www.saertex-multicom.de/de/kontakt
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

End of life (C1-C4)

Scenario information	Value	Unit
Amount of diesel consumed for dismantling	963	Liter
Collected separately	2.232	kg
For energy recovery	2.232	kg
Type of fuel	Diesel	-
Vehicle type	LKW Euro 6, 34-40 t Total weight	-
Transportation distance	100	km

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Net flow in module D	2.232	kg
Electrical efficiency of the system	25,9	%
Thermal efficiency of the system	11,1	%

SAERTEX-LINER® MULTI 800/10

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	LKW Euro 6, 34-40 t Total weight	-
Transport distance	900	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	2.065	kg/m³

Installation of the product in the building (A5)

Scenario information	Value	Unit
Packaging material Wooden transport crate for thermal utilization	140	kg
Support cap for thermal utilization	3,54	kg
Amount of diesel consumed for preparatory work and the actual installation	142	Liter

Reference service life for gravity liners

RSL-Informationen	Unit
Reference service Life	100 Years
Declared product properties	It is assumed that the implementation for installation complies with the manufacturer's recommendations. Technical specifications and instructions can be requested by contacting Saertex multiCom directly. https://www.saertex-multicom.de/de/kontakt
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

Reference service life for pressure liners

RSL-Informationen	Unit
Reference service Life	50 Years
Declared product properties	It is assumed that the implementation for installation complies with the manufacturer's recommendations. Technical specifications and instructions can be requested by contacting Saertex multiCom directly. https://www.saertex-multicom.de/de/kontakt
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

End of life (C1-C4)

Scenario information	Value	Unit
Amount of diesel consumed for dismantling	403	Liter
Collected separately	2.065	kg
For energy recovery	2.065	kg
Type of fuel	Diesel	-
Vehicle type	LKW Euro 6, 34-40 t Total weight	-
Transportation distance	100	km

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Net flow in module D	2.065	kg
Electrical efficiency of the system	25,9	%
Thermal efficiency of the system	11,1	%

SAERTEX-LINER® MULTI 1200/12

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	LKW Euro 6, 34-40 t Total weight	-
Transport distance	900	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	2.025	kg/m³

Installation of the product in the building (A5)

Scenario information	Value	Unit
Packaging material Wooden transport crate for thermal utilization	205	kg
Support cap for thermal utilization	5,32	kg
Amount of diesel consumed for preparatory work and the actual installation	133	Liter

Reference service life for gravity liners

RSL-Informationen	Unit
Reference service Life	100 Years
Declared product properties	It is assumed that the implementation for installation complies with the manufacturer's recommendations. Technical specifications and instructions can be requested by contacting Saertex multiCom directly. https://www.saertex-multicom.de/de/kontakt
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

Reference service life for pressure liners

RSL-Informationen	Unit
Reference service Life	50 Years
Declared product properties	It is assumed that the implementation for installation complies with the manufacturer's recommendations. Technical specifications and instructions can be requested by contacting Saertex multiCom directly. https://www.saertex-multicom.de/de/kontakt
Design application parameters	
Assumed quality of work	
Outdoor environment	
Indoor environment	
Usage conditions	
Maintenance	

End of life (C1-C4)

Scenario information	Value	Unit
Amount of diesel consumed for dismantling	252	Liter
Collected separately	2.025	kg
For energy recovery	2.025	kg
Type of fuel	Diesel	-
Vehicle type	LKW Euro 6, 34-40 t Total weight	-
Transportation distance	100	km

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Net flow in module D	2.025	kg
Electrical efficiency of the system	25,9	%
Thermal efficiency of the system	11,1	%

Indoor air

The product considered in this study is installed exclusively underground and is therefore not relevant for indoor air.

Soil and water

The EPD does not contain any information on the release of hazardous substances into soil and water, as the horizontal standards for the relevant measurements are not available.

References

Publisher	www.epddanmark.dk Template version 2023.2
Programme operator	Danish Technological Institute Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	WESSLING Consulting Engineering GmbH & Co. KG Oststraße 6, 48341 Altenberge www.wessling-consulting-engineering.de
LCA software /background data	Sphera GaBi Database Version 2023.2 www.sphera.com
3rd party verifier	Kim Christiansen Kimconsult www.kimconsult.dk

General programme instructions
General Programme Instructions, version 2.0, spring 2020
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”.

EN 15942
DS/EN 15942:2021 – ”Sustainability of construction works – Environmental product declarations – Communication format business-to-business”.

EN 15941
DS/EN 15941:2024 – ”Sustainability of construction works - Data quality for environmental assessment of products and construction work - Selection and use of data”.

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

ISO 14040
DS/EN ISO 14040:2020 – ”Environmental management – Life cycle assessment – Principles and framework”

ISO 14044
DS/EN ISO 14044:2020 – ”Environmental management – Life cycle assessment – Requirements and guidelines”