epddanmark

ECO PLATFORM EPD VERIFIED

Owner: Phønix Tag Materialer A/S
No.: MD-22069-EN

Issued: 28-09-2022
Valid to: 28-09-2027

3rd PARTY **VERIFIED**

EPD

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

Owner of declaration
Phønix Tag Materialer A/S
Vester Allé 1
6600 Vejen
VAT no. 25711785

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared product(s)
Three bitumen membranes:

- PTM AeroTæt 20 Dampspærre (vapor barrier)
- PTM AeroTæt 32 Dampspærre (vapor barrier)
- PTM Flammespærre (flame barrier)

Number of declared datasets/product variations: 3

Production site
The production site is located in Vejen in Denmark.

Product(s) use
The EPD covers three bitumen membranes, which are intended as vapor and flame barriers.

Declared or functional unit
1 m^2 bitumen sheet.

Year of data
2021

EPD version
1st version.

Issued: 28-09-2022
Valid to: 28-09-2027

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 serves as the core PCR

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

☐ internal ☒ external

Third party verifier:

Guangli Du, Aalborg University

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
Bitumen	49-59%
Reinforcement (polyester/glass fibre)	3-6%
Minerals as fillers and finishing	36-48%
Polypropylene film	<1%

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the Cradle-to-gate with options, modules C1-C4 and D, impact from three bituminous membranes. The production site is Vejen, Denmark. The product specific data, covering the production process and packaging of the products, as well as supplier location and information on inbound transport, has been collected for the year 2021. Allocation of manufacturing data was based on the bill of materials or allocated based on square metres. Background data are based on GaBi 10.6.1.35 incl. databases 2022.2 Edition, Ecoinvent 3.8 and an LCI profile from Eurobitume. One dataset is 12 years old, and the remaining datasets are all less than 10 years old.

Picture of product(s)

Hazardous substances

The product does not contain substances listed in the "Candidate List of Substances of Very High Concern for authorization" more than 0,1 weight %.

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

Essential characteristics (CE)

The reinforced bitumen membranes PTM AeroTæt are covered by harmonized technical specification DS/EN13970:2004+A1:2006 and PTM Flammespærre is covered by harmonized technical specification DS/EN13707:2004+A2:2009. Declaration of performance according to EU regulation 305/2011 is available for all declared product variations.

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

https://www.phonixtagmaterialer.dk/produkter/

Reference Service Life (RSL)

Not relevant for the study but is 35 years according to EWA (European Waterproofing Association).

LCA background

Functional Unit

Not relevant for the assessment.

Declared unit

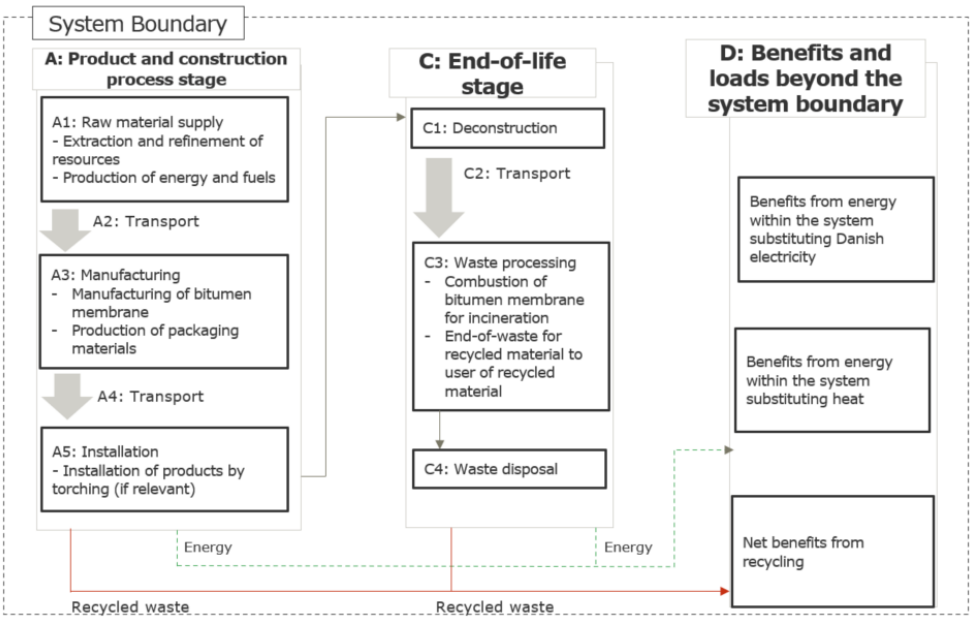
The LCI and LCIA results in this EPD relates to a declared unit for the three bitumen membranes defined as: "1 m^2 bitumen sheet".

Name	Amount	Unit
PTM AeroTæt 20 Dampspærre		
Declared unit	1	m^2 bitumen sheet
Density	2.24	kg/m^2
Conversion factor to 1 kg	0.447	m^2/kg
PTM AeroTæt 32 Dampspærre		
Declared unit	1	m^2 bitumen sheet
Density	3.39	kg/m^2
Conversion factor to 1 kg	0.295	m^2/kg
PTM Flammespærre		
Declared unit	1	m^2 bitumen sheet
Density	2.54	kg/m^2
Conversion factor to 1 kg	0.394	m^2/kg

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804+A2.

Flowdiagram



System boundary

This EPD is based on an LCA, in which 99,8 weight-% has been accounted for. The packaging materials of incoming raw materials have been excluded.

The cut-off criteria, meaning 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 – Raw material supply

Module A1 comprises impacts from extraction and processing of raw materials including bitumen, reinforcements (polyester/glass- fiber), fillers, etc. The module also includes the production of purchased electricity and water used at the PTM production site.

A2 – Transport (to the manufacturing site)

Module A2 comprises impacts from transportation of raw materials to the PTM production site, which includes extraction and production of the fuels as well as the combustion of the fuel during the transport.

A3 – Manufacturing

Module A3 includes the manufacturing of the final product, production of packaging materials, combustion of fuels on site, as well as end-of-life treatment of waste generated during manufacturing. Land use is also included, both land occupation and land transformation, as well as inflows and outflows of water that is used in the manufacturing. Impacts from these waste management processes are included in module A3.

Certified electricity from wind power and biogas are used for energy.

Construction process stage (A4-A5) includes:

A4 – Transport

Module A4 includes impacts from transportation of the finished product to an assumed installation site in Denmark. The module includes extraction of the fuels and the combustion of the fuel during the transport.

A5 – Construction installation process

Module A5 represents installation of the product at the installation site. The module includes the production of additional bitumen sheet needed for overlap of the layers and wasted product during installation if needed. It also includes production and combustion of propane for torching if needed. Waste from the installation is classified as materials for recycling or waste for incineration with energy recovery. Impacts from these waste management processes are included in module A5 whereas potential benefits beyond the system boundary are reported in module D.

End of Life stage (C1-C4) includes:

C1 – De-construction, demolition

De-construction of the bitumen sheet was assumed to be done manually, and thus not require any processes with an environmental impact.

C2 – Transport (to waste processing)

Module C2 comprises impacts from transportation of the deconstructed products to waste processing. The waste processing consists of two scenarios that are displayed separately.

C3 – Waste processing

Module C3 consists of the waste processing steps, that is incineration of the bitumen membranes at end-of-life. Emissions from incineration are reported in module C3 and the benefits from heat and electricity generation are carried forward to module D. The de-constructed bitumen from C1 that is recycled is reported as materials for recycling in C3. Waste for recycling

leaves the system boundary and potential benefits are reported in module D.

C4 – Disposal

Ashes and other remains after incineration are reported in stage C4, this includes slag landfill and residual landfill. Note that this does not include ashes from the other modules with bitumen waste, i.e. module A5, since the emissions are reported in their respective modules.

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

Module D includes reuse, recovery and/or recycling potential, expressed as net impact and benefits, due to recycling and incineration of materials with energy recovery. In the end-of-life stage, part of the product is incinerated, and electricity and heat are produced. The energy is recovered and assumed to replace electricity and heat that would have been produced from other sources.

For the membranes that are sent to recycling, the net benefit consists of burdens from recycling processes and the benefit of replacement of alternative material production used in the production of asphalt mixture.

LCA results

Results per declared unit

PTM AeroTæt 20 Dampspærre

LCA results according to the preceeding EN15804+A1 standard can be found in a separate appendix.

ENVIRONMENTAL IMPACTS PER [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	7.49E-01	2.83E-02	3.29E-01	0	2.82E-02	0.00E+00	0.00E+00	-3.00E-01	1.24E-02	4.07E+00	1.70E-03	-1.45E+00
GWP-fossil	[kg CO_2 eq.]	7.40E-01	2.81E-02	3.22E-01	0	2.79E-02	0.00E+00	0.00E+00	-2.99E-01	1.23E-02	4.07E+00	1.69E-03	-1.44E+00
GWP-biogenic	[kg CO_2 eq.]	7.98E-03	7.26E-05	6.54E-03	0	7.22E-05	0.00E+00	0.00E+00	-4.30E-04	3.18E-05	2.12E-04	4.54E-06	-2.59E-03
GWP-luluc	[kg CO_2 eq.]	1.04E-03	1.92E-04	1.66E-04	0	1.91E-04	0.00E+00	0.00E+00	-3.81E-05	8.40E-05	4.82E-05	1.57E-07	-1.99E-04
ODP	[kg CFC 11 eq.]	8.92E-09	2.80E-15	2.77E-08	0	2.78E-15	0.00E+00	0.00E+00	1.77E-08	1.22E-15	1.82E-08	3.40E-10	5.44E-09
AP	[mol H^+ eq.]	1.45E-03	3.18E-05	4.04E-04	0	3.17E-05	0.00E+00	0.00E+00	4.08E-04	1.39E-05	1.43E-03	1.70E-05	-1.12E-03
EP-freshwater	[kg P eq.]	5.42E-05	1.02E-07	1.30E-05	0	1.01E-07	0.00E+00	0.00E+00	-1.29E-05	4.45E-08	1.95E-05	9.59E-08	-6.82E-06
EP-marine	[kg N eq.]	8.10E-04	1.02E-05	1.91E-04	0	1.02E-05	0.00E+00	0.00E+00	-6.65E-04	4.48E-06	4.11E-04	7.27E-06	-6.64E-04
EP-terrestrial	[mol N eq.]	8.74E-03	1.23E-04	2.07E-03	0	1.22E-04	0.00E+00	0.00E+00	-7.47E-03	5.37E-05	3.79E-03	7.96E-05	-7.04E-03
POCP	[kg NMVOC eq.]	1.26E-03	2.74E-05	5.08E-04	0	2.73E-05	0.00E+00	0.00E+00	4.88E-04	1.20E-05	9.65E-04	2.23E-05	-1.04E-03
ADPm[1]	[kg Sb eq.]	3.47E-07	2.87E-09	3.29E-07	0	2.86E-09	0.00E+00	0.00E+00	1.18E-07	1.26E-09	1.99E-06	2.47E-09	-2.30E-07
ADPf[1]	[MJ]	6.32E+01	3.74E-01	9.05E+00	0	3.72E-01	0.00E+00	0.00E+00	-1.06E+02	1.64E-01	9.76E-01	2.27E-02	-5.26E+01
WDP[1]	[m^3]	9.86E-02	3.19E-04	2.15E-02	0	3.17E-04	0.00E+00	0.00E+00	-3.28E-02	1.39E-04	9.61E-02	5.26E-05	-5.42E-02
Caption	GWP-total = Global 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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
PM	[Disease incidence]	2.57E-08	2.19E-10	5.90E-09	0	2.18E-10	0.00E+00	0.00E+00	-7.78E-09	9.57E-11	8.57E-09	4.41E-10	-1.22E-08
IRP[2]	[kBq U235 eq.]	5.29E-02	1.05E-04	1.41E-02	0	1.05E-04	0.00E+00	0.00E+00	4.16E-03	4.61E-05	4.41E-03	9.93E-05	-5.42E-02
ETP-fw[1]	[CTUe]	1.19E+01	2.65E-01	2.61E+00	0	2.64E-01	0.00E+00	0.00E+00	-5.23E+00	1.16E-01	1.72E+00	1.75E-02	-3.68E+00
HTP-c[1]	[CTUh]	5.40E-10	5.47E-12	1.10E-10	0	5.43E-12	0.00E+00	0.00E+00	3.93E-11	2.39E-12	1.15E-10	5.03E-13	-2.70E-10
HTP-nc[1]	[CTUh]	4.03E-08	2.98E-10	6.25E-09	0	2.96E-10	0.00E+00	0.00E+00	-6.99E-10	1.30E-10	4.15E-09	2.02E-11	-5.07E-09
SQP[1]	-	1.32E+01	1.58E-01	1.86E+00	0	1.57E-01	0.00E+00	0.00E+00	2.91E-02	6.93E-02	4.25E-01	1.03E-01	-8.72E+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 (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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	7.15E+00	2.59E-02	1.05E+00	0	2.58E-02	0.00E+00	0.00E+00	-3.25E-01	1.13E-02	4.03E-02	1.73E-04	-1.28E+01
PERM	[MJ]	1.95E-01	0	-1.95E-01	0	0	0	0	0	0	0	0	0
PERT	[MJ]	7.35E+00	2.59E-02	8.52E-01	0	2.58E-02	0.00E+00	0.00E+00	-3.25E-01	1.13E-02	4.03E-02	1.73E-04	-1.28E+01
PENRE	[MJ]	2.14E+01	3.76E-01	5.55E+00	0	3.73E-01	0.00E+00	0.00E+00	-1.12E+02	1.64E-01	9.76E-01	2.27E-02	-5.46E+01
PENRM	[MJ]	4.49E+01	0	3.88E+00	0	0	-4.88E+01	0	4.88E+01	0	-4.88E+01	0	1.46E+01
PENRT	[MJ]	6.64E+01	3.76E-01	9.43E+00	0	3.73E-01	-4.88E+01	0.00E+00	-6.33E+01	1.64E-01	-1.37E+01	2.27E-02	-4.00E+01
SM	[kg]	6.85E-02	0.00E+00	8.21E-03	0	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	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m³]	3.61E-03	3.00E-05	6.61E-04	0	2.98E-05	0.00E+00	0.00E+00	-8.24E-04	1.31E-05	2.24E-03	1.23E-06	-4.70E-03
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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
HWD	[kg]	9.94E-10	1.99E-12	1.20E-10	0	1.98E-12	0.00E+00	0.00E+00	-4.18E-11	8.69E-13	0.00E+00	0.00E+00	-2.49E-09
NHWD	[kg]	1.18E-02	6.12E-05	1.43E-03	0	6.08E-05	0.00E+00	0.00E+00	1.24E-01	2.68E-05	0.00E+00	0.00E+00	1.58E-02
RWD	[kg]	2.22E-04	6.97E-07	-1.29E-05	0	6.93E-07	0.00E+00	0.00E+00	-8.71E-06	3.05E-07	0.00E+00	0.00E+00	-5.02E-04
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0.00E+00	0.00E+00	3.22E-02	0,00E+00	0.00E+00	2.46E+00	0.00E+00	0.00E+00	0.00E+00	7.38E-01	0.00E+00	0.00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0.00E+00	0.00E+00	1.22E-01	0,00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	2.35E-01	0,00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+01	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; EEE = Exported electrical energy; EET = Exported thermal energy												

BIOGENIC CARBON CONTENT PER [m² bitumen sheet]		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	6.76E-03
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Results per declared unit

PTM AeroTæt 32 Dampspærre

LCA results according to the preceeding EN15804+A1 standard can be found in a separate appendix.

ENVIRONMENTAL IMPACTS PER [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	1.01E+00	4.28E-02	5.35E-01	0	4.27E-02	0.00E+00	0.00E+00	-4.53E-01	1.88E-02	6.17E+00	2.57E-03	-2.19E+00
GWP-fossil	[kg CO_2 eq.]	1.00E+00	4.24E-02	5.27E-01	0	4.23E-02	0.00E+00	0.00E+00	-4.52E-01	1.86E-02	6.17E+00	2.56E-03	-2.19E+00
GWP-biogenic	[kg CO_2 eq.]	1.33E-02	1.10E-04	7.88E-03	0	1.09E-04	0.00E+00	0.00E+00	-6.51E-04	4.81E-05	3.22E-04	6.87E-06	-3.93E-03
GWP-luluc	[kg CO_2 eq.]	1.20E-03	2.90E-04	2.10E-04	0	2.89E-04	0.00E+00	0.00E+00	-5.77E-05	1.27E-04	7.30E-05	2.38E-07	-3.01E-04
ODP	[kg CFC 11 eq.]	1.08E-08	4.23E-15	5.37E-08	0	4.22E-15	0.00E+00	0.00E+00	2.68E-08	1.86E-15	2.75E-08	5.15E-10	8.19E-09
AP	[mol H^+ eq.]	1.71E-03	4.81E-05	7.92E-04	0	4.80E-05	0.00E+00	0.00E+00	6.16E-04	2.11E-05	2.17E-03	2.57E-05	-1.70E-03
EP-freshwater	[kg P eq.]	6.90E-05	1.54E-07	2.05E-05	0	1.53E-07	0.00E+00	0.00E+00	-1.96E-05	6.75E-08	2.95E-05	1.45E-07	-1.03E-05
EP-marine	[kg N eq.]	1.19E-03	1.55E-05	3.35E-04	0	1.54E-05	0.00E+00	0.00E+00	-1.01E-03	6.79E-06	6.23E-04	1.10E-05	-1.00E-03
EP-terrestrial	[mol N eq.]	1.29E-02	1.85E-04	3.64E-03	0	1.85E-04	0.00E+00	0.00E+00	-1.13E-02	8.14E-05	5.74E-03	1.21E-04	-1.06E-02
POCP	[kg NMVOC eq.]	1.50E-03	4.14E-05	9.04E-04	0	4.13E-05	0.00E+00	0.00E+00	7.39E-04	1.82E-05	1.46E-03	3.38E-05	-1.58E-03
ADPm[1]	[kg Sb eq.]	3.98E-07	4.34E-09	5.82E-07	0	4.33E-09	0.00E+00	0.00E+00	1.79E-07	1.90E-09	3.01E-06	3.74E-09	-3.49E-07
ADPf[1]	[MJ]	1.06E+02	5.65E-01	1.59E+01	0	5.64E-01	0.00E+00	0.00E+00	-1.60E+02	2.48E-01	1.48E+00	3.44E-02	-7.94E+01
WDP[1]	[m^3]	1.30E-01	4.82E-04	3.15E-02	0	4.80E-04	0.00E+00	0.00E+00	-4.96E-02	2.11E-04	1.46E-01	7.98E-05	-8.20E-02
Caption	GWP-total = Global 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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
PM	[Disease incidence]	3.64E-08	3.31E-10	1.12E-08	0	3.30E-10	0.00E+00	0.00E+00	-1.18E-08	1.45E-10	1.30E-08	6.68E-10	-1.84E-08
IRP[2]	[kBq U235 eq.]	6.44E-02	1.59E-04	2.30E-02	0	1.59E-04	0.00E+00	0.00E+00	6.29E-03	6.98E-05	6.69E-03	1.50E-04	-8.22E-02
ETP-fw[1]	[CTUe]	1.56E+01	4.00E-01	4.19E+00	0	3.99E-01	0.00E+00	0.00E+00	-7.91E+00	1.76E-01	2.61E+00	2.66E-02	-5.55E+00
HTP-c[1]	[CTUh]	6.49E-10	8.25E-12	1.66E-10	0	8.23E-12	0.00E+00	0.00E+00	5.95E-11	3.62E-12	1.75E-10	7.62E-13	-4.09E-10
HTP-nc[1]	[CTUh]	4.92E-08	4.50E-10	8.65E-09	0	4.49E-10	0.00E+00	0.00E+00	-1.06E-09	1.98E-10	6.28E-09	3.07E-11	-7.69E-09
SQP[1]	-	1.35E+01	2.39E-01	2.15E+00	0	2.39E-01	0.00E+00	0.00E+00	4.36E-02	1.05E-01	6.43E-01	1.56E-01	-1.32E+01
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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	7.47E+00	3.92E-02	1.09E+00	0	3.91E-02	0.00E+00	0.00E+00	-4.93E-01	1.72E-02	6.11E-02	2.63E-04	-1.93E+01
PERM	[MJ]	1.95E-01	0	-1.95E-01	0	0	0	0	0	0	0	0	0
PERT	[MJ]	7.66E+00	3.92E-02	8.93E-01	0	3.91E-02	0.00E+00	0.00E+00	-4.93E-01	1.72E-02	6.11E-02	2.63E-04	-1.93E+01
PENRE	[MJ]	6.70E+01	5.67E-01	1.27E+01	0	5.66E-01	0.00E+00	0.00E+00	-1.70E+02	2.49E-01	1.48E+00	3.44E-02	-8.24E+01
PENRM	[MJ]	4.49E+01	0	3.88E+00	0	0	-4.88E+01	0	4.88E+01	0	-4.88E+01	0	1.46E+01
PENRT	[MJ]	1.12E+02	5.67E-01	1.65E+01	0	5.66E-01	-4.88E+01	0.00E+00	-1.21E+02	2.49E-01	1.61E+01	3.44E-02	-6.78E+01
SM	[kg]	8.32E-02	0.00E+00	9.98E-03	0	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	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m³]	4.46E-03	4.52E-05	9.11E-04	0	4.51E-05	0.00E+00	0.00E+00	-1.25E-03	1.99E-05	3.39E-03	1.86E-06	-7.12E-03
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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
HWD	[kg]	1.17E-09	3.00E-12	1.41E-10	0	2.99E-12	0.00E+00	0.00E+00	-6.34E-11	1.32E-12	0.00E+00	0.00E+00	-3.77E-09
NHWD	[kg]	1.32E-02	9.24E-05	1.59E-03	0	9.22E-05	0.00E+00	0.00E+00	1.88E-01	4.06E-05	0.00E+00	0.00E+00	2.35E-02
RWD	[kg]	2.70E-04	1.05E-06	-1.56E-05	0	1.05E-06	0.00E+00	0.00E+00	-1.32E-05	4.62E-07	0.00E+00	0.00E+00	-7.61E-04
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0.00E+00	0.00E+00	4.20E-02	0,00E+00	0.00E+00	3.73E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+00	0.00E+00	0.00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0.00E+00	0.00E+00	1.84E-01	0,00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E+01	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	3.57E-01	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E+01	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; EEE = Exported electrical energy; EET = Exported thermal energy												

BIOGENIC CARBON CONTENT PER [m² bitumen sheet]		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	6.76E-03
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Results per declared unit

PTM Flammespærre

LCA results according to the preceeding EN15804+A1 standard can be found in a separate appendix.

ENVIRONMENTAL IMPACTS PER [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	4.65E-01	3.21E-02	1.62E-01	0	3.20E-02	0.00E+00	0.00E+00	-3.40E-01	1.41E-02	4.62E+00	1.93E-03	-1.64E+00
GWP-fossil	[kg CO_2 eq.]	4.79E-01	3.18E-02	1.58E-01	0	3.17E-02	0.00E+00	0.00E+00	-3.39E-01	1.39E-02	4.62E+00	1.92E-03	-1.64E+00
GWP-biogenic	[kg CO_2 eq.]	-1.51E-02	8.23E-05	3.94E-03	0	8.19E-05	0.00E+00	0.00E+00	-4.88E-04	3.60E-05	2.41E-04	5.15E-06	-2.94E-03
GWP-luluc	[kg CO_2 eq.]	9.04E-04	2.18E-04	1.39E-04	0	2.17E-04	0.00E+00	0.00E+00	-4.33E-05	9.54E-05	5.47E-05	1.78E-07	-2.25E-04
ODP	[kg CFC 11 eq.]	1.45E-12	3.17E-15	-2.19E-09	0	3.16E-15	0.00E+00	0.00E+00	2.01E-08	1.39E-15	2.06E-08	3.86E-10	6.16E-09
AP	[mol H^+ eq.]	1.68E-03	3.61E-05	-7.09E-06	0	3.59E-05	0.00E+00	0.00E+00	4.62E-04	1.58E-05	1.62E-03	1.93E-05	-1.27E-03
EP-freshwater	[kg P eq.]	1.49E-05	1.15E-07	2.21E-06	0	1.15E-07	0.00E+00	0.00E+00	-1.47E-05	5.06E-08	2.21E-05	1.09E-07	-7.74E-06
EP-marine	[kg N eq.]	7.58E-04	1.16E-05	7.66E-05	0	1.16E-05	0.00E+00	0.00E+00	-7.55E-04	5.09E-06	4.67E-04	8.26E-06	-7.53E-04
EP-terrestrial	[mol N eq.]	8.20E-03	1.39E-04	8.29E-04	0	1.39E-04	0.00E+00	0.00E+00	-8.48E-03	6.09E-05	4.30E-03	9.04E-05	-7.99E-03
POCP	[kg NMVOC eq.]	8.00E-04	3.11E-05	4.18E-05	0	3.09E-05	0.00E+00	0.00E+00	5.54E-04	1.36E-05	1.09E-03	2.53E-05	-1.19E-03
ADPm[1]	[kg Sb eq.]	1.88E-07	3.26E-09	6.41E-08	0	3.24E-09	0.00E+00	0.00E+00	1.34E-07	1.43E-09	2.26E-06	2.80E-09	-2.61E-07
ADPf[1]	[MJ]	6.18E+01	4.24E-01	6.97E+00	0	4.22E-01	0.00E+00	0.00E+00	-1.20E+02	1.86E-01	1.11E+00	2.58E-02	-5.97E+01
WDP[1]	[m^3]	4.00E-02	3.62E-04	9.52E-03	0	3.60E-04	0.00E+00	0.00E+00	-3.72E-02	1.58E-04	1.09E-01	5.98E-05	-6.15E-02
Caption	GWP-total = Global 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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
PM	[Disease incidence]	2.97E-08	2.48E-10	1.43E-09	0	2.47E-10	0.00E+00	0.00E+00	-8.82E-09	1.09E-10	9.72E-09	5.01E-10	-1.38E-08
IRP[2]	[kBq U235 eq.]	1.26E-02	1.19E-04	9.54E-04	0	1.19E-04	0.00E+00	0.00E+00	4.72E-03	5.23E-05	5.01E-03	1.13E-04	-6.15E-02
ETP-fw[1]	[CTUe]	7.27E+00	3.01E-01	8.34E-01	0	2.99E-01	0.00E+00	0.00E+00	-5.94E+00	1.32E-01	1.95E+00	1.99E-02	-4.17E+00
HTP-c[1]	[CTUh]	1.49E-10	6.20E-12	1.82E-11	0	6.17E-12	0.00E+00	0.00E+00	4.46E-11	2.71E-12	1.31E-10	5.71E-13	-3.06E-10
HTP-nc[1]	[CTUh]	5.46E-09	3.38E-10	6.30E-10	0	3.37E-10	0.00E+00	0.00E+00	-7.93E-10	1.48E-10	4.71E-09	2.30E-11	-5.76E-09
SQP[1]	-	1.24E+01	1.80E-01	1.53E+00	0	1.79E-01	0.00E+00	0.00E+00	3.29E-02	7.86E-02	4.82E-01	1.17E-01	-9.90E+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 (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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	6.73E+00	2.94E-02	9.82E-01	0	2.93E-02	0.00E+00	0.00E+00	-3.69E-01	1.29E-02	4.57E-02	1.97E-04	-1.45E+01
PERM	[MJ]	1.95E-01	0	-1.95E-01	0	0	0	0	0	0	0	0	0
PERT	[MJ]	6.92E+00	2.94E-02	7.88E-01	0	2.93E-02	0.00E+00	0.00E+00	-3.69E-01	1.29E-02	4.57E-02	1.97E-04	-1.45E+01
PENRE	[MJ]	1.56E+01	4.26E-01	3.08E+00	0	4.24E-01	0.00E+00	0.00E+00	-1.27E+02	1.87E-01	1.11E+00	2.58E-02	-6.19E+01
PENRM	[MJ]	4.97E+01	0	4.31E+00	0	0	-5.40E+01	0	5.40E+01	0	-5.40E+01	0	1.62E+01
PENRT	[MJ]	6.53E+01	4.26E-01	7.39E+00	0	4.24E-01	5.40E+01	0.00E+00	-7.32E+01	1.87E-01	1.73E+01	2.58E-02	-4.57E+01
SM	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m³]	1.96E-03	3.40E-05	3.49E-04	0	3.38E-05	0.00E+00	0.00E+00	-9.35E-04	1.49E-05	2.54E-03	1.39E-06	-5.34E-03
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 [m² bitumen sheet]													
Parameter	Unit	A1-A3	A4	A5	C1	100% recycling				30% recycling, 70% incineration			
						C2	C3	C4	D	C2	C3	C4	D
HWD	[kg]	6.73E-10	2.25E-12	8.11E-11	0	2.24E-12	0.00E+00	0.00E+00	-4.75E-11	9.87E-13	0.00E+00	0.00E+00	-2.83E-09
NHWD	[kg]	2.38E-02	6.94E-05	2.86E-03	0	6.91E-05	0.00E+00	0.00E+00	1.41E-01	3.04E-05	0.00E+00	0.00E+00	1.78E-02
RWD	[kg]	1.02E-04	7.91E-07	-2.94E-05	0	7.87E-07	0.00E+00	0.00E+00	-9.88E-06	3.46E-07	0.00E+00	0.00E+00	-5.70E-04
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0.00E+00	0.00E+00	3.56E-02	0,00E+00	0.00E+00	2.79E+00	0.00E+00	0.00E+00	0.00E+00	8.38E-01	0.00E+00	0.00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0.00E+00	0.00E+00	1.38E-01	0,00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	2.67E-01	0,00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+01	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; EEE = Exported electrical energy; EET = Exported thermal energy												

BIOGENIC CARBON CONTENT PER [m² bitumen sheet]		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	6.76E-03
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Additional information

Technical information on scenarios

Transport to the installation site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	Euro 6, 28-32 t gross	-
Transport distance	164	km
Capacity utilization (including empty runs)	61	%
Capacity utilization volume factor	1	-

Installation of the product (A5)

Scenario information	PTM AeroTæt 20 Dampspærre	PTM AeroTæt 32 Dampspærre	PTM Flammespærre	Unit
Ancillary materials	0	0	0	kg
Water use	0	0	0	m^3
Other resource use	–	–	–	kg
Energy type and consumption	1.64 (propane)	3.14 (propane)	0	MJ
Waste materials	0.014 (wooden pallet, for recycling)	0.014 (wooden pallet, for recycling)	0.014 (wooden pallet, for recycling)	kg
	0.0015 (wooden pallet, for incineration)	0.0015 (wooden pallet, for incineration)	0.0015 (wooden pallet, for incineration)	
	0.015 (plastics, for incineration)	0.018 (plastics, for incineration)	0.015 (plastics, for incineration)	
	0.031 (bitumen, for incineration)	0.047 (bitumen, for incineration)	0.036 (bitumen, for incineration)	
	0.013 (bitumen, for recycling)	0.020 (bitumen, for recycling)	0.015 (bitumen, for recycling)	
Output materials	2.46 (bitumen membrane)	3.73 (bitumen membrane)	2.79 (bitumen membrane)	kg
Direct emissions to air, soil or water	Combustion of propane	Combustion of propane	-	kg

End of life (C1-C4)

Scenario information	30% recycling; 70% incineration with energy recovery			100% recycling			Unit
	PTM AeroTæt 20 Dampspærre	PTM AeroTæt 32 Dampspærre	PTM Flammespærre	PTM AeroTæt 20 Dampspærre	PTM AeroTæt 32 Dampspærre	PTM Flammespærre	
Collected separately	2.46	3.73	2.79	2.46	3.73	2.79	kg
Collected with mixed waste	0	0	0	0	0	0	kg
For reuse	0	0	0	0	0	0	kg
For recycling	0.74	1.119	0.837	2.46	3.73	2.79	kg
For energy recovery	1.72	2.61	1.95	0	0	0	kg
For final disposal	0.63	0.95	0.71	0	0	0	kg
Assumptions for scenario development	30 km to incineration 150 km to recycling	30 km to incineration 150 km to recycling	30 km to incineration 150 km to recycling	150 km to recycling	150 km to recycling	150 km to recycling	As appropriate

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	30% recycling; 70% incineration with energy recovery			100% recycling			Unit
	PTM AeroTæt 20 Dampspærre	PTM AeroTæt 32 Dampspærre	PTM Flammespærre	PTM AeroTæt 20 Dampspærre	PTM AeroTæt 32 Dampspærre	PTM Flammespærre	
Material for energy recovery	1.72	2.61	1.95	0.00	0.00	0.00	kg
Material for recycling	0.74	1.12	0.84	2.46	3.73	2.79	kg

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

References

Publisher	www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Niclas Silfverstrand and Janus Kirkeby Ramboll Sweden AB Vädursgatan 6 SE-412 50 Göteborg
LCA software /background data	GaBi 10.6.1.35 incl. databases 2022.2 Edition Ecoinvent 3.8, LCI profile from Eurobitume (2019)
3rd party verifier	Guangli Du, Aalborg University

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"

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"