epddanmark

Owner:	Phønix Tag Materialer A/S
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3rd PARTY **VERIFIED**

EPD

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

Owner of declaration
Phønix Tag Materialer A/S
Vester Allé 1
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Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared product(s)
Two systems of PTM reinforced bitumen membrane for roof waterproofing:

- System 1: PTM BituFlex (top layer) & PTM DuraFlex Kombi (bottom layer)
- System 2: PTM BituFlex Kombi (top layer) & PTM DuraFlex (bottom layer)

Number of declared datasets/product variations: 2

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

Product(s) use
The EPD covers two product systems, which are intended for roof waterproofing.

Declared or functional unit
1 m^2 installed 2-layer roof waterproofing, from cradle-to-grave, with activities needed for a study period of 50 years for the building.

In addition, the declared unit is "1 m^2 of produced roof waterproofing with processes at construction and end-of-life stage" as defined by the reference PCR**.**

Year of data
2019, with updated supplier information in 2021.

EPD version
Revision 4, [December 10th 2024]: change in wording; from reuse to recycling.

Issued: 10-03-2023
Valid to: 09-11-2025

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	X	X	X	X	X	X	X	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	54-55%
SBS-polymer	4-5%
Reinforcement (polyester/glass fibre)	4%
Minerals as fillers and finishing	36-37%
Polypropylene film	<1%

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the cradle-to-grave, and module D, impact from two reinforced bitumen membrane systems for roof waterproofing. 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 2019. Allocation of manufacturing data was based on the bill of materials or allocated based on square metres. Background data are based on GaBi ts 9.2.1.68 incl. databases 2020 Edition, Ecoinvent 3.6 and an LCI profile from Eurobitume and are 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 %.

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Essential characteristics (CE)

The elastomeric bitumen membranes are 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:

Reference Service Life (RSL)

The reference service life of the building is set to 50 years which is a departure from the reference PCR, see explanation below.

The waterproofing systems are expected to fulfill their function for 50 years in accordance with the TGA 2018/004 (Teknisk Godkendelse til Anvendelsen), technical approval for the use, for the product systems.

LCA background

Functional Unit

The LCI and LCIA results in this EPD relates to a functional unit for the two product systems (top layer + bottom layer) defined as: 1 m^2 installed 2-layer roof waterproofing, from cradle-to-grave, with activities needed for a study period of 50 years for the building.

Name	Amount	Unit
PTM BituFlex (top layer) & PTM DuraFlex Kombi (bottom layer)		
Functional unit	1	m^2 installed 2-layer roof waterproofing during 50 years
Conversion factor to 1 kg	0,11	m^2 installed 2-layer roof waterproofing during 50 years/kg
PTM BituFlex Kombi (top layer) & PTM Duraflex (bottom layer)		
Functional unit	1	m^2 installed 2-layer roof waterproofing during 50 years
Conversion factor to 1 kg	0,11	m^2 installed 2-layer roof waterproofing during 50 years /kg

Declared unit

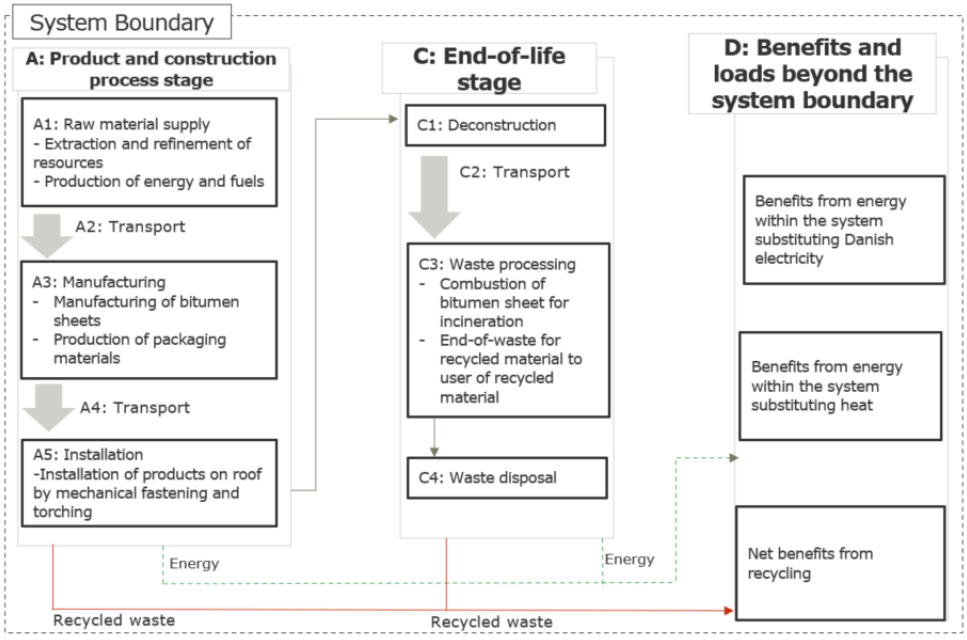
In addition to the functional unit, the PCR requires that results are also displayed per declared unit "1 m^2 of produced roof waterproofing with processes at construction and end-of-life stage". In this EPD, the results per declared unit are identical to the results per functional unit.

Name	Amount	Unit
PTM BituFlex (top layer) & PTM DuraFlex Kombi (bottom layer)		
Declared unit	1	m^2 of produced roof waterproofing with processes at construction and end-of-life stage
Conversion factor to 1 kg	0,11	m^2 of produced roof waterproofing with processes at construction and end-of-life stage/kg
PTM BituFlex Kombi (top layer) & PTM Duraflex (bottom layer)		
Declared unit	1	m^2 of produced roof waterproofing with processes at construction and end-of-life stage
Conversion factor to 1 kg	0,11	m^2 of produced roof waterproofing with processes at construction and end-of-life stage/kg

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804, and NPCR 022 version 2.0 (PCR – Part B for roof waterproofing). The RSL of the declared product is deviated from the definition in the reference PCR.

Flowdiagram



System boundary

This EPD is based on an LCA, in which 99,9 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, SBS-polymer, reinforcements (polyester/glass- and polyester 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.

Construction process stage (A4-A5) includes:

A4 – Transport

Module A4 includes impacts from transportation of the finished products (top and bottom layer) 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 to the building at the installation site. The module includes the production of additional bitumen sheets needed for overlap of the layers for complete waterproofing and wasted product during installation. It also includes production of fastening materials, and production and combustion of propane for torching. 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.

Use stage (B1-B7) includes:

B1 – Use

No impacts from use have been included in accordance with the default values provided in the reference PCR.

B2 – Maintenance

No impacts from maintenance have been included in accordance with the default values provided in the reference PCR.

B3 – Repair

No impacts from repair have been included in accordance with the default values provided in the reference PCR.

B4 – Replacement

No impacts from repair have been included in accordance with the default values provided in the reference PCR.

B5 – Refurbishment

No impacts from the refurbishment have been included in accordance with the default values provided in the reference PCR.

B6 – Operational energy use

The roofing system does not require energy to operate, there is therefore no operational energy use for either of the product systems.

B7 – Operational water use

The roofing system does not require water to operate, there is therefore no operational water use for either of the product systems.

End of Life stage (C1-C4) includes:

C1 – De-construction, demolition

De-construction of the waterproofing 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 after 50 years to the 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 sheets 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 sheets 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 functional unit – System 1

PTM BituFlex (top layer) & PTM DuraFlex Kombi (bottom layer).

ENVIRONMENTAL IMPACTS PER [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	3,48E+00	1,04E-01	1,90E+00	0	0	1,04E-01	0,00E+00	0,00E+00	-1,11E+00	4,58E-02	1,50E+01	6,26E-03	-5,34E+00
GWP-fossil	[kg CO_2 eq.]	3,46E+00	1,03E-01	1,89E+00	0	0	1,03E-01	0,00E+00	0,00E+00	-1,11E+00	4,53E-02	1,50E+01	6,25E-03	-5,33E+00
GWP-biogenic	[kg CO_2 eq.]	1,46E-02	2,67E-04	1,75E-02	0	0	2,66E-04	0,00E+00	0,00E+00	-1,59E-03	1,17E-04	7,84E-04	1,68E-05	-9,57E-03
GWP-luluc	[kg CO_2 eq.]	2,95E-03	7,06E-04	6,01E-04	0	0	7,05E-04	0,00E+00	0,00E+00	-1,41E-04	3,10E-04	1,78E-04	5,80E-07	-7,33E-04
ODP	[kg CFC 11 eq.]	4,14E-08	1,03E-14	1,58E-07	0	0	1,03E-14	0,00E+00	0,00E+00	6,55E-08	4,52E-15	6,71E-08	1,26E-09	2,02E-08
AP	[mol H^+ eq.]	6,91E-03	1,17E-04	4,06E-03	0	0	1,17E-04	0,00E+00	0,00E+00	1,51E-03	5,14E-05	5,28E-03	6,26E-05	-4,13E-03
EP-freshwater	[kg P eq.]	1,87E-04	3,74E-07	5,77E-05	0	0	3,74E-07	0,00E+00	0,00E+00	-4,78E-05	1,64E-07	7,20E-05	3,54E-07	-2,53E-05
EP-marine	[kg N eq.]	3,38E-03	3,77E-05	1,22E-03	0	0	3,76E-05	0,00E+00	0,00E+00	-2,46E-03	1,66E-05	1,52E-03	2,69E-05	-2,46E-03
EP-terrestrial	[mol N eq.]	3,74E-02	4,51E-04	1,33E-02	0	0	4,51E-04	0,00E+00	0,00E+00	-2,76E-02	1,98E-04	1,40E-02	2,94E-04	-2,60E-02
POCP	[kg NMVOC eq.]	7,02E-03	1,01E-04	3,78E-03	0	0	1,01E-04	0,00E+00	0,00E+00	1,81E-03	4,43E-05	3,56E-03	8,23E-05	-3,85E-03
ADPm[1]	[kg Sb eq.]	1,53E-06	1,06E-08	3,42E-06	0	0	1,05E-08	0,00E+00	0,00E+00	4,37E-07	4,64E-09	7,35E-06	9,12E-09	-8,49E-07
ADPf[1]	[MJ]	2,68E+02	1,38E+00	4,91E+01	0	0	1,37E+00	0,00E+00	0,00E+00	-3,90E+02	6,04E-01	3,60E+00	8,38E-02	-1,95E+02
WDP[1]	[m^3]	6,65E-01	1,17E-03	2,60E-01	0	0	1,17E-03	0,00E+00	0,00E+00	-1,21E-01	5,15E-04	3,55E-01	1,94E-04	-2,00E-01
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 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
PM	[Disease incidence]	1,16E-07	8,05E-10	4,92E-08	0	0	8,03E-10	0,00E+00	0,00E+00	-2,88E-08	3,53E-10	3,16E-08	1,63E-09	-4,49E-08
IRP[2]	[kBq U235 eq.]	2,02E-01	3,87E-04	7,27E-02	0	0	3,86E-04	0,00E+00	0,00E+00	1,54E-02	1,70E-04	1,63E-02	3,67E-04	-2,00E-01
ETP-fw[1]	[CTUe]	4,69E+01	9,75E-01	1,29E+01	0	0	9,73E-01	0,00E+00	0,00E+00	-1,93E+01	4,28E-01	6,35E+00	6,48E-02	-1,36E+01
HTP-c[1]	[CTUh]	3,22E-09	2,01E-11	1,06E-08	0	0	2,01E-11	0,00E+00	0,00E+00	1,45E-10	8,83E-12	4,26E-10	1,86E-12	-9,96E-10
HTP-nc[1]	[CTUh]	6,49E-08	1,10E-09	2,00E-08	0	0	1,09E-09	0,00E+00	0,00E+00	-2,58E-09	4,82E-10	1,53E-08	7,47E-11	-1,87E-08
SQP[1]	-	3,78E+01	5,82E-01	6,30E+00	0	0	5,81E-01	0,00E+00	0,00E+00	1,09E-01	2,56E-01	1,57E+00	3,80E-01	-3,22E+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 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	1,73E+01	9,53E-02	2,50E+00	0	0	9,52E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PERM	[MJ]	7,20E-01	0	8,64E-02	0	0	0	0	0	0	0	0	0	0
PERT	[MJ]	1,80E+01	9,53E-02	2,59E+00	0	0	9,52E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PENRE	[MJ]	7,91E+01	1,38E+00	2,64E+01	0	0	1,38E+00	0,00E+00	0,00E+00	1,36E+02	6,07E-01	3,60E+00	8,38E-02	-2,69E+01
PENRM	[MJ]	2,02E+02	0	2,42E+01	0	0	0	0	0	-5,50E+02	0	0	0	-1,75E+02
PENRT	[MJ]	2,81E+02	1,38E+00	5,06E+01	0	0	1,38E+00	0,00E+00	0,00E+00	-4,15E+02	6,07E-01	3,60E+00	8,38E-02	-2,02E+02
SM	[kg]	2,04E-01	0,00E+00	2,47E-02	0	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	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m³]	1,64E-02	1,10E-04	6,49E-03	0	0	1,10E-04	0,00E+00	0,00E+00	-3,05E-03	4,84E-05	8,26E-03	4,53E-06	-1,74E-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 [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
HWD	[kg]	1,21E-08	7,31E-12	1,81E-09	0	0	7,30E-12	0,00E+00	0,00E+00	-1,54E-10	3,21E-12	0,00E+00	0,00E+00	-9,20E-09
NHWD	[kg]	4,75E-02	2,25E-04	8,61E-03	0	0	2,25E-04	0,00E+00	0,00E+00	4,59E-01	9,88E-05	0,00E+00	0,00E+00	5,89E-02
RWD	[kg]	9,25E-04	2,56E-06	6,85E-05	0	0	2,56E-06	0,00E+00	0,00E+00	-3,21E-05	1,13E-06	0,00E+00	0,00E+00	-1,85E-03
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0,00E+00	0,00E+00	1,14E-01	0	0	0,00E+00	9,08E+00	0,00E+00	0,00E+00	0,00E+00	2,73E+00	0,00E+00	0,00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0,00E+00	0,00E+00	4,49E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+01	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	8,68E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,78E+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 installed 2-layer roof waterproofing during 60 years]		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	2,25E-02
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Results per functional unit – System 2

PTM BituFlex Kombi (top layer) & PTM DuraFlex (bottom layer)

ENVIRONMENTAL IMPACTS PER [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	3,66E+00	1,04E-01	1,93E+00	0	0	1,04E-01	0,00E+00	0,00E+00	-1,11E+00	4,57E-02	1,50E+01	6,26E-03	-5,34E+00
GWP-fossil	[kg CO_2 eq.]	3,64E+00	1,03E-01	1,91E+00	0	0	1,03E-01	0,00E+00	0,00E+00	-1,10E+00	4,53E-02	1,50E+01	6,24E-03	-5,33E+00
GWP-biogenic	[kg CO_2 eq.]	1,86E-02	2,67E-04	1,82E-02	0	0	2,66E-04	0,00E+00	0,00E+00	-1,59E-03	1,17E-04	7,84E-04	1,67E-05	-9,56E-03
GWP-luluc	[kg CO_2 eq.]	3,05E-03	7,06E-04	6,09E-04	0	0	7,05E-04	0,00E+00	0,00E+00	-1,41E-04	3,10E-04	1,78E-04	5,80E-07	-7,33E-04
ODP	[kg CFC 11 eq.]	2,25E-08	1,03E-14	1,54E-07	0	0	1,03E-14	0,00E+00	0,00E+00	6,54E-08	4,52E-15	6,70E-08	1,25E-09	2,01E-08
AP	[mol H^+ eq.]	6,60E-03	1,17E-04	3,89E-03	0	0	1,17E-04	0,00E+00	0,00E+00	1,51E-03	5,14E-05	5,28E-03	6,26E-05	-4,12E-03
EP-freshwater	[kg P eq.]	1,51E-04	3,74E-07	5,33E-05	0	0	3,73E-07	0,00E+00	0,00E+00	-4,78E-05	1,64E-07	7,19E-05	3,54E-07	-2,52E-05
EP-marine	[kg N eq.]	3,44E-03	3,77E-05	1,21E-03	0	0	3,76E-05	0,00E+00	0,00E+00	-2,46E-03	1,65E-05	1,52E-03	2,68E-05	-2,45E-03
EP-terrestrial	[mol N eq.]	3,73E-02	4,51E-04	1,31E-02	0	0	4,50E-04	0,00E+00	0,00E+00	-2,76E-02	1,98E-04	1,40E-02	2,94E-04	-2,60E-02
POCP	[kg NMVOC eq.]	7,30E-03	1,01E-04	3,76E-03	0	0	1,01E-04	0,00E+00	0,00E+00	1,80E-03	4,42E-05	3,56E-03	8,22E-05	-3,85E-03
ADPm[1]	[kg Sb eq.]	9,95E-07	1,06E-08	3,35E-06	0	0	1,05E-08	0,00E+00	0,00E+00	4,36E-07	4,64E-09	7,34E-06	9,12E-09	-8,49E-07
ADPf[1]	[MJ]	2,80E+02	1,38E+00	4,99E+01	0	0	1,37E+00	0,00E+00	0,00E+00	-3,90E+02	6,04E-01	3,60E+00	8,38E-02	-1,95E+02
WDP[1]	[m^3]	5,47E-01	1,17E-03	2,46E-01	0	0	1,17E-03	0,00E+00	0,00E+00	-1,21E-01	5,15E-04	3,55E-01	1,94E-04	-2,00E-01
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 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
PM	[Disease incidence]	1,07E-07	8,05E-10	4,69E-08	0	0	8,03E-10	0,00E+00	0,00E+00	-2,87E-08	3,53E-10	3,16E-08	1,63E-09	-4,49E-08
IRP[2]	[kBq U235 eq.]	1,97E-01	3,87E-04	7,15E-02	0	0	3,86E-04	0,00E+00	0,00E+00	1,54E-02	1,70E-04	1,63E-02	3,66E-04	-2,00E-01
ETP-fw[1]	[CTUe]	4,83E+01	9,75E-01	1,30E+01	0	0	9,73E-01	0,00E+00	0,00E+00	-1,93E+01	4,28E-01	6,35E+00	6,47E-02	-1,36E+01
HTP-c[1]	[CTUh]	2,76E-09	2,01E-11	1,05E-08	0	0	2,00E-11	0,00E+00	0,00E+00	1,45E-10	8,82E-12	4,26E-10	1,86E-12	-9,95E-10
HTP-nc[1]	[CTUh]	1,10E-07	1,10E-09	2,53E-08	0	0	1,09E-09	0,00E+00	0,00E+00	-2,58E-09	4,81E-10	1,53E-08	7,47E-11	-1,87E-08
SQP[1]	-	3,56E+01	5,82E-01	5,99E+00	0	0	5,81E-01	0,00E+00	0,00E+00	1,09E-01	2,56E-01	1,57E+00	3,80E-01	-3,22E+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 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
PERE	[MJ]	1,80E+01	9,53E-02	2,54E+00	0	0	9,51E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PERM	[MJ]	5,99E-01	0	7,18E-02	0	0	0	0	0	0	0	0	0	0
PERT	[MJ]	1,86E+01	9,53E-02	2,62E+00	0	0	9,51E-02	0,00E+00	0,00E+00	-1,20E+00	4,19E-02	1,49E-01	6,40E-04	-4,71E+01
PENRE	[MJ]	8,76E+01	1,38E+00	2,69E+01	0	0	1,38E+00	0,00E+00	0,00E+00	1,39E+02	6,06E-01	3,60E+00	8,38E-02	-2,44E+01
PENRM	[MJ]	2,05E+02	0	2,46E+01	0	0	0	0	0	-5,53E+02	0	0	0	-1,78E+02
PENRT	[MJ]	2,93E+02	1,38E+00	5,15E+01	0	0	1,38E+00	0,00E+00	0,00E+00	-4,14E+02	6,06E-01	3,60E+00	8,38E-02	-2,02E+02
SM	[kg]	1,73E-01	0,00E+00	2,07E-02	0	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	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m³]	1,40E-02	1,10E-04	6,22E-03	0	0	1,10E-04	0,00E+00	0,00E+00	-3,04E-03	4,83E-05	8,26E-03	4,52E-06	-1,74E-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 [m2 installed 2-layer roof waterproofing during 50 years]														
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	100% recycling				30% recycling, 70% incineration			
							C2	C3	C4	D	C2	C3	C4	D
HWD	[kg]	1,23E-08	7,31E-12	1,81E-09	0	0	7,29E-12	0,00E+00	0,00E+00	-1,54E-10	3,21E-12	0,00E+00	0,00E+00	-9,19E-09
NHWD	[kg]	5,43E-02	2,25E-04	9,37E-03	0	0	2,24E-04	0,00E+00	0,00E+00	4,58E-01	9,88E-05	0,00E+00	0,00E+00	5,86E-02
RWD	[kg]	9,58E-04	2,56E-06	5,08E-05	0	0	2,56E-06	0,00E+00	0,00E+00	-3,21E-05	1,13E-06	0,00E+00	0,00E+00	-1,85E-03
CRU	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	[kg]	0,00E+00	0,00E+00	1,09E-01	0	0	0,00E+00	9,08E+00	0,00E+00	0,00E+00	0,00E+00	2,72E+00	0,00E+00	0,00E+00
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	[MJ]	0,00E+00	0,00E+00	4,49E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+01	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	8,68E-01	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,78E+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 installed 2-layer roof waterproofing during 60 years]		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	1,90E-02
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Additional information

Technical information on scenarios

Transport to the building site (A4)

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

Installation of the product in the building (A5)

Scenario information	System 1	System 2	Unit
Ancillary materials	0,017 (plastic bushings)	0,017 (plastic bushings)	kg
	0,056 (steel screws)	0,056 (steel screws)	
Water use	0	0	m^3
Other resource use	–	–	kg
Energy type and consumption	2,49 (propane)	2,49 (propane)	kWh
Waste materials	0,046 (wooden pallet, for recycling)	0,039 (wooden pallet, for recycling)	kg
	0,005 (wooden pallet, for incineration)	0,0043 (wooden pallet, for incineration)	
	0,03 (plastics, for incineration)	0,039 (plastics, for incineration)	
	0,12 (bitumen, for incineration)	0,12 (bitumen, for incineration)	
	0,050 (bitumen, for recycling)	0,050 (bitumen, for recycling)	
Output materials	9,08 bitumen sheet	9,08 bitumen sheet	kg
Direct emissions to air, soil or water	Combustion of propane	Combustion of propane	kg

Reference service life

RSL information	Value
Reference service Life	50 years for building; 50 years for product system
Declared product properties	Roof waterproofing
Assumed quality of work	Instructions are available via https://www.phonixtagmaterialer.dk/
Maintenance	–

End of life (C1-C4)

Scenario information	30% recycling; 70% incineration with energy recovery		100% recycling		Unit
	System 1	System 2	System 1	System 2	
Collected separately	9,08	9,08	9,08	9,08	kg
Collected with mixed waste	0	0	0	0	kg
For reuse	0	0	0	0	kg
For recycling	2,73	2,72	9,08	9,08	kg
For energy recovery	6,36	6,35	0	0	kg
For final disposal	0	0	0	0	kg
Assumptions for scenario development	30 km to incineration 150 km to recycling	30 km to incineration 150 km to recycling	150 km to recycling	150 km to recycling	–

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	30% recycling; 70% incineration with energy recovery		100% recycling		Unit
	System 1	System 2	System 1	System 2	
Material for recycling	2,73	2,73	9,08	9,08	kg
Material for energy recovery	6,36	6,35	0	0	kg

Result tables (modules A1-A3) for individual sheets

The value for phase A1-A3 for each single product included in the 2-layer systems is listed (EN 15804 + A2:2019). Equivalent tables for the previous standard, EN 15804 + A1:2013, are found in the appendix.

ENVIRONMENTAL IMPACTS PER [m2 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
GWP-total	[kg CO_2 eq.]	1,41E+00	2,07E+00	1,52E+00	2,14E+00
GWP-fossil	[kg CO_2 eq.]	1,39E+00	2,07E+00	1,51E+00	2,13E+00
GWP-biogenic	[kg CO_2 eq.]	1,18E-02	2,82E-03	7,70E-03	1,09E-02
GWP-luluc	[kg CO_2 eq.]	1,23E-03	1,73E-03	1,25E-03	1,80E-03
ODP	[kg CFC 11 eq.]	3,07E-08	1,07E-08	1,10E-08	1,15E-08
AP	[mol H^+ eq.]	3,35E-03	3,56E-03	2,77E-03	3,82E-03
EP-freshwater	[kg P eq.]	1,11E-04	7,54E-05	7,15E-05	7,98E-05
EP-marine	[kg N eq.]	1,48E-03	1,90E-03	1,46E-03	1,98E-03
EP-terrestrial	[mol N eq.]	1,67E-02	2,07E-02	1,58E-02	2,15E-02
POCP	[kg NMVOC eq.]	2,82E-03	4,20E-03	3,05E-03	4,24E-03
ADPm[1]	[kg Sb eq.]	1,03E-06	4,98E-07	4,67E-07	5,27E-07
ADPf[1]	[MJ]	1,12E+02	1,56E+02	1,17E+02	1,63E+02
WDP[1]	[m^3]	3,54E-01	3,11E-01	2,32E-01	3,14E-01
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 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
PM	[Disease incidence]	5,58E-08	6,04E-08	4,59E-08	6,13E-08
IRP[2]	[kBq U235 eq.]	9,69E-02	1,05E-01	8,83E-02	1,08E-01
ETP-fw[1]	[CTUe]	2,03E+01	2,67E+01	2,12E+01	2,71E+01
HTP-c[1]	[CTUh]	1,64E-09	1,58E-09	1,19E-09	1,57E-09
HTP-nc[1]	[CTUh]	1,07E-08	5,42E-08	5,25E-08	5,77E-08
SQP[1]	-	1,88E+01	1,90E+01	1,75E+01	1,81E+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 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
PERE	[MJ]	8,31E+00	8,97E+00	8,74E+00	9,25E+00
PERM	[MJ]	3,60E-01	3,60E-01	2,99E-01	2,99E-01
PERT	[MJ]	8,67E+00	9,33E+00	9,04E+00	9,55E+00
PENRE	[MJ]	3,07E+01	4,84E+01	3,70E+01	5,04E+01
PENRM	[MJ]	8,64E+01	1,15E+02	8,52E+01	1,20E+02
PENRT	[MJ]	1,17E+02	1,64E+02	1,22E+02	1,70E+02
SM	[kg]	1,22E-01	8,25E-02	8,45E-02	8,82E-02
RSF	[MJ]	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
FW	[m^3]	8,79E-03	7,59E-03	6,21E-03	7,81E-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 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
HWD	[kg]	4,50E-09	7,57E-09	4,87E-09	7,39E-09
NHWD	[kg]	2,82E-02	1,93E-02	3,03E-02	2,40E-02
RWD	[kg]	4,04E-04	5,21E-04	4,16E-04	5,42E-04
CRU	[kg]	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
MER	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+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; EEE = Exported electrical energy; EET = Exported thermal energy				

WASTE CATEGORIES AND OUTPUT FLOWS PER [m2 produced waterproofing]					
Parameter	Unit	System 1 components (modules A1-A3)		System 2 components (modules A1-A3)	
		DuraFlex Kombi (bottom layer)	BituFlex (top layer)	DuraFlex (bottom layer)	BituFlex Kombi (top layer)
Biogenic carbon content in product	[kg C]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Biogenic carbon content in accompanying packaging	[kg C]	1,12E-02	1,13E-02	9,56E-03	9,45E-03
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO2				

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	Sara Tollin, David Lindén, Niclas Silfverstrand and Kristian Jelse Ramboll Sweden AB Vädursgatan 6 SE-412 50 Göteborg Email: Niclas.silfverstrand@ramboll.se
LCA software /background data	GaBi ts 9.2.1.68 incl. databases 2019 Edition Ecoinvent 3.6, 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"

Productspecifik cPCR
NPCR 022 version 2.0 (PCR – Part B for roof waterproofing). Dated 2018-06-06.

EN 15942
DS/EN 15942:2021 – "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"