



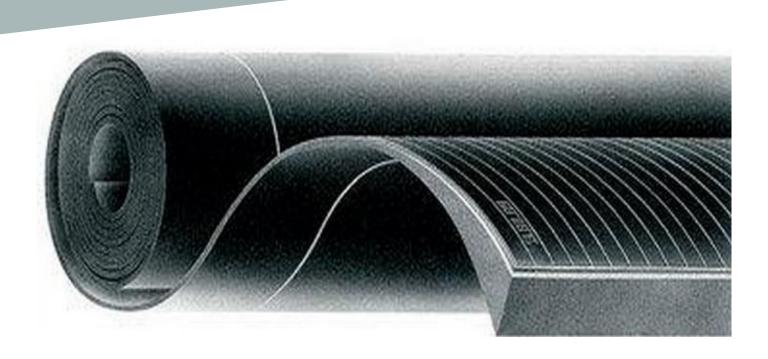
Owner: Imperbel NV/SA
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First issued: 15-07-2021 Issued: 19-09-2023 Valid to: 15-07-2026

3rd PARTY **VERIFIED** 

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804







Owner of declaration

Imperbel NV/SA Chaussée de Wavre 67, 1360 Perwez BE 0400.484.591



**Programme** 

EPD Danmark www.epddanmark.dk



☐ Industry EPD

□ Product EPD

Declared product(s)

Derbigum NT

Number of declared datasets/product variations: 1

**Production site** 

Perwez, Belgium

Product(s) use

Bituminous roofing material

#### Declared/ functional unit

Functional unit: 1 m 2 installed roof waterproofing from cradle-to-grave with activities needed for a study period of 50 years for a building.

Year of data

2020

**EPD version** Second version **Issued:** 19-09-2023

Valid to: 15-07-2026

**Basis of calculation** 

This EPD is developed in accordance with the European standard EN 15804+A2 and NPCR 022 version 2.0 (PCR – Part B for roof waterproofing).

Comparability

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804+A2. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804+A2 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. The EPD is developed for B2B communication.

**EPD** type

☐ Cradle-to-gate with modules C1-C4 and D

 $\Box$  Cradle-to-gate with options, modules C1-C4 and D

□ Cradle-to-grave and module D

☐ Cradle-to-gate

☐ Cradle-to-gate with options

CEN standard EN 15804+A2 serves as the core PCR

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

□ internal

Third party verifier:



Life Cycle Assessment Consulting

Martha Katrine Sørensen

Life	Life cycle stages and modules (MNR = module not relevant)															
	Produc	t		ruction cess		Use					End of life			Beyond the system boundary		
Raw material supply	Transport	Manufacturin g	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishme nt	Operational energy use	Operational water use	De- construction	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential
A1	A2	А3	A4	A5	B1	B2	В3	B4	B5	В6	В7	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**

Derbigum NT is a bituminous waterproofing membrane modified by plastomeric polymers. Derbigum NT partly consists of bitumen extracted from recycled cutting waste from installing bituminous waterproofing membranes and used bituminous roofing membranes. The top of the membrane is equipped with two different reinforcements; a glass cloth and a non-woven polyester. These materials give the roofing membrane dimensional stability and tear and puncture resistance.

The main product components are shown in the table below.

Material	Weight-% of declared product
Bitumen	53-61%
Polymers	17-21%
Reinforcements	4-6%
Others	18-24%

#### Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of one square meter Derbigum NT bitumen roof waterproofing system in the production site located in Perwez, Belgium. 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 2020. Allocation of manufacturing data is based on the factory data from 2020 and allocated per square meter by dividing by the total production in 2020. Background data are based on GaBi ts 10.0.1.92 incl. databases 2021 Edition, Ecoinvent 3.6 and an LCI profile from Eurobitume and are less than 10 years old.

#### Hazardous substances

The product does not contain substances listed in the "Candidate List of Substances of Very High Concern for authorization".

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

#### **Essential characteristics**

The modified bituminous roofing membrane is covered by harmonized technical specification DS/EN13707:2004+A2:2009. Declaration of performance according to EU regulation 305/2011 is available for the declared product.

Fire resistance: In accordance with EN 13501-5, class BROOF (t2) according to method CEN/TS 1187.

Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website: www.derbigum.dk/

### Reference Service Life (RSL)

The reference service life of the building is set to 50 years. The Derbigum NT product system is expected to fulfil its function for the entirety of its installation, thus no replacement is expected for the Derbigum NT product system. The product is expected to fulfill its function in compliance with TGA (Teknik Godkendelse til Anvendelsen Nr TGA.2017/002).

#### Picture of product(s)







## LCA background

#### **Functional Unit**

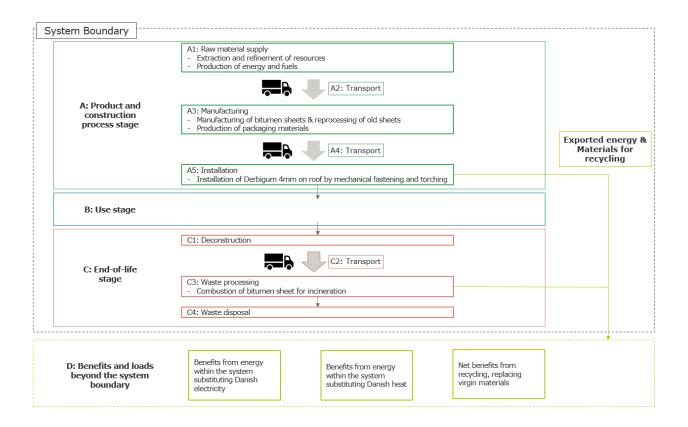
The LCI and LCIA results in this EPD relates to a functional unit of 1 m2 installed Derbigum NT bitumen roof waterproofing system, consisting of a 4 mm layer. The functional unit is defined as: "1 m2 installed roof waterproofing, from cradle-to-grave, with activities needed for a study period of 50 years for the building."

Name	Value	Unit
Functional unit	1	m <sup>2</sup> installed roof waterproofing during 50 years
Weight per unit	5.19	kg/m² installed
Conversion factor to 1 kg.	0.193	m²/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), referred to as reference PCR. The reference PCR suggests an RSL of 60 years. To reflect Danish calculation rules, according to LCAbyg, this was changed to 50 years.

#### **Flowdiagram**







#### System boundary

This is a specific product EPD, based on a cradle-to-grave and module DLCA, in which 100 product weight-% has been accounted for.

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 renewable and non-renewable primary energy usage and mass for unit processes. The application of cut-off criteria is described below.

## **Excluded processes:**

In addition to the processes explicitly excluded from the system boundary by DS/EN 15804 and the reference PCR, the following exclusions have been made based on the cut-off criteria:

- Production and waste management of packaging materials used for incoming raw materials.
- Production of infrastructure, capital goods, travelling by personnel and research and development.
- Production and waste management of packaging materials accompanying the product which are small (0.12 % of weight) in comparison to the product, these are:
  - o Corrugated board
  - Plastic packaging
  - o Tape

## Product stage (A1-A3) includes:

### A1 - Raw material supply

Module A1 comprises impacts from extraction and processing of raw materials including bitumen, polymers, reinforcements (glass- and polyester fiber), fillers, etc. The module also includes the production of purchased electricity used at the Derbigum production site. The recycling process of secondary raw materials used in the product is also included in module A1.

A2 - Transport (to the production site)

Module A2 comprises impacts from transportation of raw materials to the Derbigum 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 larger packaging materials (e.g. pallet), combustion of fuels on site (natural gas, diesel, and propane), as well as end-of-life treatment of waste generated during manufacturing. Inflows and outflows of water that is used in the manufacturing is also included as well as the wastewater treatment.

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

The module A1-A3 includes the production of additional bitumen sheets needed for overlap of the layers for complete waterproofing.

# 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 to the building at the installation site. The module includes the production of additional bitumen sheets needed for wasted product during installation. The module includes production of fastening materials, and production and combustion of propane for torching. Waste from the installation is classified as materials for recycling (99%) and waste for incineration (1%). Impacts from these waste management processes are included in module A5 whereas potential benefits 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 replacement have been included since the product is expected to fulfill its function. for 50 years and thus no replacement is needed.

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. Therefore, no operational energy use for either of the product systems is included.

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 (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)

Comprises impacts from transportation of the deconstructed products after 50 years to the waste processing (incineration or recycling site).

C3 - Waste processing

Module C3 consists of the waste processing steps, that is incineration of the bitumen sheets (1%) and plastic fastening materials at end-of-life. Emissions from the materials incinerated in Denmark are reported in module C3 and the benefits from heat and electricity generation are carried forward to module D.

Most of the de-constructed bitumen roofing (99%) from C1 is collected by Derbigum for recycling. This is reported as materials for recycling in C3 and the burden from the recycling process and the benefits from replacing bitumen is recorded in module D.

C4 - Disposal

Ashes and other remains after incineration are reported in stage C4.

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

Module D includes recovery and/or recycling potential, expressed as net impact and benefits.

At end of life most of the product is recycled. When bitumen sheets are recycled throughout the modules, the burden from the recycling process and net benefit of this recycling is reported in module D. The net benefit consists of the virgin material in the bitumen sheet replacing alternative material production.

A part of the product is also incinerated, and heat and electricity are produced. The energy is recovered and assumed to replace heat that would have been produced from other sources.





# LCA results

	ENVI	RONMENTAL	IMPACTS	PER [m2 ii	nstalled roo	f waterpr	oofing du	ring 50 ye	ars]	
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	3.75E+00	4.30E-01	3.32E-01	0.00E+00	0.00E+00	4.78E-01	1.22E-01	1.22E-05	-2.55E-01
GWP-fossil	[kg CO₂ eq.]	3.76E+00	4.22E-01	3.06E-01	0.00E+00	0.00E+00	4.69E-01	1.22E-01	1.23E-05	-2.52E-01
GWP- biogenic	[kg CO <sub>2</sub> eq.]	-5.50E-03	4.54E-03	2.61E-02	0.00E+00	0.00E+00	5.05E-03	6.51E-06	-1.26E-07	-4.01E-03
GWP-luluc	[kg CO <sub>2</sub> eq.]	2.78E-03	3.48E-03	2.16E-04	0.00E+00	0.00E+00	3.87E-03	1.45E-06	1.23E-08	4.22E-04
ODP	[kg CFC 11 eq.]	7.04E-08	8.42E-17	1.27E-09	0.00E+00	0.00E+00	9.35E-17	5.56E-10	2.91E-20	-4.23E-08
AP	[mol H <sup>+</sup> eq.]	1.00E-02	1.37E-03	5.76E-04	0.00E+00	0.00E+00	1.53E-03	4.35E-05	3.92E-08	-6.05E-03
EP- freshwater	[kg PO₄ eq.]	1.52E-04	1.27E-06	2.92E-06	0.00E+00	0.00E+00	1.41E-06	5.88E-07	9.36E-12	-2.64E-05
EP-marine	[kg N eq.]	2.68E-03	6.29E-04	1.98E-04	0.00E+00	0.00E+00	6.99E-04	1.26E-05	9.73E-09	-9.62E-04
EP- terrestrial	[mol N eq.]	2.91E-02	7.02E-03	2.17E-03	0.00E+00	0.00E+00	7.81E-03	1.16E-04	1.07E-07	-1.08E-02
POCP	[kg NMVOC eq.]	9.07E-03	1.24E-03	6.48E-04	0.00E+00	0.00E+00	1.38E-03	2.96E-05	3.07E-08	-4.00E-03
ADPm <sup>1</sup>	[kg Sb eq.]	3.11E-06	3.78E-08	7.31E-08	0.00E+00	0.00E+00	4.20E-08	5.98E-08	8.49E-13	1.72E-07
ADPf <sup>1</sup>	[MJ]	1.76E+02	5.68E+00	7.44E+00	0.00E+00	0.00E+00	6.31E+00	3.00E-02	1.79E-04	-1.73E+02
WDP <sup>1</sup>	[m³]	2.67E-01	3.96E-03	1.08E-02	0.00E+00	0.00E+00	4.40E-03	2.89E-03	-1.46E-07	-5.76E-02
Caption	GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication - aquatic freshwater; EP-marine = Eutrophication - aquatic marine; EP-terrestrial = Eutrophication - terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential - minerals and metals; ADPf = Abiotic Depletion Potential - fossil fuels; WDP = water use									
Disclaimer	<sup>1</sup> The resu	lts of this environ	mental indicato		d with care as the rienced with the		es on these i	esults are hiç	gh or as ther	e is limited

AD	ADDITIONAL ENVIRONMENTAL IMPACTS PER [m2 installed roof waterproofing during 50 years]									
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PM	[Disease incidence]	8.61E-08	7.93E-09	6.61E-09	0.00E+00	0.00E+00	8.82E-09	2.71E-10	4.25E-13	-2.01E-09
IRP <sup>2</sup>	[kBq U235 eq.]	1.63E-01	1.51E-03	7.98E-03	0.00E+00	0.00E+00	1.68E-03	1.36E-04	2.93E-07	-2.60E-03
ETP-fw <sup>1</sup>	[CTUe]	5.83E+01	4.21E+00	3.82E+00	0.00E+00	0.00E+00	4.68E+00	5.22E-02	5.27E-05	-9.26E+00
HTP-c <sup>1</sup>	[CTUh]	3.91E-09	8.52E-11	1.33E-10	0.00E+00	0.00E+00	9.47E-11	3.48E-12	6.12E-15	2.38E-10
HTP-nc <sup>1</sup>	[CTUh]	1.40E-07	4.99E-09	6.16E-09	0.00E+00	0.00E+00	5.55E-09	1.25E-10	6.15E-13	8.12E-10
SQP <sup>1</sup>	-	9.16E+00	1.95E+00	3.31E-01	0.00E+00	0.00E+00	2.17E+00	1.58E-02	1.32E-05	1.97E-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)								an toxicity –	
	<sup>1</sup> 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.									
Disclaimers	does not co	nct category dea nsider effects di tential ionizing ra	ue to possible n	uclear accider	its, occupationa	l exposure no	or due to radio	oactive waste	disposal in u	underground





	RESOURCE USE PER [m2 installed roof waterproofing during 50 years]									
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	[MJ]	9.93E+00	3.27E-01	2.91E-01	0.00E+00	0.00E+00	3.63E-01	1.22E-03	1.29E-05	9.94E+00
PERM	[MJ]	1.95E-01	0.00E+00	2.69E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.01E+01	3.27E-01	3.18E-01	0.00E+00	0.00E+00	3.63E-01	1.22E-03	1.29E-05	9.94E+00
PENRE	[MJ]	3.38E+01	5.70E+00	4.15E+00	0.00E+00	0.00E+00	6.33E+00	3.00E-02	1.79E-04	7.34E+01
PENRM	[MJ]	1.48E+02	0.00E+00	3.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.56E+02
PENRT	[MJ]	1.82E+02	5.70E+00	7.55E+00	0.00E+00	0.00E+00	6.33E+00	3.00E-02	1.79E-04	-1.83E+02
SM	[kg]	1.18E+00	0.00E+00	2.12E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00								
NRSF	[MJ]	0.00E+00								
FW	[m <sup>3</sup> ]	1.14E-02	3.74E-04	4.95E-04	0.00E+00	0.00E+00	4.16E-04	6.72E-05	1.85E-09	-1.37E-03
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources; PENRE = Use of non renewable primary energy resources; PENRE = Use of non 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; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water									

WA	WASTE CATEGORIES AND OUTPUT FLOWS PER [m2 installed roof waterproofing during 50 years]									
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	[kg]	9.82E-09	3.00E-10	4.01E-10	0.00E+00	0.00E+00	3.34E-10	0.00E+00	3.17E-14	6.11E-10
NHWD	[kg]	5.38E-02	8.94E-04	1.86E-03	0.00E+00	0.00E+00	9.93E-04	0.00E+00	2.52E-04	2.17E-03
RWD	[kg]	8.27E-04	1.03E-05	4.78E-05	0.00E+00	0.00E+00	1.15E-05	0.00E+00	2.04E-09	-2.93E-05
CRU	[kg]	0.00E+00								
MFR	[kg]	0.00E+00	0.00E+00	9.13E-02	0.00E+00	0.00E+00	0.00E+00	5.12E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00								
EE	[MJ]	0.00E+00	0.00E+00	4.08E-02	0.00E+00	0.00E+00	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; EE = Exported energy									

BIOGENIC CARBON CONTENT PER [m2 installed roof waterproofing during 50 years]							
Parameter	Unit	At the factory gate					
Biogenic carbon content in product	[kg C]	0					
Biogenic carbon content in accompanying packaging	[kg C]	6.88E-03					
Note	1 kg biogenio	c carbon is equivalent to 44/12 kg of CO <sub>2</sub>					





## Additional information

**Technical information on scenarios** 

Production of waterproofing (A1-A3)

Scenario information	Value	Unit
Material weight per produced square meter	4.61	kg/m²
Material weight of additional sheets for overlap (11,.81%)	0.55	kg/m²
Weight per functional unit (total weight including fastening material)	5.19	kg/m²

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	Truck, Euro 5, 28-32t gross	-
Transport distance	1230	km
Capacity utilization (including empty runs)	61	%
Capacity utilization volume factor	1	-

Installation of the product in the building (A5)

Scenario information	Value	Unit	
Ancillary materials	0.0172 (plastic fasteners)	kg	
Water use	0	m³	
Other resource use	0	kg	
Energy type and consumption	0.05 (propane)	kg	
	0.014 (wooden pallet, for incineration)		
Waste materials	0.001 (bitumen trimmings, for incineration)	kg	
	0.091 (bitumen trimmings, for recycling)		
Output materials	0	kg	
Direct emissions to air, soil or water	Combustion of propane	kg	
Overlap in cm	13	cm	
Additional material due to overlap	11.8	%	

## Reference service life

RSL information	Unit				
Reference service Life	50 years for building; 50 years for product				
Declared product properties	Roof waterproofing				
Assumed quality of work	Instructions are available via: www.derbigum.dk/				
Maintenance	-				

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	5.173	kg
Collected with mixed waste		kg
For reuse		kg
For recycling	5.12	kg
For energy recovery	0.05	kg
Assumptions for scenario development	50 km to incineration and landfill 1230 km to recycling	-

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Materials replacing bitumen	3.89	kg
Heat replacing Danish natural gas	0.94	MJ
Electricity replacing Danish electricity grid mix	0.49	MJ





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	<b>L</b> epddanmark
	www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Katarzyna Dziubanii, Jonathan Klement Ramboll Sweden AB Email: <u>katarzyna.dziubanii@ramboll.se</u> <u>jonathan.klement@ramboll.se</u>
LCA software /background data	GaBi ts 10.0.1.92 incl. databases 2021 Edition Ecoinvent 3.6 LCI profile from Eurobitume (2019)
3 <sup>rd</sup> party verifier	Linda Høibye Life Cycle Assessment Consulting Email: hoeibye@gmail.com

### **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"

### **Product specific cPCR**

NPCR 022 version 2.0 (PCR - Part B for roof waterproofing)

## 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"