B-EPD .BE

24.0156.01-
01.00.00

DERBIGUM

DERBICOAT NT 2.5

ISSUED 04.05.2024
VALID UNTIL 04.05.2029

THIRD PARTY VERIFIED
in accordance with EN 15804+A2
and BE-PCR version 18.10.2022

MODULES DECLARED
Ensure the waterproofing of 1 m^2 of roof with bituminous membrane with activities needed for a study period of 60 years for the building

Cradle-to-grave

A123	A4	A5	B2 B4	C	D
•	•	•	•	•	•

The intended use of this EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings. This EPD is only valid when registered on www.b-epd.be. The FPS Public Health cannot be held responsible for the information provided by the owner of the EPD.

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1 PRODUCT DESCRIPTION

1.1 Product name

Derbicoat NT 2.5

1.2 Product description and intended use

Derbicoat NT is an underlayer vapour barrier, which can be assembled with a Derbigum NT membrane (described in another B-EPD: 24.0156.002-01.00.00), or alone under an insulation layer.
Derbicoat NT is a bituminous base sheet that contains DERBITUMEN, a raw material that is acquired by recycling cutting losses and old bituminous roofing membranes. Derbicoat NT has a glass/polyester reinforcement that gives the membrane a high tear resistance. They are used in buildings to provide a vapour barrier on masonry roofs.
The reference product has a thickness of 2,5 mm (Derbicoat NT 2.5 – noted DC2.5). The alternative thickness is 3 mm (Derbicoat NT3 – noted DC3).

Derbicoat NT 2.5 is a product.

This is a specific EPD from a single company.

Insert intended use(s) :

- Reinforced bituminous sheet for roof waterproofing, used as underlayer (base layer/first layer)
- Bitumen water vapour layer
- Can be used on flat or sloping roofs.
- Can be used as a vapour barrier or base sheet on wooden panels, planks and steel deck.
- Specifically recommended when a high tear resistance is required.

1.3 Reference flow / Functional unit

FUNCTIONAL UNIT (FU): "ENSURE THE WATERPROOFING OF 1 M² OF ROOF WITH BITU-MINOUS MEMBRANE, FROM CRADLE-TO-GRAVE, WITH ACTIVITIES NEEDED FOR A STUDY PERIOD OF 60 YEARS FOR THE BUILDING".
THE FU INCLUDES THE OVERLAP NECESSARY TO ENSURE A CORRECT INSTALLATION. THE OVERLAP (OVL) IS 10,5%, AND THE FU CORRESPOND TO 1,105 M² OF MEMBRANE.

Packaging is included.

The weight per reference flow is 3,383 kg.
The density of the product is 1225 kg / m^3.

The product is declared "as installed" (module A5 declared), but without the inclusion of the ancillary material.

1.4 Installation

The product is declared as "installed" (including module A5), but the ancillary material is not included. The installation is not directly included in the B-EPD but is modelled in TOTEM by the default values. The installation losses represent 2% per "net installed m²" (0,02 m²/FU).

The Derbicoat NT 2.5 can be used alone only as a vapour-barrier layer under an insulant (i.e. insulation panels).
But it cannot be used alone on a roof, only in combination with another bituminous membrane such as Derbigum NT 4 (B-EPD 24.0156.002-01.00.00).

Materials for fixation and installation are not included. The TOTEM generic values such as fully torched or lose lay can be selected.

This EPD includes the necessary overlap of two strip of membrane to ensure the tightness (10,5%) and the installation losses (2%).

Detailed information on this scenario can be found in the chapter “Data of the underlying scenario’s”.

You can find more detailed information helping to develop a correct scenario at building level in the chapter “Additional technical information for scenario development at building”. For these other options additional materials are necessary for which the environmental impact is not included in this EPD, but which should be taken into account at building level (cold bonded with bituminous cold glue, fully torched, mechanical fixing with screw, ...).

1.5 Composition and content

The main product components are shown in the table below.

Components	Composition / content / ingredients	Quantity
Product	– Bitumen – Polymers – Reinforcement (support) – Others (minerals)	– 50-60% – 4-9% – 4-6% – 30-40%
Fixation materials	– See Section 14	
Jointing materials	–	
Treatments	– None	
Packaging	– Pallet	– 1,036 kg/FU

The product does not contain materials listed in the “Candidate list of Substances of Very High Concern for authorization”.

1.6 Reference service life

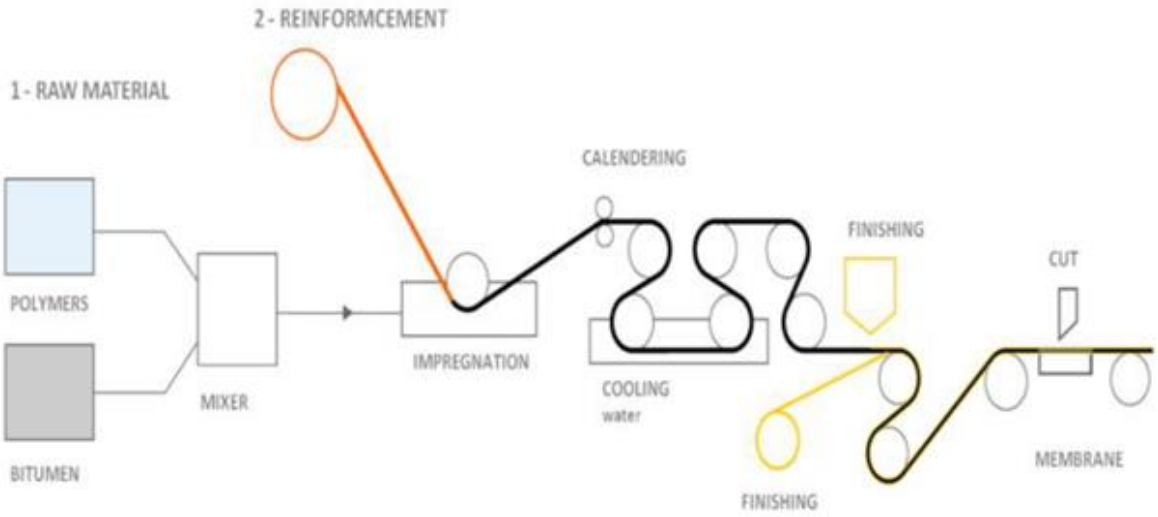
The reference service life is estimated at 60 years.
The RSL is based on the fact that the Derbicoat NT 2.5 is installed either under the insulation layer, or under a second layer of bituminous membrane such as the Derbigum NT 4. In consequence, it is never exposed to external conditions (intrinsic RSL = 40 years).
This reference service life is compliant with TOTEM.
The conditions under which this RSL is valid are as following: normal use of a correctly installed double-layer roof waterproofing coating system.
The installation is supposed to be carried out according to the rules of the art, and in accordance with the installation instructions issued by the manufacturer, and in compliance with the applicable standards.

1.7 Description of geographical representativity

The B-EPD is representative for the Belgian market for A123, A4, A5, B, C and D.
The assumed market for the installation, the use phase and the end-of-life is Belgium.

1.8 Description of the production process and technology

Virgin bitumen, recycled mix and plastomer/elastomer are mixed and stored in liquid phase at 180°C in 16-tonne tanks. The mixture is then impregnated on a nonwoven polyester reinforcement (for Derbicoat NT vapour barriers), then laminated by calendering. Once cooled, the bottom and top side of the membrane are then treated with talc, then cut into 7,27 m lengths and rolled up. Finally, it is packaged. Any waste as a result of the production is collected and internally recycled.
Water is used to cool the bitumen during the process in a closed-circuit.



2 TECHNICAL DATA / PHYSICAL 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.
The British Board of Agreement (an independent certifier) carried out measurements of Derbigum bitumen at different locations during the use phase (S260461 Report Issue 2 FINAL lifetime). This measurement concluded that a RSL of 40 years can be fulfilled for the Derbicoat NT 2.5 "alone" (intrinsic RSL), and 60 years under an insulation panel or a bituminous waterproofing membrane on a roof.

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

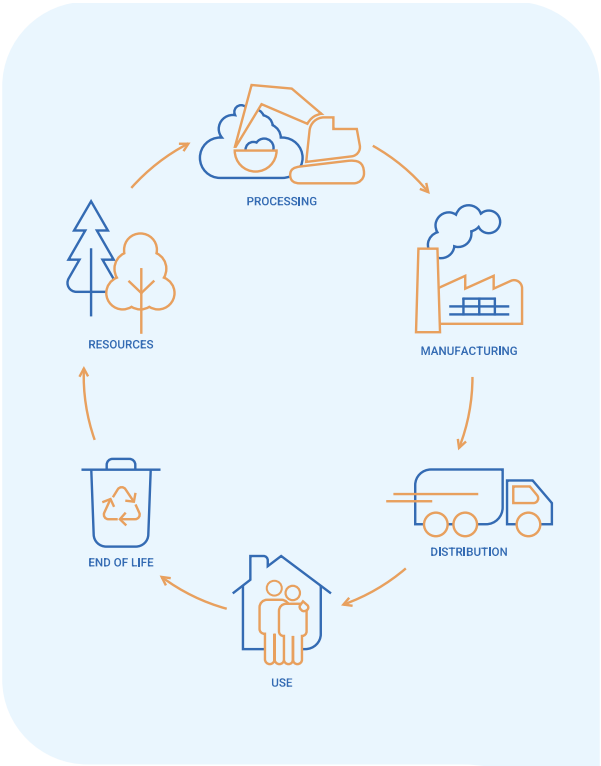
Further technical information can be obtained by contacting the manufacturer or on the manufacturers.
Website: www.derbigum.be / www.derbigum.eu

Technical property	Standard	Value	Unit	Comment
Thickness		2,5	mm	also available in 3 mm
Thermal conductivity λ		0,23	W/m.K	Not measured - TOTEM value for roof waterproofing bitumen sheet
Thermal resistance R		0,011	m².K/W	Calculated from λ value for 2,5 mm thickness
Cold bending	EN 1109	-15	°C	
Tensile strength L/T	EN 12311-1	650 x450	N/50 mm	
Elongation at break L/T	EN 12311-1	40 x 40	%	
Flow resistance	EN 1110	≥ 125	°C	
Resistance to static loading method A		10	kg	
Resistance to impact method A and B		1000	mm	
Dimensional stability	EN 1107-1	≤ 0,5	%	
Tear resistance	EN 12310-1	200 x 200	N	
Dynamic seizure (B)		-		
Static seizure (A)		-		
Vapour diffusion resistance μd	En 1931	100 (eq. class E3)	m	
Water vapour permeability		50,000	μ	
Density		1225	kg/m³	
External fire performance		FRoof (t1, t2, t3, t4)	-	
Reaction to fire		F		

3 LCA-STUDY

3.1 Date of LCA-study

September 2023.



3.2 Software

For the calculation of the LCA results, the software program SimaPro 9.5.0.2 has been used.

3.3 Information on allocation

Allocation was avoided as far as possible by dividing unit processes into more detailed sub-processes. When allocation had to be made, it was done in accordance with EN 15804+A2 section 6.4.3.

Different bituminous products are produced at the Derbigum site, and the site data (energy use, generation of waste and emissions) have been allocated to the products based on the relative weight (mass allocation).

The processing of the products at the site are similar, consequently this allocation was judged to be a good approximation.

In line with the system boundaries, secondary raw materials are included with no environmental impacts from its previous lifecycle allocated to the material. However, the environmental burden of reprocessing/recycling the material to the state in which it is used at the Derbigum site in Perwez is included.

Similarly, Derbigum uses old roofs as raw material in new roofs. Derbigum has specific data concerning the reprocessing of the bitumen roof to replace virgin bitumen in the product. The reprocessing step is allocated to module A where old roofs are used as input material and is reprocessed to secondary material replacing bitumen. Consequently, to not double count, the end of waste state in module C occurs when the old roof has been transported back to Derbigum production facility in Perwez. LCA of the recycled materials is realised with primary data (and ecoinvent background data)

Furthermore, allocation has been applied to bituminous material from Eurobitume-members. The allocation between these bitumen and other co-products made from crude oil is based on mass balances at the crude oil extraction and the transport stages. At the refining level, the allocation is based on relative economic values (Eurobitume, 2020, 2022).

3.4 Information on cut off

The general rules for exclusion of inputs and outputs in the LCA follows the rules of in EN 15804+A2, section 6.3.6, where the cut-off criterion is 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of that unit process. The total of neglected input flows per module shall be maximum of 5% of energy usage and mass.

3.5 Information on excluded processes

Following processes were excluded for the inventory:

- Lighting, heating, and cleaning of production sites,
- Administrative department,
- Employee transport,
- Manufacture of production tools and transport systems (where these were not directly included in the life cycle inventories used),
- Consumables required for the operation of the process (lubricating oil)
- Infrastructure
- Long-term emissions.

The following processes are considered below cut-off and excluded:

- Production and waste management of packaging materials used for incoming raw materials.
- Production and waste management of packaging materials accompanying the product which are small (0,21% of weight), these are:
  - Corrugated board
  - Plastic packaging
  - Tape

3.6 Information on biogenic carbon modelling

There are no significant biogenic carbon flows in the products however the wooden pallets that are used for packaging contain biogenic carbon.
Biogenic carbon is calculated as in EN16449:2014.

Pallet:
Humidity : 12 %
Carbon content: 0,494 kg C/kg wood (source ecoinvent 3.9.1 documentation for the "softwood" used in pallets)
Biogenic carbon: 0,1036 kg pallet/FU
0,1036 x 0,494 x 1/(1+12/100) = 4,569 E-02 kg C/FU
x 44/12 = 0,1675 kg CO_2 /FU

Biogenic carbon content	(kg C / FU)
Biogenic carbon content in product (at the gate)	0
Biogenic carbon content in accompanying packaging (at the gate)	4,569 E-02 kg C/FU (0,1675 kg CO_2 /FU)

3.7 Information on carbon offsetting

Carbon offsetting is not allowed in the EN 15804 and hence not taken into account in the calculations.

3.8 Additional or deviating characterisation factors

For EN 15804+A2, the characterisation factors of EC-JRC were applied.
The method for the characterisation for the indicators corresponds to the CF of EN 15804+A2:2019 (adapted 1.00) as implemented in SimaPro 9.5.0.2, with adaptations made by PRé Consultants to match the substances used in the SimaPro libraries (EN15804 reference package based on the EF 3.1 reference package).
For energy resources, the "Cumulative energy demand (LHV)" method is used. It was created by PRé Consultants from the data published by Ecoinvent for the raw materials available in the SimaPro database. The method calculates the lower heating values (LHV).
Waste flows are calculated using the EDIP 2003 method (Hauschild 2003) (version of the Danish EDIP97 method adapted for SimaPro - http://www.lca-center.dk/cms/site.aspx?p=4441).
All characterisation factors are in accordance with EN 15804:2012+A2:2019.
In accordance with BE-PCR, when infrastructure data is available in generic data (e.g. Ecoinvent) used for up-stream or downstream processes, it should be included (A17); the effects of long-term emissions are excluded (A22).

3.9 Description of the variability

Not relevant, the B-EPD corresponds to a single production site.

3.10 Specificity

The data used for the LCA are specific for this product which is manufactured by a single manufacturer in a single production site.

3.11 Period of data collection

Manufacturer specific data have been collected for the year 2021.

3.12 Information on data collection

The data for consumption (materials and energy), origin of materials; average transport (A4), recycling process, are primary data transmitted directly by Derbigum.

3.13 Database used for background data

The database used is Ecoinvent 3.9.1, except for bitumen which is modelled by specific data transmitted by Eurobitume (update 2021).
The reinforcement is modelled from the corresponding EPD (validity 2026).
In accordance with EN 15804:2012+A2:2019 and the BE-PCR supplement, when generic data from Ecoinvent v3 is used, the system model "allocation, cut-off by classification" is used.
Update date: Ecoinvent 3.9.1: January 2023.
The background data are less than ten years old: either they are updated in the database, or they have been adjusted according to direct information about the Belgian situation (e.g. electricity mix).
A time period of 100 years is used for the assessments.

The recycling process data comes from a previous study. The first version was based on 2018 data, and an update has been done data from year 2021. The study is realised in accordance with standard EN 15804:2012+A2:2019[1].

3.14 Energy mix

1. Belgian grid mix:
The ecoinvent database version 3.9.1 integrates the Belgian mix for 2019.
The 2021 Belgian mix is modelled on the basis of the distribution of energy sources available at national level (Statbel , SPF Économie , ELIA , FEBEG) (background data Ecoinvent 3.9.1).
Energy sources 2021: 50,25% nuclear, 24,4% fossil (natural gas 22,5%), 22,9% renewable, other 2,5% (pumped hydro, Q recovery, non-renewable waste, others)
Renewable: 0,4% non-pumped hydro, 5,6% solar, 11,9% wind, 0,9% renewable urban waste, 3,1% solid biomass, 1,0% biogas.

2. Derbigum/Imperbel mix: (2021)
The electricity invoiced by Engie to Derbigum for the reference period corresponds to a 100% renewable electricity mix. The corresponding mix has been modelled according to the data provided by Engie and the Walloon Region (background data Ecoinvent 3.9.1).
Energy sources: 0,7% biogas, 35,34% biomass, 3,8% waste, 26,64% wind, 33,52% hydropower.

[1] No direct verification document available, but implicit validation by acceptance of the the report results and information to produce EPD (DK) and FDES (FR).

4 PRODUCTION SITES

The B-EPD is specific to one production site:
Imperbel – Derbigum - Chaussée de Wavre 67, 1360 Perwez, Belgium

5 SYSTEM BOUNDARIES

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒

X = included in the EPD
☐ = module not declared

All known use of resources and emissions to air, water and soil are included. The environmental impacts of the various activities in the life cycle are included regardless of geographic location. The sensitivity of the recipient environment in question has not been considered.
The system boundary with nature is set, in accordance with EN 15804 Section 6.3.4.2, to include those processes that provide the material and energy inputs into the system and the following manufacturing, and transport processes up to the grave as well as the processing of any waste arising from those processes.
With regards to recycling or other recovery of waste, impacts are borne by the product and included in the system until the waste is managed to the end-of-waste state. Benefits and credits of recovery are inside the system boundaries in module D. The environmental impact of the processing/recycling of secondary raw materials is included in the system boundaries, however the environmental burden from its previous lifecycle is excluded in line with the Polluter Pays Principle.

6 POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP total (kg CO2 equiv/FU)	1,33E+00	1,75E-01	5,05E-01	8,16E-02	2,34E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,16E-02	1,58E-04	2,18E-02	-2,00E-01
GWP fossil (kg CO2 equiv/FU)	1,32E+00	1,75E-01	6,72E-01	8,15E-02	6,61E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,16E-02	1,58E-04	2,18E-02	-9,78E-02
GWP biogenic (kg CO2 equiv/FU)	0,00E+00	0,00E+00	-1,68E-01	0,00E+00	1,68E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,02E-01
GWP luluc (kg CO2 equiv/FU)	1,11E-02	8,51E-05	3,37E-04	3,96E-05	2,12E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,96E-05	1,83E-07	1,56E-06	7,24E-05
ODP (kg CFC 11 equiv/FU)	5,20E-08	3,81E-09	3,02E-08	1,77E-09	1,75E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,77E-09	4,79E-12	4,75E-11	-1,26E-08
AP (mol H+ eq/FU)	6,66E-03	5,72E-04	1,34E-03	2,66E-04	1,83E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,66E-04	1,14E-06	2,61E-05	-6,71E-04
EP - freshwater (kg P-equiv/FU)	4,39E-05	1,40E-06	7,53E-06	6,52E-07	1,02E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,53E-07	1,97E-09	3,32E-08	1,71E-06
EP - marine (kg N equiv/FU)	1,46E-03	1,94E-04	3,97E-04	9,03E-05	4,81E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,04E-05	4,38E-07	2,18E-05	-5,81E-05
EP - terrestrial (kg mol N equiv/FU)	1,58E-02	2,08E-03	5,04E-03	9,65E-04	5,26E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,66E-04	4,83E-06	5,79E-05	1,46E-04
POCP (kg Ethene equiv/FU)	5,76E-03	8,54E-04	1,89E-03	3,97E-04	1,92E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,97E-04	1,45E-06	2,56E-05	-4,17E-04
ADP Elements (kg Sb equiv/FU)	4,96E-06	5,63E-07	2,45E-06	2,62E-07	1,61E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,62E-07	1,75E-09	4,55E-09	2,51E-06
ADP fossil fuels (MJ/FU)	8,18E+01	2,49E+00	9,70E+00	1,16E+00	1,79E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,16E+00	4,77E-03	4,40E-02	-5,92E+01
WDP (m³ water eq deprived /FU)	4,06E-01	1,01E-02	5,55E-02	4,71E-03	1,16E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,71E-03	3,94E-05	1,83E-03	-1,17E-02

GWP TOTAL = TOTAL GLOBAL WARMING POTENTIAL (CLIMATE CHANGE); GWP-LULUC = GLOBAL WARMING POTENTIAL (CLIMATE CHANGE) LAND USE AND LAND USE CHANGE; ODP = OZONE DEPLETION POTENTIAL; AP = ACIDIFICATION POTENTIAL FOR SOIL AND WATER; EP = EUTROPHICATION POTENTIAL; POCP = PHOTOCHEMICAL OZONE CREATION; ADPE = ABIOTIC DEPLETION POTENTIAL – ELEMENTS; ADPF = ABIOTIC DEPLETION POTENTIAL – FOSSIL FUELS; WDP = WATER USE (WATER (USER) DEPRIVATION POTENTIAL, DEPRIVATION-WEIGHTED WATER CONSUMPTION)

7 RESOURCE USE

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
PERE (MJ/FU, net calorific value)	1.60E+00	3.86E-02	5.38E+00	1.79E-02	6.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-02	4.24E-04	9.64E-04	2.51E+00
PERM (MJ/FU, net calorific value)	0.00E+00	0.00E+00	1.27E+00	0.00E+00	-1.27E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E-01
PERT (MJ/FU, net calorific value)	1.60E+00	3.86E-02	6.65E+00	1.79E-02	-6.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-02	4.24E-04	9.64E-04	3.27E+00
PENRE (MJ/FU, net calorific value)	8.20E+01	2.49E+00	9.70E+00	1.16E+00	1.79E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	4.77E-03	4.40E-02	-5.92E+01
PENRM (MJ/FU, net calorific value)	9.02E+01	0.00E+00	-2.97E+00	0.00E+00	7.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-8.29E+01	0.00E+00	5.98E+01
PENRT (MJ/FU, net calorific value)	1.72E+02	2.49E+00	6.74E+00	1.16E+00	1.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	-8.29^{E}+01	4.40E-02	6.09E-01
SM (kg/FU)	7.46E-01	0.00E+00	0.00E+00	0.00E+00	1.35E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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/FU, net calorific value)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF (MJ/FU, net calorific value)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW (m^3 water eq/FU)	3.76E-03	4.12E-04	1.45E-03	1.91E-04	1.82E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-04	1.01E-06	4.77E-05	-2.62E-04

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

8 WASTE CATEGORIES & OUTPUT FLOWS

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (kg/FU)	4,45E-05	1,58E-05	4,32E-05	7,36E-06	2,40E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,36E-06	1,36E-08	2,15E-07	1,22E-06
Non-hazardous waste disposed (kg/FU)	7,36E-02	1,21E-01	3,58E-02	5,65E-02	1,26E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,65E-02	1,09E-05	1,70E-01	1,75E-02
Radioactive waste disposed (kg/FU)	6,32E-04	8,08E-07	3,42E-06	3,75E-07	1,16E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,76E-07	3,47E-08	2,10E-08	-6,74E-04
Components for re-use (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,11E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (kg/FU)	0,00E+00	0,00E+00	1,15E-01	0,00E+00	1,00E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,21E+00	0,00E+00	0,00E+00
Materials for energy recovery (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,52E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy (MJ/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,72E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

9 IMPACT CATEGORIES ADDITIONAL TO EN 15804

		Production			Construction process stage		Use stage							End-of-life stage				
		A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	PM (disease incidence)	5,90E-08	1,39E-08	1,49E-08	6,46E-09	2,06E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,47E-09	2,51E-11	3,13E-10	1,91E-08
	IRHH (kg U235 eq/FU)	3,95E-01	1,25E-03	4,48E-03	5,79E-04	7,31E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,80E-04	4,26E-05	3,14E-05	-4,09E-01
	ETF (CTUe/FU)	3,11E+00	1,23E+00	1,13E+00	5,70E-01	2,20E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,71E-01	8,96E-04	4,49E-02	4,79E-01
	HTCE (CTUh/FU)	3,63E-09	7,96E-11	3,61E-10	3,70E-11	8,22E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,70E-11	1,46E-13	1,21E-12	7,66E-11
	HTnCE (CTUh/FU)	7,22E-09	1,75E-09	4,38E-09	8,14E-10	4,99E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,14E-10	2,18E-12	3,97E-11	3,46E-09
	Land Use Related impacts (dimensionless)	1,28E+01	1,48E+00	2,01E+01	6,88E-01	7,00E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,89E-01	3,28E-03	9,82E-02	2,05E+00

HTCE = HUMAN TOXICITY – CANCER EFFECTS; HTNCE = HUMAN TOXICITY – NON CANCER EFFECTS; ETF = ECOTOXICITY – FRESHWATER; (POTENTIAL COMPARATIVE TOXIC UNIT)
PM = PARTICULATE MATTER (POTENTIAL INCIDENCE OF DISEASE DUE TO PM EMISSIONS);
IRHH = IONIZING RADIATION – HUMAN HEALTH EFFECTS (POTENTIAL HUMAN EXPOSURE EFFICIENCY RELATIVE TO U235);

9.1 Environmental impact categories explained

 Global Warming Potential	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1. It is split up in 4: – Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc – Global Warming Potential fossil fuels (GWP-fossil) : The global warming potential related to greenhouse gas (GHG) emissions to any media originating from the oxidation and/or reduction of fossil fuels by means of their transformation or degradation (e.g. combustion, digestion, landfilling, etc). – Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO2, CO and CH4) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO2 uptake from the atmosphere through photosynthesis during biomass growth - i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood. – Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO2, CO and CH4) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions).
 Ozone Depletion	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons), Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.
 Acidification potential	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.
 Eutrophication potential	The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects. It is split up in 3: – Eutrophication potential - freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects. – Eutrophication potential - marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects. – Eutrophication potential - terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects.
 Photochemical ozone creation	Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.
 Abiotic depletion potential for non-fossil ressources	Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimonium (Sb). The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
 Abiotic depletion potential for fossil ressources	Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ). The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Ecotoxicity for aquatic fresh water	The impacts of chemical substances on ecosystems (freshwater). The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
Human toxicity (carcinogenic effects)	The impacts of chemical substances on human health via three parts of the environment: air, soil and water. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
Human toxicity (non-carcinogenic effects)	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
Particulate matter	Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)
Resource depletion (water)	Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
Ionizing radiation - human health effects	This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation 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.
Land use related impacts	The indicator is the “soil quality index” which is the result of an aggregation of following four aspects: – Biotic production – Erosion resistance – Mechanical filtration – Groundwater The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

10 DETAILS OF THE UNDERLYING SCENARIOS USED TO CALCULATE THE IMPACTS

10.1 A1 – raw material supply

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

10.2 A2 – transport to the manufacturer

The raw materials are transported to the manufacturing site. Primary data are provided by Derbigum.

10.3 A3 – manufacturing

Module A3 includes the manufacturing of the final product, production and transport of larger packaging materials (pallets), combustion of fuels on site (natural gas, diesel, and propane), as well as end-of-life treatment of waste generated during manufacturing.
It also includes the production of electricity (Derbigum mix).

10.4 A4 – transport to the building site

Fuel type and consumption of vehicle or vehicle type used for transport	Truck 16-32 ton 0,256 l diesel / km	Truck 16-32 ton 0,256 l diesel / km
Distance	100 km	100 km + 35 km
Capacity utilisation (including empty returns)	Default Ecoinvent	Default Ecoinvent
Bulk density of transported products	Default Ecoinvent	Default Ecoinvent
Volume capacity utilisation factor	Default Ecoinvent	Default Ecoinvent

Default B-PCR distances for delivery are used, completed with specific data provided by Derbigum for the repartition of the transport. The following transport steps apply:

- 20% directly to the construction site over 100 km with a 16-32 ton lorry (ecoinvent record: '*Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U*)
- 80% to a supplier over 100 km with a 16 -32 ton lorry (ecoinvent record: '*Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U*)
- 100% of these 80% is transported over 35 km from supplier to construction site with a 16-32 ton lorry (ecoinvent record: '*Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U*)

10.5 A5 – installation in the building

At the construction site, packaging materials are released. Also 2% material losses (trimming) have been taken into account. This waste is measured for 1 m² "net installed" (0,02 m²/FU).

The vapour barrier Derbicoat NT 2.5 can be installed on a roof with a second layer on it (bituminous membrane), or as vapour barrier under an insulation panel.
The installation if the Derbicoat NT 2.5 is modelled as the default processes in TOTEM, and no ancillary material is counted.
Some installation processes are described in the alternative scenario part. No ancillary material is counted at this point and should be added.
The only parts to be considered in the present study are the installation losses and the packaging waste.
Usual overlap is 10,5% - and is included in the present B-EPD in the FU (in modules A1, A2, A3, and A4).

Examples of installation scenarios (with ancillary material, AM):

- fully torched by use of flame (AM: propane)
- loose lay (AM: none)
- mechanical fastening (AM: stainless steel screw and plastic tubes/round washers in PP)
- glued with bituminous cold adhesive (AM: Derbibond NT)

Parts of the installation	quantity	Description
Processes necessary for the installation of the product		
Fixation materials		
Jointing materials		
Treatments		
Material losses	6,123 E-02 kg/FU	Trimming waste (2%) (0,02 m²/FU)
Packaging	0,1055 kg/FU	Pallet waste (including installation waste and ovelap)
Others	10,5%	Additional sheet for overlap on the layers for complete waterproofing (already included the FU)

Ancillary materials for installation (specified by material)	Insert information		
Water use			
Other resource use	Default TOTEM		
Quantitative description of energy type (regional mix) and consumption during the installation process	Default TOTEM		

Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	Trimming waste Packaging waste: pallet	6,123 E-02 kg/FU 0,1055 kg/FU	2% (0,02 m²/FU)
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	Trimming waste	6,123 E-02 kg/FU	95% recycled by Derbigum 5% "non sorted waste: landfill
Direct emissions to ambient air, soil and water	None		
Distance	Derbigum recycling facility Sorting centre Landfill Incineration	128 km* 30 km 50 km 100 km	5,816 E-2 kg/FU 3,061 E-03 kg/FU** 1,055 kg/FU*** 3,061 E-03 kg/FU** 4,218 E-02 kg/FU***

* Corresponding to the average A4 transport distance
** 5% installation waste
*** Pallet waste

10.6 B – use stage (excluding potential savings)

No scenario. The Derbicoat NT 2.5 vapour barrier is integrated under other structural elements (insulation or second layer bituminous roof waterproofing sheet), and do not need any maintenance or repair.
Modules B are declared but have a zero value.

10.7 C: End of life

The amount of material to consider includes the overlap (10,5%).

C1: The waterproofing layer is removed manually, and no impacts are readily attributed to the product whereby no emissions arise from the deconstruction

C2: Comprises impacts from transportation of the deconstructed products after 60 years to the waste processing (sorting centre and landfill, or recycling site).

C3: All Derbigum roofs sold in Belgian (or foreign) market come with a "take back" guarantee, which means all losses during installation are collected and transported back to Derbigum recycling facility in Belgium. It is assumed that 95% of the Derbicoat NT 2.5 waste are recovered and recycled.
The burden for recycling process and the benefits from replacing bitumen are recorded in Module D.
The remaining 5% are considered to be mixed with the other "non sorted" waste of the deconstruction site. They go to the sorting centre where they are handled or moved once. Default values for BE-PCR are applied.

C4: The residual 5% of membrane waste are landfilled in this module.

Module C2 – Transport to waste processing

Type of vehicle (truck/boat/etc.)	Fuel consumption (litres/km)	Distance (km)	Capacity utilisation (%)	Density of products (kg/m3)	Assumptions
Lorry	16-32 t EURO5	128	EI	1225 kg / m^3	Derbigum facility
Lorry	16-32 t EURO5	30	EI	1225 kg / m^3	Sorting centre
Lorry	16-32 t EURO5	50	EI	1225 kg / m^3	Landfill

EI: ecoinvent default value

End-of-life modules – C3 and C4

Parameter	Value (kg)
Wastes collected separately	3,214 kg/FU
Wastes collected as mixed construction waste	0,1691 kg/FU
Waste for re-use	
Waste for recycling	3,214 kg/FU
Waste for energy recovery	
Waste for final disposal	0,1691 kg/FU

10.8 D – Benefits and loads beyond the system boundaries

Module D is calculated in accordance with EN 15804:2012+A2:2019 and B-EPD-PCR. All reported net benefits and loads resulting from net flows leaving the system of products that have not been assigned as co-products (there are none in this case) and have reached end-of-waste status are included in the Module D (reuse, recycling, direct energy recovery).

Production, trimming and end of life waste of Derbicoat NT 2.5:
At end of life most of the product is recycled (patented process by Derbigum, and organised collection network).

- **A5, C3**: Installation and demolition waste: 95% is recycled in Derbigum facility.
- **The load for recycling** is included (recycling unit is modelled with primary data)
- **Avoided materia**l: The net flow of recycled material is calculated according to BE-PCR, and the corresponding amount of virgin bitumen is evaluated taking the efficiency of the recycling process into account.

Pallets: A5: 0,1055 kg/FU; PCI = 12,24 MJ/kg

- Reuse: 20%: 2,109 E-02 kg/FU; transport 20 km[2].
- Recycling (wood chips): 40% 4,218 E-02 kg/FU; transport 20 km + chipping.
- Incineration: 40%; 4,218 E-02 kg/FU.

Energy recovery: efficiency

- Pallet waste: incineration in a specific cogeneration unit, energy efficiency of 50% for thermal energy and 22% for electric energy[3].

QUANTITATIVE DESCRIPTION OF THE LOADS BEYOND THE SYSTEM BOUNDARIES	– Recycling process for bituminous membrane waste – Transport for reused pallets: 20 km – Transport for recycled pallets: 20 km – Wood chipping of pallets
QUANTITATIVE DESCRIPTION OF THE BENEFITS BEYOND THE SYSTEM BOUNDARIES	– Avoided virgin bitumen: 1,339 kg/FU – Pallet reused: 2,109 E-02 kg/FU – Wood chips (pallet recycled): 4,218 E-02 kg/FU – Energy recovery: o Heat: 0,2582 MJ/FU (substitution: thermal energy from natural gas) o Electricity: 0,4089 kWh/FU (substitution: BE high voltage mix, excluding impact from the transmission network)

[2] Economically reasonable distance -validated bu the h igh density of sorting centres in Belgium
[3] https://monprojet.labiomasseenwallonie.be/download/file/fid/2449 (accessed on 01.12.2022)

11 RELEASE OF DANGEROUS SUBSTANCES TO INDOOR AIR, SOIL AND WATER DURING THE USE STAGE

11.1 Indoor air

This product does not come into contact with indoor air, so it has no impact on the health quality of indoor spaces.

11.2 Soil and water

The product is not in contact with drinking water but may be in contact with rainwater. No tests have been carried out.

12 DEMONSTRATION OF VERIFICATION

EN 15804+A2 serves as the core PCR

Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010
Internal ☐ External ☒

Third party verifier: Naeem Adibi,
n.adibi@weloop.org
WeLOOP S.A.R.L, http://weloop.org
Rue du Bourg 254, 59130 Lambersart – France

13 LCA INTERPRETATION

This study leads to the realisation of a B-EPD for the bitumen waterproofing products of Derbigum: Derbicoat NT 2.5 vapour barrier

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The most impacted domain by the Derbicoat NT 2.5 is the Resource use, fossils, but this issue is partly compensated by the important recycling of the membrane at its end of life.

The main impacts of this product come from the sourcing and processing of raw materials (bitumen, polyester reinforcement, and polymers), and in a lesser extent to the manufacture of the products (consumption of natural gas for heat, and electricity).

Although raw materials play a major role, their impact is limited, and the savings in virgin materials made by recycling membranes and the use of recycled bitumen limit the impact of the process.

Other ways of reducing environmental impact are to optimise energy consumption during manufacture and recycling, and to reduce the distance between the manufacturing and recycling sites (for example by duplicating the latter in a region closer to the target area).

The recycled content of the Derbicoat NT 2.5 represents 21% of the raw materials.

Due to the implementation of a recycling chain to collect both installation trimming waste and demolition waste 85% of the membrane waste are recycled in the patented recycling process of Derbigum.

The production (A1-A3) of 1 FU of Derbicoat NT 2.5 (1 m² installed, including an overlap of 10,5%) corresponds to the emission of 2 kg CO2 eq/FU in the Climate change category, and the consumption of 94 MJ for the Resource use, fossils.

14 TECHNICAL INFORMATION FOR SCENARIO DEVELOPMENT

Different installation mode can be used for the Derbicoat NT 2.5, with the following ancillary materials

- fully torched by use of flame: propane
- loose lay: none
- mechanical fastening: stainless steel screw and plastic tubes/round washers in PP
- glued with bituminous cold adhesive: Derbibond NT

The default scenarios in TOTEM can be applied.

15 APPLICATION UNIT

Derbicoat NT 2.5 is an underlayer vapour barrier, which can be assembled with a Derbigum NT membrane (described in another B-EPD), or under an insulation layer.
This product has the particularity of incorporating a proportion of recycled bitumen and benefiting from a new patented technology for recycling used membranes.

The application unit is 1 m² installed (including 10.5% overlap necessary to ensure the full functionality).

Applications:

- Flexible reinforced bitumen sheet for roof waterproofing: base layer/first layer (overlap 10,5%)
- Can be used on flat or sloping roofs.
- Can be used as a vapour barrier or base sheet on wooden panels, planks, and steel deck.
- Application by mechanical fixing, fully torched or cold bonded (Max. slope 15%).
- Specifically recommended when a high tear resistance is required.

Information on scalability. The membrane is available in two thickness: 2,5 mm (Derbicoat NT 2.5) and 3 mm (Derbicoat NT 3).

Since it is a homogeneous material, the rescaling will be automatically done in TOTEM, and the impacts will be calculated for the selected thickness: ratio 3/2.5 = 1,2.

Commercial names:

- Derbicoat NT 2.5 (2,5 mm thickness)
- Derbicoat NT 3 (3 mm thickness)
- Roll: 1 m (width) x 8 m (length) = 8 m²
- Pallet: 36 rolls (288 m²)
- Ratio between application and the reference flow in the EPD.
  - 1 (10,5% overlap included)
  - If overlap different: ratio (1+overlap)/(1+0,105)

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16 ADDITIONAL INFORMATION ON REVERSIBILITY

Description	Type of fixing	Level of reversibility	Simplicity of disassembly	Speed of disassembly	Ease of handling (size and weight)	Robustness of material (material resistance to disassembly)	Comment
			–		–	–	
Flexible reinforced bitumen sheet for roof waterproofing: base layer/first layer	Welded Fully torched	Non reversible connections	Simple – requires the use of specific though common tools	Speed of disassembly varies from quick to slow depending on element dimensions and number of fixations per distance unit	Material easy to manipulate by hand, one to two workers required depending on dimensions	Disassembly is possible but will likely cause damage to the material due to the type of assembly or and tools used and the presence of additional layers	Bitumen sublayer – combined materials when disassembled
Flexible reinforced bitumen sheet for roof waterproofing: base layer/first layer	Loose laid	Non reversible connections	Simple – requires the use of specific though common tools	Speed of disassembly varies from quick to slow depending on element dimensions and number of fixations per distance unit	Material easy to manipulate by hand, one to two workers required depending on dimensions	Disassembly is possible but will likely cause damage to the material due to the type of assembly or and tools used and the presence of additional layers	Bitumen sublayer – combined materials when disassembled
Flexible reinforced bitumen sheet for roof waterproofing: base layer/first layer	Screwed	Non reversible connections	Simple – requires the use of specific though common tools	Speed of disassembly varies from quick to slow depending on element dimensions and number of fixations per distance unit	Material easy to manipulate by hand, one to two workers required depending on dimensions	Disassembly is possible but will likely cause damage to the material due to the type of assembly or and tools used and the presence of additional layers	Bitumen sublayer – combined materials when disassembled
Flexible reinforced bitumen sheet for roof waterproofing: base layer/first layer	Glued (Cold bonded)	Non reversible connections	Simple – requires the use of specific though common tools	Speed of disassembly varies from quick to slow depending on element dimensions and number of fixations per distance unit	Material easy to manipulate by hand, one to two workers required depending on dimensions	Disassembly is possible but will likely cause damage to the material due to the type of assembly or and tools used and the presence of additional layers	Bitumen sublayer – combined materials when disassembled

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General information

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Verifier

Naeem Adibi - WeLoop
Date of verification: 22.02.2024
External independent verification of the declaration and data according to EN ISO 14025 and relevant PCR documents

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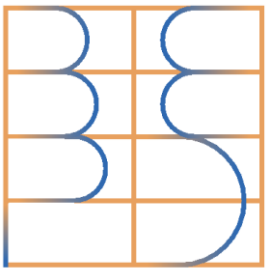

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