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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


Issued:

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Valid to:

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Programme

EPD Danmark
www.epddanmark.dk



- Industry EPD
 Product EPD

Basis of calculation

This EPD is developed and verified in accordance with the European standard EN 15804+A2.

Comparability

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

Declared product(s)

DERBICOLOR NT WSL

Number of declared datasets/product variations: 1

Production site

Perwez, Belgium

Use of Guarantees of Origin

- No certificates used
 Electricity covered by GoO
 Biogas covered by GoO

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

Declared/ functional unit

Functional unit: 1 m² plain surface, roof waterproofing system, from cradle-to-grave, with activities needed for a study period of 50 years.

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:

Charlotte Merlin

Year of production site data (A3)

2023

EPD version

First version

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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 study covers DERBICOLOR NT WSL, an APP-bitumen mineral waterproofing membrane. The product consists of reinforced bitumen flexible sheets for roof waterproofing in accordance with EN 13707. The sheets have a width of 1,1 metres and a length of 7,27 metres. These membranes are installed on various types of building roofs as waterproofing, either as a single layer or multilayer, depending on the selected product type. This EPD covers the single layer installation. On site, the layer is mechanically fixed, and overlaps are torched.

| Material | Weight-% of declared product |
|----------------------------------|------------------------------|
| Bitumen, virgin and pre-consumer | 33% |
| Bitumen, recycled | 7% |
| Polymers | 14% |
| Filler | 19% |
| Reinforcements | 3% |
| Surfacing | 24% |

Product packaging:

The composition of the sales- and transport packaging of the product is shown in the table below.

| Material | Weight of packaging material (kg) | Weight-% of packaging |
|---------------------|-----------------------------------|-----------------------|
| Tapes and Labelling | 2,05E-04 | 0.2% |
| Plastic wrapping | 7,00E-03 | 5% |
| Carton | 1,50E-03 | 1% |
| Pallet | 1,25E-01 | 93% |
| Total | 1,34E-01 | 100% |

Representativity

This declaration, including data collection and the modelled foreground system, including results, represents the production of one square meter DERBICOLOR NT WSL bitumen roof waterproofing system at the production site located in Perwez, Belgium, its transportation to a customer in

Denmark or Europe for installation, use phase and end of life. 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 2023. Allocation of manufacturing data is based on the factory data from 2023 and allocated both based on the blend weight and production process specific parameters. Generic data and background data are based on life cycle inventory (LCI) data from LCA For Experts Professional database 2025.1 and Data on demand, and Ecoinvent version 3.11. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

Hazardous substances

The product contains PAHs at levels below 0,1%. PAHs are on the "Candidate List of Substances of Very High Concern for authorization".

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

Product(s) use

Bituminous roofing material.

Essential characteristics

The essential characteristics of the modified bituminous roofing membrane is covered by harmonized technical specification EN13707:2004+A2:2009 (for roof waterproofing). 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) on substrate MW and wood, according to method CEN/TS 1187.

Further technical information can be obtained by contacting the manufacturer or on the following website: <http://derbigum.com/> and <http://derbigum.dk/>, <http://derbigum.no/>, <http://derbigum.se/>.

Reference Service Life (RSL)

The DERBICOLOR NT WSL product system is expected to fulfil its function for the entirety of its installation, thus no replacement is expected for the DERBICOLOR NT WSL product system. Due to its technical properties, under normal service conditions, when installed on stable substrates and regularly maintained, the product will have a lifespan of up to 50 years. This is consistent with other products in Derbigum's range, for which a minimum lifetime of 50 years has been observed (cf. TGA.2017/002).

LCA background

Functional unit

The functional unit is defined as: "1 m² plain surface, roof waterproofing system, from cradle-to-grave, with activities needed for a study period of 50 years for the building.". The weight of the functional unit thus includes the production per square metre (5,76 kg/m²) in the modules A1-A3. Module A5 includes additional production processes to compensate for the overlap losses and wastage of products during installation, at 16% (0,92 kg/m²).

| Name | Value | Unit |
|---------------------------|--------------|---|
| Functional unit | 1 | m ² plain surface, roof waterproofing system during 50 years |
| Weight per unit | 6,39 (A1-A5) | kg/m ² (A1-A5, installed product) |
| Conversion factor to 1 kg | 0,156 | m ² /kg |

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804:2012+A2:2019, and EN 17388-1:2024, referred to as reference PCR.

Energy modelling principles

Foreground system:

The product is produced using electricity from renewable sources in Belgium, substantiated by a Guarantee of Origin. The electricity has been modelled with a customized electricity mix for electricity from hydro power (61%), wind power (29%), and photovoltaic (10%), which is aligned with the information provided by the electricity supplier.

Other energy inputs, i.e., natural gas, propane and diesel are used for thermal energy and are modelled using a European consumption mix.

Information about the energy mix in the foreground system:

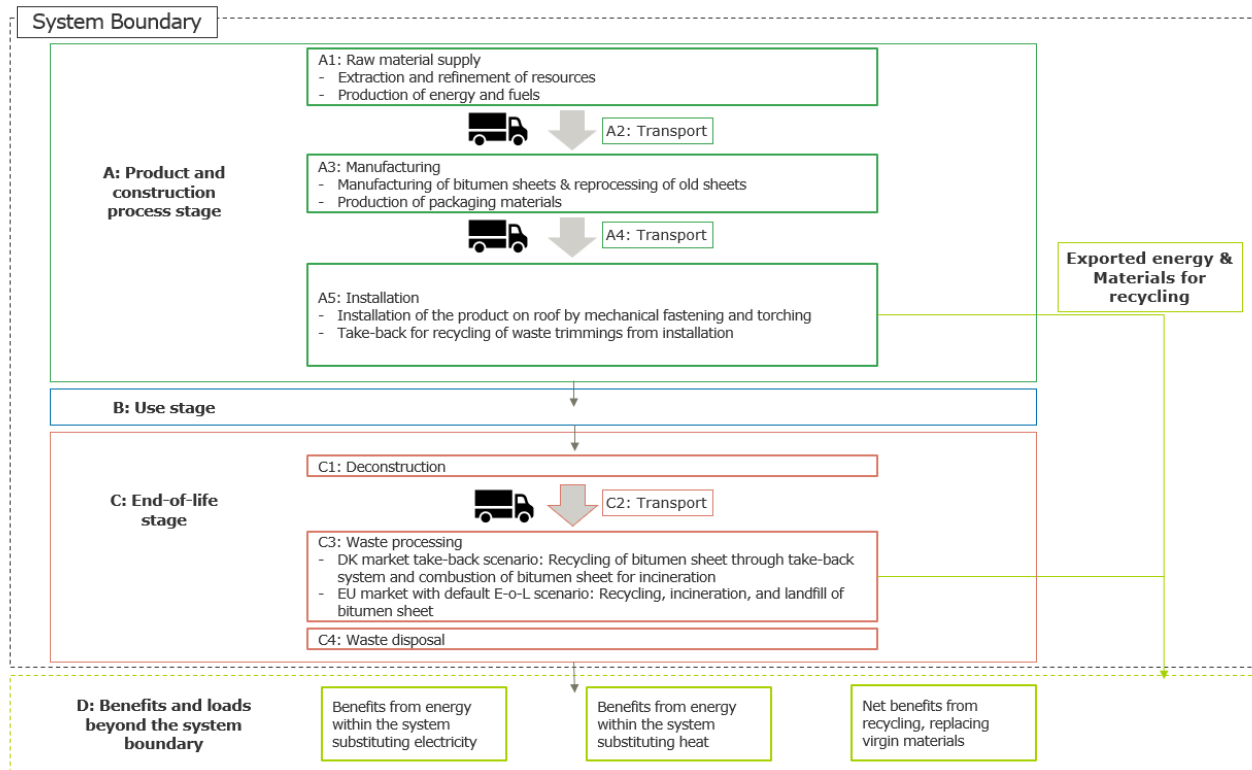
| Dataset | EF | Unit |
|-------------------------------------|------|--------------------------|
| Electricity mix | 0,01 | kg CO ₂ e/kWh |
| Thermal energy from natural gas | 0,06 | kg CO ₂ e/MJ |
| Propane at refinery, ref. year 2020 | 0,8 | kg CO ₂ e/kg |
| propane, burned in building machine | 0,09 | kg CO ₂ e/MJ |
| Diesel mix and burned | 3,5 | kg CO ₂ e/kg |

Background system:

Upstream processes for production of the incoming materials are modelled using the energy mix found in the generic data from the Professional database 2025.1, Data on demand, and Ecoinvent version 3.11 .

Downstream processes are modelled using propane at refinery and burned in a building machine for overlap torching and is modelled using a European consumption mix. The heat entering module D from preceding modules is assumed to replace heat from biofuels. The chosen dataset is specific for each country. The electricity entering module D from preceding modules are assumed to replace the average Danish or European electricity grid mix.

Flowdiagram



System boundary

This is a product specific EPD based on a cradle-to-grave and module D LCA, which accounts for 100 product-weight-%.

The cut-off criteria, meaning the general rules for the exclusion of inputs and outputs, follows the requirements in EN 15804, 6.3.6, 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

- Production and waste management of packaging materials used for incoming raw materials to Derbigum. This is assessed to fall well under the cut-off rules, as the total incoming packaging material is of marginal weight in comparison to the weight of the delivered raw material.
- Production of Derbigum infrastructure, capital goods, travelling by personnel and research and development.
- Production of active carbon for fume filtration (waste treatment is included).
- Production of the input material for the solid waste is not included as it is not considered part of the product system. The modelled inputs of the product are

based in specific data derived from the production formulation of the roof waterproofing system, including all materials and energies related to the production process. The outputs of solid waste, which derive from various sources, not directly connected to the production process are allocated to the products based on production volume in square metres (m²). The waste treatment of the solid waste is included as a conservative value.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

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's 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 transportation.

A3 – Manufacturing processes

Module A3 includes the manufacturing of the final product, production of outgoing packaging, 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 and lubricating oil that is used in the manufacturing is also included as well as the treatment of wastewater mixed with oil.

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

The production starts with a mixture of bitumen, polymers (including recycled polymers), recycled material and fillers. The recycled materials are partly bitumen, from internal (pre-consumer) and external recycling (post-consumer) and partly

secondary oils from a supplier. Recycled external bitumen are materials collected by Derbigum, which consequentially are recycled by them. Internally recycled bitumen are production wastes that are recycled to be used as input material for newly produced sheets. Water is used to cool the bitumen during the process in a closed-circuit. The membrane is impregnated with a polyester-glass composite reinforcement. The top side of the membranes are then treated with talc or natural slates. The bottom side of the membrane are then treated with talc. Finally, it is packaged.

Construction process stage (A4-A5) includes:

A4 – Transport

Module A4 includes the impacts from transporting the finished product to an assumed installation site. Two scenarios are considered in this EPD for the use phase in two different markets: Denmark and Europe. The distances are modelled as the distance from the manufacturing site in Perwez to a specific storage location in the respective scenarios: 1000 km in Denmark, and 300 km for Europe (in accordance with the reference PCR section 6.3.9.3). This module includes the extraction of fuels and the combustion of the fuel during transport.

A5 – Construction installation process

Module A5 represents the installation of the product at the installation site. This module includes additional production processes to compensate for the overlap losses and wastage of products during installation, at 16% (default value from the reference PCR section 6.3.9.4). The loss from fastening, included within the 16% overlap and loss, is estimated by Derbigum to be 5%. Module A5 also includes the production and combustion of propane for overlap torching. The amount of propane used for overlap torching is calculated based on the default values from the reference PCR (section 6.3.9.4) and the length of the torched bitumen sheet. The roof waterproofing sheets are mechanically fastened with an average of 4 fasteners per square meter, requiring polypropylene for the thermal break tube/washer and steel for the screws, following the default values in PCR section 6.3.9.4.

The installation waste is handled by Derbigum's take-back system. In the take-back system the

waste is classified as materials for recycling (95%) and waste for incineration (5%), in accordance with Derbigum's international internal statistics.

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

The maintenance activities in module B2 are related to annual cleaning activities (e.g. cleaning water outlets) by human resources, which may be omitted from the calculations according to the reference PCR. No impacts from maintenance have been included.

B3 – Repair

The repair activities in module B3 are omitted due to their incidental character and negligible impact, in line with the allowance 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 refurbishment have been included. The product is expected to fulfill its function for 50 years and therefore no refurbishment is needed.

B6 – Operational energy use

The roofing system does not require energy to operate and therefore no operational energy use 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:

All Derbigum roof water proofing systems sold on the Danish and European markets come with a "take back" guarantee incentivizing recycling.

In the Danish market the recycling scenario with the take-back system consist of 95% for material recycling and the remaining 5% to incineration for energy recovery in Denmark in accordance with Derbigum's international internal statistics and experience in Denmark. The scenario shall represent the situation if 100% of the roof water proofing system shall be recycled but incorporates the in reality observed inefficiency of that process, i.e., including collection and sorting loss, compare CEN/TR 16970:2016 ch. 6.3.8.

The European markets follow the default scenarios specified in EN 17388-1:2024 (section 6.3.9.11): 10% recycling, 45% incineration, 45% to landfill.

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). For all included markets, transportation to the incineration site is assumed to be 100 km, following the default values in the PCR section 6.3.9.10. In Danish market, the recycling site is in Belgium and the transportation distance for recycling is thus 1000 km from Denmark, the same distance as presented in module A4. For the European markets the recycling site is located within each respective country. The distances to the recycling and landfill sites are assumed to be 300 km and 50 km, respectively, according to the default values in EN 17388-1:2028, section 6.3.9.10.

C3 – Waste processing

Module C3 consists of the waste processing steps, of the bitumen sheets at the end-of-life.

Emissions from the incinerated materials in Denmark and Europe are reported in module C3 and the benefits from heat and electricity generation are carried forward to module D. These outflows from module C3 are recorded in

the result tables as “exported electrical energy” (EEE) for exported electricity, “exported thermal energy” (EET) for heat, “materials for recycling” (MFR) for materials that are recycled.

The recycling of the decommissioned roofing material produced is not processed within the system boundaries. The decommissioned roofing material is judged to reach an end-of-waste state when it arrives at the Derbigum site in Perwez, Belgium for the Danish market, or at the respective recycling sites for the European markets.. Hence, the waste flow is reported as materials for recycling in C3, but the burden from the recycling process and the benefits from replacing new material is recorded in module D.

Locally an additional calculation will be necessary based on the local applicable waste treatment scenario.

C4 – Disposal

Ashes and other remains after incineration are reported in EPD module C3, given modelling restrictions as the incineration datasets already include the Ash handling.

For the European market, Module C4 covers the landfilling of part of the waterproofing sheet. In the Danish market no landfilling occurs; therefore, no impact is reported in Module C4.

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

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

In this study material and energy flows (heat and electricity) enters module D from different modules:

- the bitumen waste material (trimmings) produced in module A5 that is sent to recycling,
- energy flows from incineration of bitumen waste material (trimmings) produced in module A5
- energy flows from incineration of packaging in module A5
- bitumen material from module C3 that is sent to recycling
- energy flows from incineration of bitumen waste material from C-module that is sent to incineration with energy recovery

When bitumen sheets are sent to recycling throughout the modules, the burden from the recycling process and the 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.

When the product is incinerated the burdens of the incineration are reported in the respective originating modules (modules A5 and C3). The produced energy (heat and electricity) is recovered and assumed to replace the heat and electricity that would otherwise have been produced from other sources. This benefit is reported in module D.

LCA results

DERBICOLOR NT WSL in Denmark

| ENVIRONMENTAL IMPACTS PER 1m2 | | | | | | | | | | |
|-------------------------------|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
| GWP-total | kg CO ₂ eq. | 3,27E+00 | 4,90E-01 | 8,70E-01 | 0,00E+00 | 0,00E+00 | 7,39E-02 | 7,62E-01 | 0,00E+00 | -3,08E+00 |
| GWP-fossil | kg CO ₂ eq. | 3,26E+00 | 4,82E-01 | 8,43E-01 | 0,00E+00 | 0,00E+00 | 7,30E-02 | 7,62E-01 | 0,00E+00 | -3,07E+00 |
| GWP-biogenic | kg CO ₂ eq. | 2,09E-03 | 2,47E-03 | 2,57E-02 | 0,00E+00 | 0,00E+00 | 1,00E-04 | 5,50E-05 | 0,00E+00 | -1,97E-03 |
| GWP-luluc | kg CO ₂ eq. | 3,22E-03 | 5,07E-03 | 9,06E-04 | 0,00E+00 | 0,00E+00 | 7,65E-04 | 1,45E-05 | 0,00E+00 | -3,68E-03 |
| ODP | kg CFC 11 eq. | 8,31E-10 | 9,57E-14 | 2,38E-09 | 0,00E+00 | 0,00E+00 | 1,44E-14 | 5,51E-10 | 0,00E+00 | 1,41E-08 |
| AP | mol H ⁺ eq. | 9,25E-03 | 8,55E-04 | 2,01E-03 | 0,00E+00 | 0,00E+00 | 1,37E-04 | 2,70E-04 | 0,00E+00 | -8,04E-03 |

| | | | | | | | | | | |
|-------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| EP-freshwater | kg PO ₄ eq. | 5,18E-06 | 1,33E-06 | 8,03E-06 | 0,00E+00 | 0,00E+00 | 2,01E-07 | 4,07E-06 | 0,00E+00 | 7,72E-07 |
| EP-marine | kg N eq. | 2,42E-03 | 3,64E-04 | 5,56E-04 | 0,00E+00 | 0,00E+00 | 5,91E-05 | 7,92E-05 | 0,00E+00 | -1,88E-03 |
| EP-terrestrial | mol N eq. | 2,64E-02 | 3,83E-03 | 6,03E-03 | 0,00E+00 | 0,00E+00 | 6,24E-04 | 7,32E-04 | 0,00E+00 | -1,96E-02 |
| POCP | kg NMVOC eq. | 9,61E-03 | 7,68E-04 | 2,24E-03 | 0,00E+00 | 0,00E+00 | 1,23E-04 | 1,96E-04 | 0,00E+00 | -7,71E-03 |
| ADPm ¹ | kg Sb eq. | 6,50E-07 | 3,30E-08 | 1,09E-06 | 0,00E+00 | 0,00E+00 | 4,97E-09 | 6,25E-08 | 0,00E+00 | 4,08E-06 |
| ADPf ¹ | MJ | 1,51E+02 | 6,38E+00 | 2,97E+01 | 0,00E+00 | 0,00E+00 | 9,62E-01 | 2,03E-01 | 0,00E+00 | -1,54E+02 |
| WDP ¹ | m ³ world eq. deprived | 1,99E-01 | 2,47E-03 | 4,53E-02 | 0,00E+00 | 0,00E+00 | 3,72E-04 | 1,68E-02 | 0,00E+00 | -2,21E-01 |
| Caption | GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = 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 [UNIT]

| Parameter | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
|---------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| PM | [Disease incidence] | 1,35E-07 | 7,46E-09 | 2,81E-08 | 0,00E+00 | 0,00E+00 | 1,16E-09 | 1,78E-09 | 0,00E+00 | -9,97E-08 |
| IRP ² | [kBq U235 eq.] | 7,97E-02 | 1,78E-03 | 1,71E-02 | 0,00E+00 | 0,00E+00 | 2,68E-04 | 5,35E-04 | 0,00E+00 | -9,08E-02 |
| ETP-fw ¹ | [CTUe] | 9,50E+01 | 8,23E+00 | 1,77E+01 | 0,00E+00 | 0,00E+00 | 1,24E+00 | 1,25E-01 | 0,00E+00 | -1,00E+02 |
| HTP-c ¹ | [CTUh] | 1,71E-09 | 1,11E-10 | 3,85E-10 | 0,00E+00 | 0,00E+00 | 1,68E-11 | 4,13E-11 | 0,00E+00 | -1,86E-09 |
| HTP-nc ¹ | [CTUh] | 4,07E-08 | 6,22E-09 | 8,43E-09 | 0,00E+00 | 0,00E+00 | 9,38E-10 | 6,02E-10 | 0,00E+00 | -4,88E-08 |
| SQP ¹ | - | 7,26E+00 | 2,80E+00 | 1,58E+00 | 0,00E+00 | 0,00E+00 | 4,22E-01 | 9,65E-02 | 0,00E+00 | -1,77E+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 | | | | | | | | | |
| 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 [UNIT]

| Parameter | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
|-----------|-------------------|----------|----------|-----------|----------|----------|----------|-----------|----------|-----------|
| PERE | [MJ] | 4,77E+00 | 4,83E-01 | 1,34E+00 | 0,00E+00 | 0,00E+00 | 7,28E-02 | 8,86E-03 | 0,00E+00 | -9,39E+00 |
| PERM | [MJ] | 2,53E-01 | 0,00E+00 | -2,53E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,68E-01 |
| PERT | [MJ] | 5,02E+00 | 4,83E-01 | 1,09E+00 | 0,00E+00 | 0,00E+00 | 7,28E-02 | 8,86E-03 | 0,00E+00 | -9,66E+00 |
| PENRE | [MJ] | 1,02E+02 | 6,38E+00 | 2,92E+01 | 0,00E+00 | 0,00E+00 | 9,62E-01 | 2,03E-01 | 0,00E+00 | -1,06E+02 |
| PENRM | [MJ] | 5,68E+01 | 0,00E+00 | 1,89E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,87E+01 | 0,00E+00 | -6,02E+01 |
| PENRT | [MJ] | 8,04E+01 | 6,38E+00 | 1,85E+01 | 0,00E+00 | 0,00E+00 | 9,62E-01 | -5,85E+01 | 0,00E+00 | -8,29E+01 |
| SM | [kg] | 2,65E-01 | 0,00E+00 | 4,23E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,80E-01 |
| RSF | [MJ] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NRSF | [MJ] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | [m ³] | 1,00E-02 | 2,48E-04 | 2,15E-03 | 0,00E+00 | 0,00E+00 | 3,74E-05 | 3,91E-04 | 0,00E+00 | -1,01E-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 [UNIT] | | | | | | | | | | |
|--|--|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Parameter | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
| HWD | [kg] | 1,57E-04 | 2,70E-10 | 2,00E-03 | 0,00E+00 | 0,00E+00 | 4,06E-11 | 1,83E-02 | 0,00E+00 | -8,03E-08 |
| NHWD | [kg] | 4,85E-02 | 9,06E-04 | 2,53E-02 | 0,00E+00 | 0,00E+00 | 1,37E-04 | 4,44E-01 | 0,00E+00 | -5,37E-02 |
| RWD | [kg] | 5,60E-04 | 1,25E-05 | 1,19E-04 | 0,00E+00 | 0,00E+00 | 1,89E-06 | 0,00E+00 | 0,00E+00 | -6,71E-04 |
| CRU | [kg] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MFR | [kg] | 9,49E-02 | 0,00E+00 | 2,89E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,10E+00 | 0,00E+00 | -2,72E-03 |
| MER | [kg] | 1,39E-03 | 0,00E+00 | 2,22E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,47E-03 |
| EEE | [MJ] | 0,00E+00 | 0,00E+00 | 1,27E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,24E+00 | 0,00E+00 | 0,00E+00 |
| EET | [MJ] | 0,00E+00 | 0,00E+00 | 2,37E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,42E+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 M ² INSTALLED ROOF WATERPROOFING DURING 50 YEARS | | |
|---|---|--------------------------|
| Parameter | Unit | A1-A5, installed product |
| Biogenic carbon content in product | [kg C] | 0,00E+00 |
| Biogenic carbon content in accompanying packaging | [kg C] | 5,50E-02 |
| Note | 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂ | |

LCA results

DERBICOLOR NT WSL in Europe

| ENVIRONMENTAL IMPACTS PER 1m ² | | | | | | | | | | |
|---|------------------------|----------|----------|----------|----------|----------|-----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
| GWP-total | kg CO ₂ eq. | 3,27E+00 | 1,47E-01 | 8,51E-01 | 0,00E+00 | 0,00E+00 | 1,99E-01 | 6,86E+00 | 9,98E-01 | -1,43E+00 |
| GWP-fossil | kg CO ₂ eq. | 3,26E+00 | 1,45E-01 | 8,24E-01 | 0,00E+00 | 0,00E+00 | 2,01E-01 | 6,86E+00 | 9,90E-01 | -1,40E+00 |
| GWP-biogenic | kg CO ₂ eq. | 2,09E-03 | 7,40E-04 | 2,56E-02 | 0,00E+00 | 0,00E+00 | -3,89E-03 | 4,95E-04 | 7,90E-03 | -2,23E-02 |
| GWP-luluc | kg CO ₂ eq. | 3,22E-03 | 1,52E-03 | 7,06E-04 | 0,00E+00 | 0,00E+00 | 2,06E-03 | 1,30E-04 | 3,00E-04 | -4,67E-03 |
| ODP | kg CFC 11 eq. | 8,31E-10 | 2,87E-14 | 2,38E-09 | 0,00E+00 | 0,00E+00 | 3,88E-14 | 4,96E-09 | 4,50E-09 | 1,46E-09 |
| AP | mol H ⁺ eq. | 9,25E-03 | 2,57E-04 | 1,97E-03 | 0,00E+00 | 0,00E+00 | 3,95E-04 | 2,43E-03 | 3,22E-03 | -7,86E-03 |
| EP-freshwater | kg PO ₄ eq. | 5,18E-06 | 4,00E-07 | 7,98E-06 | 0,00E+00 | 0,00E+00 | 5,41E-07 | 3,66E-05 | 3,95E-04 | -1,29E-05 |
| EP-marine | kg N eq. | 2,42E-03 | 1,09E-04 | 5,41E-04 | 0,00E+00 | 0,00E+00 | 1,73E-04 | 7,13E-04 | 9,87E-04 | -2,20E-03 |

| | | | | | | | | | | |
|-------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| EP-terrestrial | mol N eq. | 2,64E-02 | 1,15E-03 | 5,87E-03 | 0,00E+00 | 0,00E+00 | 1,83E-03 | 6,59E-03 | 1,08E-02 | -2,52E-02 |
| POCP | kg NMVOC eq. | 9,61E-03 | 2,30E-04 | 2,21E-03 | 0,00E+00 | 0,00E+00 | 3,57E-04 | 1,76E-03 | 3,09E-03 | -4,92E-03 |
| ADPm ¹ | kg Sb eq. | 6,50E-07 | 9,89E-09 | 1,09E-06 | 0,00E+00 | 0,00E+00 | 1,34E-08 | 5,63E-07 | 2,53E-06 | 1,63E-07 |
| ADPf ¹ | MJ | 1,51E+02 | 1,91E+00 | 2,95E+01 | 0,00E+00 | 0,00E+00 | 2,59E+00 | 1,83E+00 | 6,70E+00 | -3,73E+01 |
| WDP ¹ | m ³ world eq. deprived | 1,99E-01 | 7,41E-04 | 4,53E-02 | 0,00E+00 | 0,00E+00 | 1,00E-03 | 1,51E-01 | 1,21E-01 | -3,04E-01 |
| Caption | GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = 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 [UNIT]

| Parameter | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
|---------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| PM | [Disease incidence] | 1,35E-07 | 2,24E-09 | 2,78E-08 | 0,00E+00 | 0,00E+00 | 3,22E-09 | 1,60E-08 | 3,14E-08 | -6,34E-08 |
| IRP ² | [kBq U235 eq.] | 7,97E-02 | 5,33E-04 | 1,70E-02 | 0,00E+00 | 0,00E+00 | 7,20E-04 | 4,82E-03 | 1,01E-02 | -5,40E-01 |
| ETP-fw ¹ | [CTUe] | 9,50E+01 | 2,47E+00 | 1,74E+01 | 0,00E+00 | 0,00E+00 | 3,34E+00 | 1,12E+00 | 1,10E+01 | -1,52E+01 |
| HTP-c ¹ | [CTUh] | 1,71E-09 | 3,34E-11 | 3,81E-10 | 0,00E+00 | 0,00E+00 | 4,51E-11 | 3,72E-10 | 3,12E-09 | -9,40E-10 |
| HTP-nc ¹ | [CTUh] | 4,07E-08 | 1,87E-09 | 8,18E-09 | 0,00E+00 | 0,00E+00 | 2,52E-09 | 5,41E-09 | 1,38E-07 | -4,35E-08 |
| SQP ¹ | - | 7,26E+00 | 8,39E-01 | 1,47E+00 | 0,00E+00 | 0,00E+00 | 1,13E+00 | 8,69E-01 | 6,28E+00 | -1,47E+02 |
| 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 | | | | | | | | | |
| 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 [UNIT]

| Parameter | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
|-----------|---|----------|----------|-----------|----------|----------|----------|-----------|----------|-----------|
| PERE | [MJ] | 4,77E+00 | 1,45E-01 | 1,32E+00 | 0,00E+00 | 0,00E+00 | 1,96E-01 | 7,97E-02 | 2,67E-01 | -4,03E+01 |
| PERM | [MJ] | 2,53E-01 | 0,00E+00 | -2,53E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,82E-02 |
| PERT | [MJ] | 5,02E+00 | 1,45E-01 | 1,07E+00 | 0,00E+00 | 0,00E+00 | 1,96E-01 | 7,97E-02 | 2,67E-01 | -4,04E+01 |
| PENRE | [MJ] | 1,02E+02 | 1,91E+00 | 2,90E+01 | 0,00E+00 | 0,00E+00 | 2,59E+00 | 1,83E+00 | 6,70E+00 | -3,23E+01 |
| PENRM | [MJ] | 5,68E+01 | 0,00E+00 | 1,89E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -5,87E+01 | 0,00E+00 | -6,34E+00 |
| PENRT | [MJ] | 8,04E+01 | 1,91E+00 | 1,83E+01 | 0,00E+00 | 0,00E+00 | 2,59E+00 | -5,69E+01 | 6,70E+00 | -2,98E+01 |
| SM | [kg] | 2,65E-01 | 0,00E+00 | 4,23E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,95E-02 |
| RSF | [MJ] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NRSF | [MJ] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | [m ³] | 1,00E-02 | 7,44E-05 | 2,14E-03 | 0,00E+00 | 0,00E+00 | 1,00E-04 | 3,52E-03 | 2,81E-03 | -1,48E-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 [UNIT]

| Parameter | Unit | A1-A3 | A4 | A5 | B4 | C1 | C2 | C3 | C4 | D |
|-----------|--|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| HWD | [kg] | 1,57E-04 | 8,09E-11 | 2,00E-03 | 0,00E+00 | 0,00E+00 | 1,09E-10 | 1,65E-01 | 5,79E+00 | -3,45E-08 |
| NHWD | [kg] | 4,85E-02 | 2,72E-04 | 2,53E-02 | 0,00E+00 | 0,00E+00 | 3,67E-04 | 3,99E+00 | 6,66E-02 | -3,97E-02 |
| RWD | [kg] | 5,60E-04 | 3,76E-06 | 1,19E-04 | 0,00E+00 | 0,00E+00 | 5,08E-06 | 0,00E+00 | 0,00E+00 | -3,28E-03 |
| CRU | [kg] | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MFR | [kg] | 9,49E-02 | 0,00E+00 | 2,89E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,42E-01 | 0,00E+00 | -2,87E-04 |
| MER | [kg] | 1,39E-03 | 0,00E+00 | 2,22E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,55E-04 |
| EEE | [MJ] | 0,00E+00 | 0,00E+00 | 1,27E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,12E+01 | 0,00E+00 | 0,00E+00 |
| EET | [MJ] | 0,00E+00 | 0,00E+00 | 2,37E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,17E+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; EE = Exported energy | | | | | | | | | |

BIOGENIC CARBON CONTENT PER M² INSTALLED ROOF WATERPROOFING DURING 50 YEARS

| Parameter | Unit | A1-A5, installed product |
|---|---|--------------------------|
| Biogenic carbon content in product | [kg C] | 0.00E+00 |
| Biogenic carbon content in accompanying packaging | [kg C] | 5,50E-02 |
| Note | 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂ | |

Additional information

LCA interpretation

The analysis reveals that the raw material processing and manufacturing (modules A1-A3) drives the primary environmental impacts of Derbicolour NT WSL followed by module A5.

Technical information on scenarios

Transport to the building site (A4)

| Scenario information | Value | Unit |
|---|--|-------------------|
| Fuel type | Diesel | - |
| Vehicle type | Truck, 20 - 26t gross weight, Euro 0 - 6 mix | - |
| Transport distance Denmark | 1000 | km |
| Transport distance Europe | 300 | Km |
| Capacity utilisation (including empty runs) | 85 | % |
| Gross density of products transported | 6,68 | kg/m ³ |
| Capacity utilisation volume factor | | - |

Installation of the product in the building (A5)

| Input to the unit process for Installation, A5, per FU | | | |
|--|----------|----------|------|
| Scenario information | Value DK | Value EU | Unit |
| Sheets produced in A1-A5 | | | |
| - Sheets from factory (excl. Packaging), A1-A3 | 5,76E+00 | 5,76E+00 | kg |
| - Extra material, overlap + waste (16% extra sheet from factory), A5 | 9,22E-01 | 9,22E-01 | kg |
| 4 fasteners | | | |
| - Polypropylene for the thermal break tube/washer | 1,70E-02 | 1,70E-02 | kg |
| - Steel for screws | 1,40E-02 | 1,40E-02 | kg |
| Packaging for product (incl. Extra material) | | | |
| - Packaging for product, A1-A3 | 1,34E-01 | 1,34E-01 | kg |
| - Packaging for product (for the overlap and waste), A5 | 2,14E-02 | 2,14E-02 | kg |
| Propane | 2,73E-02 | 2,73E-02 | kg |
| Installed product | 6,39E+00 | 6,39E+00 | kg |
| Output to the unit process for Installation, A5, per FU | | | |
| Waste bitumen sheet | | | |
| - of which sheet for recycling | 2,74E-01 | 2,88E-02 | kg |
| - of which sheet for incineration | 1,44E-02 | 1,30E-01 | kg |
| - of which sheet for landfill | 0,00E+00 | 1,30E-01 | kg |
| Waste packaging to incineration | 1,55E-01 | 1,55E-01 | kg |

Reference service life

| RSL information | |
|-----------------------------|---|
| 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/ www.derbigum.no/ www.derbigum.se |
| Maintenance | - |

Use (B1-B7)

| Scenario information | Value | Unit |
|--|------------------|------|
| B1 – Use | | |
| | No emissions | |
| B2 - Maintenance | | |
| Maintenance process | No maintenance | - |
| B3 – Repair | | |
| Repair process | No repair | - |
| B4 – Replacement | | |
| Replacement cycle | No replacement | - |
| B5 - Refurbishment | | |
| Refurbishment process | No refurbishment | - |
| B6 + B7 – Use of energy and water | | |
| Energy and water consumption | None | - |

End of life (C1-C4)

| Scenario information | Value DK | Value EU | Unit |
|--------------------------------------|--|---|------|
| Collected separately | 6,39E+00 (100%) | 0,00E+00 (0%) | kg |
| Collected with mixed waste | 0,001E+00 (0%) | 6,39E+00 (100%) | kg |
| For reuse | 0,00E+00 (0%) | 0,00E+00 (0%) | kg |
| For recycling | 6,07E+00 (95%) | 6,39E-01 (10%) | kg |
| For energy recovery | 3,20E-01 (5%) | 2,88E+00 (45%) | kg |
| For final disposal | 0 (0%) | 2,88E+00 (45%) | kg |
| Assumptions for scenario development | Experience from the take back system in DK | Default scenario from the reference PCR | |

Re-use, recovery and recycling potential (D)

| Scenario information/Material | Value DK | Value EU | Unit |
|---|----------|----------|------|
| Electricity leaving the system | 1,24E+00 | 11,2E+00 | MJ |
| Heat leaving the system | 2,42E+00 | 2,17E+01 | MJ |
| Material for recycling leaving the system | 6,35E+00 | 6,68E-01 | kg |

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.

References

| | |
|---------------------------------------|--|
| Publisher |  www.epddanmark.dk Template version 2024.1 |
| Programme operator | Danish Technological Institute Gregersensvej DK-2630 Taastrup www.teknologisk.dk |
| LCA-practitioner | <i>Thomas Eknor Morrell, Yevgeniya Arushanyan, Jonathan Klement, and Ella Heinonen</i> Ramboll Sweden AB Email: thomas.morrell@ramboll.se yevgeniya.arushanyan@ramboll.se jonathan.klement@ramboll.se ella.heinonen@ramboll.se |
| LCA software / background data | <i>LCA For Experts 10.9.1.17 incl. data from LCA For Experts Professional database 2025.1, Data on demand, ecoinvent version 3.11 and the Eurobitume, 2025 LCI profile version 4.0 with infrastructure.</i> <i>EN 15804 reference package 3.1</i> |
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General programme instructions

General Programme Instructions, version 2.0, spring 2020
www.epddanmark.dk

EN 15804

DS/EN 15804 + A2:2019 – “Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products”

CEN/TR 16970:2016

CEN/TR 16970:2016 – “Sustainability of construction works – Guidance for the implementation of EN 15804”

Product-specific prEN 17388-1:2024

prEN 17388-1:2024 E - “Flexible sheets for waterproofing - Environmental product declarations - Product category rules for reinforced bitumen, plastic and rubber flexible sheets for roof waterproofing - Part 1: Cradle to grave and module D”

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”

Eurobitume. (2022)

The Eurobitume Life-Cycle Inventory for bitumen, version 3.1. Brussels: European Bitumen Association. (used together with version 3.0)

ETA Danmark (2023)

Teknisk Godkendelse til Anvendelsen Nr. TGA.2017/002

Ramboll (2023)

LCA report for Derbicolor NT Patch and Derbicoat NT on the Danish market