# Environmental Product Declaration

in accordance with ISO 14025:2006 and

EN 15804:2012+A2:2019/AC:2021

## Elastomeric (SBS-modified) Bituminous Membranes


*EPD of multiple products, based on the average results of the product group:*

**HERMESDIENE, COSMODIEN ASPHALDIEN, ELASTOPLAST**

**Company:** Vitex S.A.

| EPD REGISTRATION NUMBER | PUBLICATION DATE | DATE OF VALIDITY | PROGRAM | PROGRAM OPERATOR |
|---|---|---|---|---|
| **IES-0017981** | **27/11/2024** | **26/11/2029** | **The International Epd® System** www.environdec.com | **EPD International AB** |

## PROGRAM INFORMATION

| | |
|---|---|
| **PROGRAM OPERATOR**<br>**EPD INTERNATIONAL AB**<br>**ADDRESS:** Box 210 60, SE-100 31 Stockholm, Sweden<br>**WEBSITE:** www.environdec.com<br>**EMAIL ADDRESS:** info@environdec.com | **EPD OWNER**<br>**VITEX S.A.**<br>**ADDRESS**: Imeros Topos, 19300, Aspropyrgos, Greece<br>**TEL.**: (+30) 210 5589580<br>**WEBSITE**: www.vitex.gr<br>**EMAIL ADDRESS**: customercare@vitex.gr |

| | | |
|---|---|---|
| **PRODUCT CATEGORY RULES (PCR):** | ➢ CEN Standard EN 15804 serves as the Core Product Category Rules (PCR)<br>➢ PCR 2019:14 Construction products version 1.3.4 (EN 15804:A2)<br>*PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.* | |
| **LCA ACCOUNTABILITY:** | VITEX S.A. | |
| **INDEPENDENT THIRD-PARTY VERIFICATION OF THE DECLARATION AND DATA, ACCORDING TO ISO 14025:2006, VIA:** | EPD verification by accredited certification body | |
| **THIRD-PARTY VERIFICATION:** | | Business Quality Verification P.C. is an approved certification body accountable for the third-party verification<br>WEBSITE: www.bqv.gr , EMAIL ADDRESS: info@bqv.gr |
| **THE CERTIFICATION BODY IS ACCREDITED BY:** | Hellenic Accreditation System ESYD with accreditation number 1218 | |
| **PROCEDURE FOR FOLLOW-UP OF DATA DURING EPD VALIDITY INVOLVES THIRD PARTY VERIFIER:** | Yes<br>No ✓ | |

***-The EPD owner has the sole ownership, liability, and responsibility for the EPD.***

*-EPDs within the same product category but from different programs may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025."*

## COMPANY PROFILE

Vitex S.A. has held a leading position in Greece in the field of building materials since 1932. Headquartered in Aspropyrgos, Attica, with four modern production units (Imeros Topos and Agia Paraskevi) and two subsidiaries in Southeast Europe (Serbia and Bulgaria), Vitex offers complete solutions for architectural paints (Vitex), external thermal insulation (Vitextherm) and bituminous waterproofing products (Hermes).

Through the value driver of growth, Vitex aims to seek greater market opportunities through the extensive distribution channel and new investments to deliver above-market performance.
Sustainable Development is a core priority for Vitex, integrated into the company's business strategy and operations. It serves as a driver and motivating force through which the company aims to address contemporary challenges and maintain its long-term competitiveness.

Vitex S.A. nurtures environmental responsibility as an integral part of its corporate philosophy, recognizing the importance of protecting the environment, as well as the challenges arising from climate change.
The strategic priority of the company is the effective management of issues related to the environmental impact of its operations, as it seeks to operate with sensitivity and responsibility towards the natural environment.

We design and develop innovative, durable, and safe products that adapt to the evolving global landscape and environmental challenges, reinforcing our commitment to a more sustainable world. As such, VITEX is active in the product environmental footprint (PEF) developments within the industry. Over the course of year 2020 – early 2021 VITEX has followed up on its strategy in responsible business development and sustainable product marketing with execution and publication of environmental product declarations (EPDs). The company's certified management systems are important tools for the implementation and monitoring of its Corporate Responsibility actions:

- **ISO 9001** - Quality Management System
- **ISO 14001** - Environmental Management System
- **EMAS** - EU Eco-Management and Audit Scheme
- **ISO 45001** - Occupational Health and Safety System

# PRODUCT INFORMATION

## PRODUCT

HERMESDIENE, COSMODIEN, ASPHALDIEN, ELASTOPLAST

## DECLARED UNIT

1 $m^2$ (5,14 kg/ $m^2$)

This EPD applies to products under the brand names HERMESDIENE, COSMODIEN, ASPHALDIEN, and ELASTOPLAST, encompassing all types of elastomeric membranes. The products specifically used for calculating this EPD are HERMESDIENE PF MIN, COSMODIEN PF MIN, COSMODIEN PFF, ASPHALDIEN PF MIN, ASPHALDIEN PFF, ASPHALDIEN PF ALU, ELASTOPLAST PF MIN.

## REFERENCE YEAR:

2023

## GEOGRAFICAL SCOPE:

Global

## DESCRIPTION OF PRODUCT:

The bituminous membranes under study are elastomeric waterproofing membranes obtained from distilled bitumen modified with elastomeric (SBS) polymers and reinforced by a non-woven polyester. The upper surface of the membrane is protected with either mineral slate flakes, polyethylene high density or aluminum foil (fishbone shape). The products are applied per 1$m^2$ and supplied in kg/$m^2$. The upper surface protection along with the different thickness, offer a variety of bituminous options per brand name.

## PACKAGING:

Palette with 20 rolls of bituminous membranes.

## CPC CODE:

The Central Product Classification code 5453 has been used. The specific code applies for *Waterproofing and roofing services*

## PRODUCTION SITE:

HERMESDIENE, COSMODIEN, ASPHALDIEN, ELASTOPLAST are produced by Vitex S.A. at its premises in Agia Paraskevi 19300 Aspropyrgos, Attiki, Greece.

## PRODUCT STANDARDS

The bituminous membranes bear CE conformity marking in accordance with

- EN 13707:2004+ A2:2009
- EN 13969:2004/ A1:2006

## PHYSICAL / TECHNICAL PROPERTIES OF THE PROCUCT

| Characteristics | HERMESDIENE | COSMODIEN |
|---|---|---|
| Coating mass | Elastomer modified bitumen | |
| Reinforcement | Non-woven polyester | |
| Upper side finish | Mineral granules or PE film or aluminium foil | |
| Under side finish | PE film | |
| Flexibility at low temperature EN 1109 | -20°C | |
| Maximum tensile force (L/T) EN 12311-1 | (L) 850 N/5cm ±15%<br>(T) 650 N/5cm ±15% | (L) 650 N/5cm ±15%<br>(T) 450 N/5cm ±15% |
| Elongation (L/T) EN 12311-1 | (L) 45% ±15%<br>(T) 45% ±15% | (L) 40% ±15%<br>(T) 45% ±15% |

| Characteristics | ASPHALDIEN | ELASTOPLAST |
|---|---|---|
| Coating mass | Elastomer modified bitumen | |
| Reinforcement | Non-woven polyester | |
| Upper side finish | Mineral granules or PE film or aluminium foil | |
| Under side finish | PE film | |
| Flexibility at low temperature EN 1109 | -15°C | -10°C |
| Maximum tensile force (L/T) EN 12311-1 | (L) 650 N/5cm ±15%<br>(T) 450 N/5cm ±15% | (L) 500 N/5cm ±15%<br>(T) 330 N/5cm ±15% |
| Elongation (L/T) EN 12311-1 | (L) 40% ±15%<br>(T) 45% ±15% | (L) 35% ±15%<br>(T) 40% ±15% |

Further product information can be found at website: **www.hermes.gr.com**

## DESCRIPTION OF MANUFACTURING PROCESS

Creating a bituminous waterproofing membrane is a complex, multi-step process involving the preparation of raw materials, formation of the bituminous compound, the production of the membrane itself, and final storage. The first step involves gathering raw materials, primarily bitumen, polymers, fillers and additives in order to prepare the bituminous compound. Reinforcement fabrics and surfacing materials are used for the production of the membrane itself. In the second stage, raw materials are heated, mixed, and processed to form a homogenous bituminous compound that serves as the core material for the waterproofing membrane.

The production of the membrane is the main manufacturing phase which consists of a core layer of the bituminous compound coated on a reinforcement layer. A final layer of mineral granules , PE film or aluminium foil is applied  onth etop side while the bottom side of the membrane is coated with a PE film to prevent sticking in the roll form and ensure smooth unrolling during installation.
Finally, the membrane is cut into standard roll sizes. Every roll is wrapped by adhesive tapes and labelled with CE mark.  Rolls are shrink wrapped on wooden pallets and kept in a vertical position, under shade protected from sunlight, rain, snow or ice.

## CONTENT DECLARATION:

| AVERAGE BITUMINOUS MEMBRANE* | | |
|---|---|---|
| **Material** | | kg/m² |
| **COMPONENTS** | Bituminous binder | 1,86 |
| | Polymer | 0,29 |
| | Polyester (reinforcement) | 0,15 |
| | Minerals (powder, granules) | 2,73 |
| | Aluminium foil | 0,01 |
| | Polyethylene | 0,01 |
| **PACKAGING** | Tapes | 4,19E-03 |
| | Wooden pallets | 0,08 |
| | Polyethylene | 0,01 |

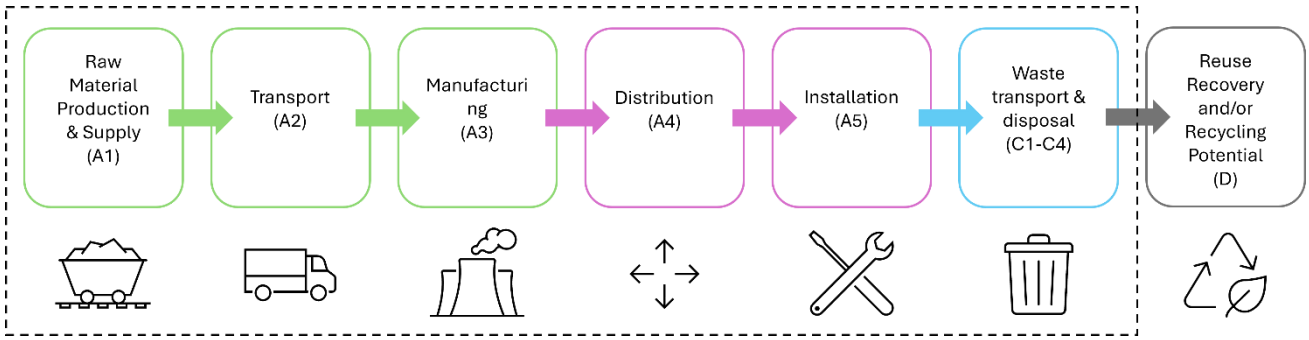
**This weighted average is according to the production volumes of the included products.*

### HAZARDOUS SUBSTANCES:

The products: HERMESDIENE, COSMODIEN, ASPHALDIEN and ELASTOPLAST contain no substances listed on the Candidate List of Substances of Very High Concern (SVHC).

## PROCESS FLOWCHART

A simplified overview of the LCA under study can be seen in the following flowchart:



## DESCRIPTION OF THE DEFINED SYSTEM

| | PRODUCTION | | | CONSTRUCTION | | USE | | | | | | END OF LIFE | | | RESOURCE, RECOVERY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Raw materials supply | Transport | Manufacturing | Transport to Customer | Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational Energy use | Operational Water use | Deconstruction/ demolition | Transport | Waste processing | Disposal | Reuse, Recovery and/or Recycling potential |
| **MODULE** | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **D** |
| **MOULES DECLARED** | X | X | X | X | X | ND | | | | | | | X | X | X | X | X |
| **GEOGRAPHY** | Global | | GR | EU | | - | - | - | - | - | - | - | EU | | | | EU |
| **SHARE OF SPECIFIC DATA** | 28,64% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **VARIATION - PRODUCTS** | * | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **VARIATION - SITES** | 0% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

* *The variation ranges correspond to the **differences in GWP-GHG indicator results in A1-A3 between the average bituminous membrane and each bituminous membrane** under study.*

| % difference in GWP-GHG indicator results in A1-A3 | | | | | | |
|---|---|---|---|---|---|---|
| **HERMESDIEN PF MIN** | **COSMODIEN PF MIN** | **COSMODIEN PFF** | **ASPHALDIEN PF ALU** | **ASPHALDIEN PF MIN** | **ASPHALDIEN PFF** | **ELASTOPLAST PF MIN** |
| **+14,6%** | **+3,6%** | **-35%** | **-18,3%** | **-4,2%** | **-15,5%** | **-11,3%** |

| Software | Database |
|---|---|
| LCA software Ecochain Helix \| version 4.3.1 | Europe - Ecoinvent v3.9.1 database |

## SYSTEM BOUNDARY

Cradle-to-Gate with modules C1–C4, module D and modules A4-A5

*Personnel-related activities, such as transportation of employees to and from work, and production of infrastructure and capital goods are not included in the scope of this study.*

## DATA QUALITY

For module A1, generic data for product compositions are used. For module A2, transportation data of the raw materials used to the production site was collected. For module A3, energy consumption and waste production data were collected for production year 2023. The average bituminous membrane is based on calculations from actual 2023 data. Specifically, each waterproofing membrane under study contributes to the final calculation of the average membrane based on its production volume in 2023, including losses.

Datasets are chosen with careful consideration of parameters like accuracy, credibility, and representativeness. The data and datasets entered into the modeled system were duly considered, justifying a satisfying calculation procedure, given the use of automated software.

## ALLOCATION, ASSUMPTIONS AND LIMITATIONS

Allocation was carried out in accordance with the provisions of EN15804:2012+A2:2019. All manufacturing inputs at production site level are allocated to different production processes, followed by allocation of the production processes to the products that are produced using these processes through mass allocation. No secondary materials have been used in the production process.

- Data on diesel and electricity input, as well as waste generation, are based on the allocation of total manufacturing site inputs to total production.
- Regarding the electricity consumption in production, it is assumed to be generated from wind energy. This assumption is based on the company's possession of a relevant Guarantee of Origin (GO) from its supplier for the specified reference period.
- In the case of hazardous waste, it is assumed zero as there is no production of hazardous waste through the production process of bituminous membranes.
- In the absence of specific information about the type of truck/ship used, a generic approach was adopted.

## CUT-OFF CRITERIA

All relevant inputs and outputs - like emissions, energy and materials - have been taken into account in this LCA. In accordance with EN15804, the total neglected input flows per module does not exceed 5% of energy usage and mass. In addition, the expanded cut-off rule of ISO 21930 is applicable, which says that at least 95% of the environmental impact per module is included as well. There are no inflows not included in the LCA and documented in this EPD.

# LCA SCENARIOS

### A1 – A3 – Production:

All relevant resources and materials in the production phase have been included. All data used in the production composition is real data from 2023. Packaging materials for the membranes are included in the bill of materials used, including any losses. This stage of the life cycle involves transporting raw materials and packaging to the production factory gate. Distances from production facilities to Vitex's facilities were accurately estimated. In the case a material is purchased through a distributor, this was also incorporated in the final calculations. Transportation methods included truck, ocean ship, or a combination, depending on available data. In the absence of specific information about the type of vehicle used, a generic approach was adopted. All relevant production processes in module A3, like packaging materials and production losses, have been included. Given the lack of detailed consumption of resources in each production unit, there was an allocation based on the production amount and the individual processes. Regarding the electricity consumption in the production of bituminous products, it is assumed to be generated from wind energy. This assumption is based on Vitex's possession of a relevant Guarantee of Origin (GO) from its supplier for the specified reference period. For 2023, the climate impact (GWP-GHG) for electricity is 0,0366 kg eq CO2/kwh.

### A4 - Transport from production place to assembly and/or user:

This stage involves transporting the bituminous membranes from the production site to the application point. In A4 module, real sales data were used as a more appropriate option. Detailed information about the data used for the average Bituminous membrane is presented in the following table. Without detailed information on the type of truck used, a generic approach has been employed. The dataset referenced is from Ecoinvent v.3.9.1. Distribution losses are assumed to be zero.

| Transportation | AVERAGE BITUMINOUS MEMBRANE |
|---|---|
| **Distance (km)** | 287,80 |
| **Bulk Density (kg/m$^2$)** | 5,05 |
| | Packaging: 9,30E-02 |

| Transport Method | Vehicle Type | Database |
|---|---|---|
| **Truck** | Unspecified | Ecoinvent v3.9.1 |

### A5 – Installation:

This stage refers to the installation of bituminous membranes. Any tools or appliances used for the application are not included. The impacts associated to this stage include all packaging materials that ultimately end up as waste:

| Waste parameter | Kg/m$^2$ |
|---|---|
| **Polypropylene** | 4,11E-03 |
| **Wood** | 7,64E-02 |
| **Polyethylene** | 1,06E-02 |

### C1 – Demolition:

The impacts of the disassembly stage are assumed zero, since the consumption of energy and natural resources for disassembling the end-of-life product is negligible.

### C2 - Transport to waste treatment:

In C2 module, an average distance of 100 km to the closest disposal facility is assumed since no actual data is Aavailable. Without detailed information on the type of truck used, a generic approach has been employed. Distribution losses are assumed to be zero.

| Transport Method | Vehicle Type | Distance (Km) | Database |
|---|---|---|---|
| **Truck** | Unspecified | 100 | Ecoinvent v3.9.1 |

### C3/C4 - End of life:

The whole quantity of Bituminous membranes Waste from building demolition is disposed since the specific stream cannot be sorted for recovery, and thus, no process is included in Module C3. Therefore, C3 is considered zero. After disposal, it is assumed that the bituminous membrane ends up in a landfill.

## D - Benefits and loads beyond the system boundaries:

As a conservative assumption, no energy recovery is considered from the incineration of bituminous membrane at the end of its life.

### Electricity generation on site

VITEX S.A. supports renewable energy development in Greece. The Company's manufacturing facilities include a rooftop solar park that supplies electricity to the grid.

### Disclaimer:

1. Modules A1-A3 should not be used without considering the results of module C.
2. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks

## LCA RESULTS

The table below shows the results of the **Average Bituminous Membrane** according to EN15804+A2 (2019).

| POTENTIAL ENVIRONMENTAL IMPACTS / 1 $m^2$ | | | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| **CORE ENVIRONMENTAL IMPACT INDICATORS** | | **UNIT** | | | | | | | | |
| Global Warming Potential – total | GWP-total | kg $CO_2$ eq. | 6,68E+00 | 2,26E-01 | 3,17E-03 | 0,00E+00 | 7,85E-02 | 0,00E+00 | 6,26E-02 | 0,00E+00 |
| Global Warming Potential – fossil | GWP-fossil | kg $CO_2$ eq. | 6,68E+00 | 2,26E-01 | 3,17E-03 | 0,00E+00 | 7,84E-02 | 0,00E+00 | 6,26E-02 | 0,00E+00 |
| Global Warming Potential– biogenic | GWP-biogenic | kg $CO_2$ eq. | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Global Warming Potential– land use and land use change | GWP-luluc | kg $CO_2$ eq. | 4,05E-03 | 1,09E-04 | 1,46E-07 | 0,00E+00 | 3,77E-05 | 0,00E+00 | 4,44E-05 | 0,00E+00 |
| Global Warming Potential [(1)] | GWP-GHG | kg $CO_2$ eq. | 6,68E+00 | 2,26E-01 | 3,17E-03 | 0,00E+00 | 7,85E-02 | 0,00E+00 | 6,26E-02 | 0,00E+00 |
| Ozone Depletion Potential | ODP | kg CFC11 eq. | 2,67E-06 | 4,83E-09 | 4,68E-12 | 0,00E+00 | 1,68E-09 | 0,00E+00 | 1,42E-09 | 0,00E+00 |
| Acidification Potential | AP | mol H+ eq. | 2,66E-02 | 1,03E-03 | 1,86E-06 | 0,00E+00 | 3,57E-04 | 0,00E+00 | 4,29E-04 | 0,00E+00 |
| Eutrophication Potential-freshwater | EP-freshwater | kg P eq. | 1,36E-04 | 1,81E-06 | 2,86E-09 | 0,00E+00 | 6,28E-07 | 0,00E+00 | 8,67E-07 | 0,00E+00 |
| Eutrophication Potential-freshwater | EP-freshwater | kg $PO_4^{-3}$ eq. | 4,18E-04 | 5,56E-06 | 8,79E-09 | 0,00E+00 | 1,93E-06 | 0,00E+00 | 2,66E-06 | 0,00E+00 |
| Eutrophication Potential-marine | EP-marine | kg N eq. | 6,22E-03 | 4,05E-04 | 1,08E-06 | 0,00E+00 | 1,41E-04 | 0,00E+00 | 1,59E-04 | 0,00E+00 |
| Eutrophication Potential-terrestrial | EP-terrestrial | mol N eq. | 6,75E-02 | 4,37E-03 | 7,96E-06 | 0,00E+00 | 1,52E-03 | 0,00E+00 | 1,72E-03 | 0,00E+00 |
| Photochemical Ozone Formation Potential | POCP | kg NMVOC eq. | 4,69E-02 | 1,53E-03 | 3,82E-06 | 0,00E+00 | 5,30E-04 | 0,00E+00 | 5,80E-04 | 0,00E+00 |
| Abiotic Depletion Potential-minerals and metals [(2)] | ADP-mm | kg Sb eq. | 3,88E-05 | 6,86E-07 | 4,51E-10 | 0,00E+00 | 2,38E-07 | 0,00E+00 | 1,22E-07 | 0,00E+00 |
| Abiotic Depletion Potential-fossil resources [(2)] | ADP-f | MJ | 1,68E+02 | 3,18E+00 | 4,14E-03 | 0,00E+00 | 1,10E+00 | 0,00E+00 | 1,31E+00 | 0,00E+00 |
| Water Deprivation Potential [(2)] | WDP | $m^3$ world eq. deprived | 1,07E+00 | 1,39E-02 | 1,56E-04 | 0,00E+00 | 4,81E-03 | 0,00E+00 | 5,53E-02 | 0,00E+00 |

| POTENTIAL ENVIRONMENTAL IMPACTS / 1 $m^2$ | | | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| | | |  |  |  |  |  |  |  |  |
| **RESOURCE USE INDICATORS** | | **UNIT** | | | | | | | | |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | PERE | MJ | 7,10E+00 | 5,03E-02 | 7,52E-05 | 0,00E+00 | 1,75E-02 | 0,00E+00 | 2,24E-02 | 0,00E+00 |
| Use of renewable primary energy resources used as raw materials | PERM | 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 |
| Total use of renewable primary energy resources | PERT | MJ | 7,10E+00 | 5,03E-02 | 7,52E-05 | 0,00E+00 | 1,75E-02 | 0,00E+00 | 2,24E-02 | 0,00E+00 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | PENRE | MJ | 1,79E+02 | 3,38E+00 | 4,40E-03 | 0,00E+00 | 1,17E+00 | 0,00E+00 | 1,39E+00 | 0,00E+00 |
| Use of non-renewable primary energy resources used as raw materials | PENRM | 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 |
| Total use of non-renewable primary energy resources | PENRT | MJ | 1,79E+02 | 3,38E+00 | 4,40E-03 | 0,00E+00 | 1,17E+00 | 0,00E+00 | 1,39E+00 | 0,00E+00 |
| Use of secondary material | SM | 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 |
| Use of renewable secondary fuels | 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 |
| Use of non-renewable secondary fuels | 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 |
| Use of net fresh water | FW | $m^3$ | 3,14E-02 | 4,46E-04 | 3,76E-06 | 0,00E+00 | 1,55E-04 | 0,00E+00 | 1,32E-03 | 0,00E+00 |

| POTENTIAL ENVIRONMENTAL IMPACTS / 1 m² | | | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| **WASTE INDICATORS** | | **UNIT** | | | | | | | | |
| Hazardous waste disposed | HWD | kg | 1,54E-03 | 2,00E-05 | 2,13E-08 | 0,00E+00 | 6,95E-06 | 0,00E+00 | 6,49E-06 | 0,00E+00 |
| Non-hazardous waste disposed | NHWD | kg | 1,25E+00 | 2,01E-01 | 1,44E-02 | 0,00E+00 | 6,98E-02 | 0,00E+00 | 5,16E+00 | 0,00E+00 |
| Radioactive waste disposed | RWD | kg | 8,44E-05 | 1,07E-06 | 1,39E-09 | 0,00E+00 | 3,71E-07 | 0,00E+00 | 4,15E-07 | 0,00E+00 |
| **OUTPUT FLOWS** | | **UNIT** | | | | | | | | |
| Components for re-use | 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 |
| Materials for recycling | MFR | 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 |
| Materials for energy recovery | MER | 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 |
| Exported energy | EE | 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 |
| **ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS** | | **UNIT** | | | | | | | | |
| Particulate matter | PM | disease inc. | 2,56E-06 | 2,16E-08 | 8,87E-11 | 0,00E+00 | 7,50E-09 | 0,00E+00 | 9,19E-09 | 0,00E+00 |
| Ionising radiation [3] | IR | kBq U-235 eq. | 1,23E-01 | 1,65E-03 | 2,26E-06 | 0,00E+00 | 5,71E-04 | 0,00E+00 | 6,75E-04 | 0,00E+00 |
| Ecotoxicity, freshwater [2] | ETP-fw | CTUe | 1,62E+02 | 3,09E+00 | 2,06E-02 | 0,00E+00 | 1,07E+00 | 0,00E+00 | 1,23E+00 | 0,00E+00 |
| Human toxicity, cancer [2] | HTP-c | CTUh | 3,05E-09 | 1,19E-10 | 3,20E-12 | 0,00E+00 | 4,13E-11 | 0,00E+00 | 3,37E-11 | 0,00E+00 |
| Human toxicity, non-cancer [2] | HTP-nc | CTUh | 9,50E-08 | 3,16E-09 | 1,79E-11 | 0,00E+00 | 1,10E-09 | 0,00E+00 | 7,14E-10 | 0,00E+00 |
| Land use related impacts/soil quality [2] | SQP | dimensionless | 3,42E+01 | 2,40E+00 | 8,83E-03 | 0,00E+00 | 8,33E-01 | 0,00E+00 | 3,02E+00 | 0,00E+00 |

**Disclaimer 1**: *The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013*

**Disclaimer 2**: *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.*

**Disclaimer 3:** *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.*

# ADDITIONAL ENVIRONMENTAL INFORMATION

According to PCR 2019:14 Construction Products version 1.3.4, when the products included exhibit a difference of over 10% concerning their declared environmental impact indicators, the specific variance for each impact indicator should be reported. The subsequent table showcases the total variances observed for all examined products, encompassing all the environmental impacts considered, compared to the potential environmental impacts of an average product.

| CORE ENVIRONMENTAL IMPACT INDICATORS | | % VARIATIONS FROM THE AVERAGE BITUMINOUS MEMBRANE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | HERMESDIENE PF MIN | COSMODIEN PF MIN | COSMODIEN PFF | ASPHALDIEN PF MIN | ASPHALDIEN PFF | ASPHALDIEN PF ALU | ELASTOPLAST PF MIN |
| Global Warming Potential – total | kg $CO_2$ eq. | 14,35 | 3,90 | -34,87 | -4,20 | -15,39 | -18,11 | -11,66 |
| Global Warming Potential – fossil | kg $CO_2$ eq. | 14,35 | 3,90 | -34,86 | -4,20 | -15,38 | -18,10 | -11,66 |
| Global Warming Potential– biogenic | kg $CO_2$ eq. | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Global Warming Potential– land use and land use change | kg $CO_2$ eq. | 14,73 | 4,03 | -45,13 | -1,86 | -31,62 | -30,89 | -12,96 |
| Global Warming Potential | kg $CO_2$ eq. | 14,35 | 3,90 | -34,87 | -4,20 | -15,39 | -18,11 | -11,66 |
| Ozone depletion | kg CFC11 eq. | 20,60 | -0,48 | -21,72 | -5,80 | -15,14 | -16,29 | -10,66 |
| Acidification | mol H+ eq. | 15,29 | 3,96 | -37,89 | -3,70 | -20,20 | -22,28 | -13,12 |
| Eutrophication, freshwater | kg P eq. | 17,29 | 2,77 | -36,63 | -3,65 | -22,19 | -22,86 | -14,55 |
| Eutrophication, freshwater | kg $PO_4^{-3}$ eq. | 17,29 | 2,77 | -36,63 | -3,65 | -22,19 | -22,86 | -14,55 |
| Eutrophication, marine | kg N eq. | 13,14 | 5,00 | -45,01 | -2,13 | -29,20 | -30,99 | -10,93 |
| Eutrophication, terrestrial | mol N eq. | 13,15 | 4,94 | -45,15 | -2,00 | -30,07 | -31,71 | -10,82 |
| Photochemical ozone formation | kg NMVOC eq. | 18,34 | 3,13 | -31,61 | -5,83 | -10,03 | -13,60 | -15,74 |
| Resource use, minerals and metals | kg Sb eq. | 18,31 | 3,18 | -23,68 | -6,37 | -1,15 | -5,72 | -19,70 |
| Resource use, fossils | MJ | 18,08 | 2,77 | -27,12 | -6,52 | -3,79 | -8,04 | -15,42 |
| Water use | $m^3$ world eq. deprived | 21,86 | 1,94 | -30,09 | -5,77 | -9,99 | -12,57 | -22,21 |

| RESOURCE USE INDICATORS | | % VARIATIONS FROM THE AVERAGE BITUMINOUS MEMBRANE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | HERMESDIENE PF MIN | COSMODIEN PF MIN | COSMODIEN PFF | ASPHALDIEN PF MIN | ASPHALDIEN PFF | ASPHALDIEN PF ALU | ELASTOPLAST PF MIN |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | MJ | 7,50 | 6,21 | -32,00 | -0,40 | -13,43 | -5,80 | -20,31 |
| Use of renewable primary energy resources used as raw materials | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -3,70 | 0,00 |
| Total use of renewable primary energy resources | MJ | 7,50 | 6,21 | -32,00 | -0,40 | -13,43 | -3,65 | -20,31 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | MJ | 18,07 | 2,72 | -27,10 | -6,50 | -3,77 | -3,65 | -15,38 |
| Use of non-renewable primary energy resources used as raw materials | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -2,13 | 0,00 |
| Total use of non-renewable primary energy resources | MJ | 18,07 | 2,72 | -27,10 | -6,50 | -3,77 | -2,00 | -15,38 |
| Use of secondary material | kg | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -5,83 | 0,00 |
| Use of renewable secondary fuels | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -6,37 | 0,00 |
| Use of non-renewable secondary fuels | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -6,52 | 0,00 |
| Use of net fresh water | $m^3$ | 21,29 | 2,07 | -29,58 | -5,89 | -8,85 | -5,77 | -21,67 |

| WASTE INDICATORS | | % VARIATIONS FROM THE AVERAGE BITUMINOUS MEMBRANE | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | HERMESDIENE PF MIN | COSMODIEN PF MIN | COSMODIEN PFF | ASPHALDIEN PF MIN | ASPHALDIEN PFF | ASPHALDIEN PF ALU | ELASTOPLAST PF MIN |
| Hazardous waste disposed | kg | 17,34 | -0,48 | -25,24 | -7,75 | -11,49 | 31,64 | -14,02 |
| Non-hazardous waste disposed | kg | 10,53 | 5,96 | -38,43 | -2,69 | -18,46 | -20,56 | -12,19 |
| Radioactive waste disposed | kg | 19,72 | 2,48 | -37,12 | -4,49 | -19,06 | -17,47 | -19,00 |
| **OUTPUT FLOWS** | | | | | | | | |
| Components for re-use | kg | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Materials for recycling | kg | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Materials for energy recovery | kg | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Exported energy | MJ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| **ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS** | | | | | | | | |
| Particulate matter | disease inc. | 4,53 | 9,44 | -92,49 | 7,40 | -90,42 | -90,70 | 1,18 |
| Ionising radiation | kBq U-235 eq. | 18,84 | 2,98 | -38,58 | -4,19 | -21,14 | -20,18 | -17,67 |
| Ecotoxicity, freshwater | CTUe | 14,82 | 3,84 | -27,47 | -5,54 | -4,98 | -9,20 | -13,72 |
| Human toxicity, cancer | CTUh | 13,84 | 4,28 | -32,58 | -3,91 | -13,54 | -15,72 | -14,39 |
| Human toxicity, non-cancer | CTUh | 14,63 | 3,99 | -30,96 | -4,67 | -11,36 | -14,40 | -13,45 |
| Land use related impacts/soil quality | dimensionless | 5,81 | 7,97 | -36,72 | 0,25 | -19,28 | -21,19 | -18,67 |

## References


[1] 'ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO 14040:2006

[2] 'ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO 14044:2006

[3] 'ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO 14025:2006

[4] 'NEN-EN 15804:2012+A2:2019/AC:2021: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products',
NEN-EN 15804:2012+A2:2019/AC:2021

[5] BS EN 1990:2002+A1:2005 Eurocode - Basis of structural design

[6] Dahlgren, L. at al, (2016) Raw materials LCI database for the European coatings and printing ink industries. Documentation of methodology v. 3.0. Commissioned by CEPE. IVL Swedish Environmental Research Institute Ltd.

[7] International EPD® System, PCR 2019:14 Construction Products, version 1.3.4 (EN 15804:A2)

[8] International EPD® System, General Program Instructions for the International EPD System, version 4