

EPD OWNER:
Soprema

PROGRAMME:
The International EPD® System,
www.environdec.com

PROGRAMME OPERATOR:
EPD International AB

EPD REGISTRATION NUMBER
EPD-IES-0028459

VERSION DATE
2026/05/19

VALIDITY DATE
2031/05/19

EPD VERSION
1

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

FLAGON PVC membranes for Civil Works

Complete list of products included on pages 7 to 9.

ENVIRONMENTAL PRODUCT DECLARATION

Waterproofing



This Environmental Product Declaration has been developed in accordance with ISO 14025:2006, EN 15804:2012+A2:2019/AC:2021 standards



An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com



General Information

PROGRAM INFORMATION

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden,
Website: www.environdec.com, E-mail: support@environdec.com.

PRODUCT CATEGORY RULES (PCR)

CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Product Category Rules (PCR): PCR 2019:14 Construction products version 2.0.1 (EN 15804+A2).

c-PCR: c-PCR-032 Flexible sheets for waterproofing (EN 17388:2024). Version: 2025-04-24.

PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review Chair: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact.

VERIFICATION

☐ Individual EPD verification without a pre-verified LCA/EPD tool

Third-party verifier: **Anni Oviir**, LCA Support - Rangi Maja OÜ

Approved by: International EPD System

Procedure for follow-up of data during EPD validity involves third-party verifier:

☐ YES

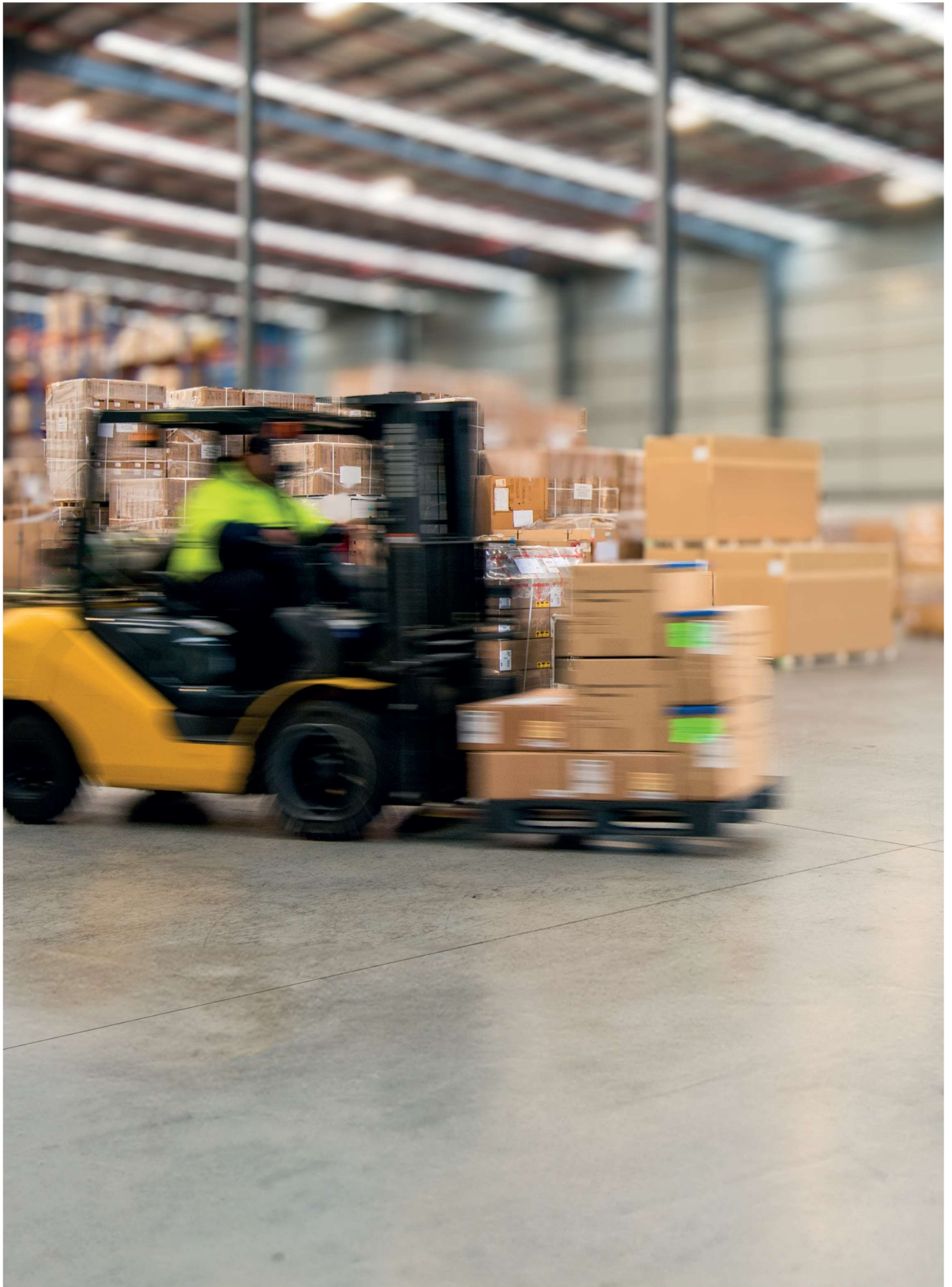
☒ NO

LIFE CYCLE ASSESSMENT (LCA)

LCA accountability: Mariana Amaro, Soprema Group.

The EPD owner has the sole ownership, liability and responsibility of the EPD.

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same version number up to the first two digits) 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.





The Company

THE SOPREMA GROUP

An independent group since its inception in 1908, SOPREMA specializes in the design and implementation of cutting-edge waterproofing systems and thermal and acoustic insulation solutions, in line with the requirements of sustainable construction.

With the collaboration of over 12,000 people worldwide and a turnover of 5,14 billion Euros in 2024, the SOPREMA Group has a global industrial and commercial presence, comprising 128 production plants, more than 130 branches, and over 70 distributors. It operates in 90 countries with 24 Research and Development centers consistently focused on environmentally respectful development and has 62 technical training centers capable of passing on the technical expertise acquired over a century to new generations.

The SOPREMA product range, the result of close collaboration between the marketing and Research and Development departments, is innovative and in perfect harmony with market needs and current standards. SOPREMA's success is based on a fundamental principle: focusing on ideas.

SOPREMA's products and services aim to meet the needs of construction professionals, whether it be waterproofing with synthetic or bituminous membranes, thermal and acoustic insulation, liquid products, or civil engineering works – SOPREMA always has the solution.

SOPREMA offers high-performance technological products, constantly optimized through Research and Development in an eco-design logic, boasting exceptional characteristics in terms of robustness, reliability, and longevity.

At SOPREMA, sustainability is an essential driver that propels us towards the creation of a sustainable construction model in two main aspects: developing high-energy efficiency products and adopting an approach oriented towards the life cycle analysis of our products. Our goal is to promote a renewed vision of construction, with more responsible and environmentally friendly practices.

Chignolo d'Isola production plant has the certification of quality and environmental management system according to ISO 9001:2015 and ISO 14001:2015.

HEADQUARTER

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PRODUCTION PLANT

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info@soprema.it - www.soprema.it

Product Information

FLAGON PVC membranes for Civil Works WATERPROOFING PVC MEMBRANES

FLAGON PVC membranes have been manufactured since 1999, originally by Flag and now by Soprema, primarily for roofing waterproofing and hydraulic works. These membranes are produced using a co-extrusion process, allowing for thicknesses ranging from 1.0 mm to 3.0 mm and enabling the creation of membranes with different chemical properties on each side, while maintaining full homogeneity between layers.

These synthetic PVC-P geomembranes are designed for versatile waterproofing across civil engineering, hydraulic works, and storage structures. They are particularly flexible at low temperatures and offer strong mechanical performance.

FLAGON PVC membranes are CE-marked in accordance with applicable standards.

Depending on their formulation, they may also provide:

- Resistance to hot-cold cycles
- Static and dynamic puncture resistance
- Rot-proof durability
- Resistance to root penetration and micro-organism attack
- UV resistance
- Safe, flame-free installation
- Custom colour options (subject to minimum quantities)
- Wide format availability (typically 2.10 m width; 20–40 m length standard, others on request)

Detailed product technical data sheet are also available for further guidance.

Products included in the EPD

The EPD corresponds to a virtual average product, calculated based on production volumes. In some product ranges, the thickness can be part of the commercial designation, for example FLAGON BFR-SL XT 20, FLAGON BFR-SL XT 21, FLAGON BFR-SL XT 22, FLAGON BFR-SL XT 30, FLAGON BFR-SL XT 31.

The associated variability is set out in the additional information section.

FLAGON A

Non-reinforced synthetic PVC membrane with high resistance to hydrocarbons, oils, puncturing, and mechanical stress, while remaining flexible to structural movements.

Application: Suitable for tunnels and underground structures, waterproofing of parking decks, used in combination with accessories such as disks and waterstops.



FLAGON BFR/SL 500

Two-coloured, non-reinforced synthetic PVC membrane coupled with geotextile, featuring a signal layer, offering resistance to root penetration, with no need for joint pretreatment and high robustness and elongation.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON AT

Non-reinforced synthetic PVC-P membrane, offering flexibility, excellent weldability.

Applications: waterproofing tanks and basins used for drinking water,



FLAGON BFR/SL XE

Two-coloured, non-reinforced synthetic PVC membrane featuring a signal layer, offering resistance to root penetration, with no need for joint pretreatment and high robustness and elongation.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON BFR/SL

Two-coloured, non-reinforced synthetic PVC membrane featuring a signal layer, offering resistance to root penetration, with no need for joint pretreatment and high robustness and elongation.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON BFR/SL XET

Two-coloured, non-reinforced synthetic PVC membrane featuring a signal layer, offering resistance to root penetration, with no need for joint pretreatment and high robustness and elongation.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



Note: for all the technical information, refer to the technical data sheet of the products.

FLAGON BFR/SL XT

Two-coloured, non-reinforced synthetic PVC membrane featuring a signal layer, offering resistance to root penetration, with no need for joint pretreatment and high robustness and elongation.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON BSL

Two-coloured, non-reinforced synthetic PVC membrane, featuring a signal layer and offering high mechanical resistance, resistance to wash-out water and root penetration.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON BSL OBV

Two-coloured, non-reinforced synthetic PVC membrane, featuring a signal layer and offering high mechanical resistance, resistance to wash-out water and root penetration.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON BT

Transparent, non-reinforced synthetic PVC membrane, offering resistance to soil micro-organisms (fungi, bacteria, spores), high mechanical and puncture resistance, root and eddy current resistance, with transparency enabling material purity verification and visual inspection of welds and subgrade.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON BT-I

Transparent, non-reinforced synthetic PVC membrane, offering resistance to soil micro-organisms (fungi, bacteria, spores), high mechanical and puncture resistance, root and eddy current resistance, with transparency enabling material purity verification and visual inspection of welds and subgrade.

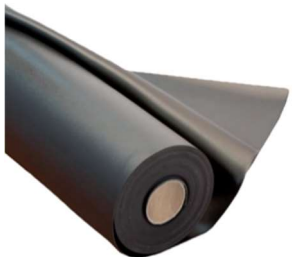
Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON CS

Non-reinforced synthetic PVC-P geomembrane, offering flexibility, excellent weldability, and water immersion resistance.

Application: waterproofing channels and non-exposed hydraulic works.



Note: for all the technical information, refer to the technical data sheet of the products.

FLAGON CSL

UV-resistant synthetic PVC-P geomembrane specifically, offering flexibility, excellent weldability.

Application: waterproofing of basins, tanks, canals and similar structures.



FLAGON RP

Multilayer, non-reinforced synthetic PVC barrier, featuring a signal layer and offering anti-radon properties, high mechanical resistance, water resistance, and strong protection against puncturing and root penetration.

Application: Suitable for tunnels and underground structures, used in combination with accessories such as disks and waterstop.



FLAGON PZ

Black, non-reinforced single-layer synthetic PVC membrane, offering high mechanical and puncture resistance, and strong protection against micro-organisms and root penetration.

Application: Suitable as a protective layer for geomembranes used in tunnels and underground structures, used in combination with accessories such as disks and waterstops.



FLAGON SR AT

Reinforced synthetic PVC-P geomembrane specifically, offering flexibility at low temperatures, resistance to hot-cold cycles, high mechanical and puncture resistance, UV resistance, and suitability for fire-free installation.

Application: waterproofing tanks and basins used for drinking water.



FLAGON PZ/SL

Black, non-reinforced single-layer synthetic PVC membrane, offering high mechanical and puncture resistance, and strong protection against micro-organisms and root penetration.

Application: Suitable as a protective layer for geomembranes used in tunnels and underground structures, used in combination with accessories such as disks and waterstops.



GEODAM SL

Two-coloured, non-reinforced synthetic PVC-P geomembrane with high elasticity and UV resistance, featuring a signal layer and specifically designed for waterproofing dams and retaining structures.

Application: waterproofing dams and retaining structures.



Note: for all the technical information, refer to the technical data sheet of the products.

Scope and type of EPD

System diagram of the processes included in the LCA, divided into life cycle stages and information modules as defined by EN 15804.

This statement may not be comparable with those developed under other programs or based on different reference

In particular, it may not be comparable with declarations not prepared according to EN 15804 (EN 15804:2012 + A2:2019/AC:2021). Similarly, environmental declarations may not be comparable if the data sources, information modules, or scenarios considered differ.

PRODUCT STAGE			ASSEMBLY STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	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
✓	✓	✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	✓	✓	✓	✓	✓

GEOGRAPHY

GLO	GLO	IT	GLO	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
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SHARE OF PRIMARY DATA

15%																
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VARIATIONS PRODUCTS

-58% / +86% ¹																
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VARIATIONS SITES

0%																
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PROCESS	SOURCE TYPE	SOURCE	REFERENCE YEAR	DATA CATEGORY	SHARE OF PRIMARY DATA, OF GWP GHG RESULTS FOR A1-A3
Product manufacturing	Database	Ecoinvent v 3.10	2023	Secondary data	0%
Electricity generation for manufacturing	Collected data	EPD owner	2023	Primary data	13%
Raw material transportation	Collected data	EPD owner	2023	Primary data	2%
Packaging production	Collected data	Ecoinvent v 3.10	2023	Secondary data	0%
Other processes	Collected data	Ecoinvent v 3.10	2023	Secondary data	0%
Total share of primary data in GWP-GHG results for A1-A3					15%

1 - The deviation is calculated by comparing the maximum and minimum values with respect to the average value.

LCA Information

TYPE OF EPD

Cradle-to-gate with modules C1-C4, module D and optional modules (A4-A5).

UN CPC 3699 Articles of plastics n.e.c.

DECLARED UNIT

The declared unit is 1 m² of installed membrane, including 5% extra membrane for application, with an average thickness of 1.89 mm.

The weight per 1 m² of installed roof (including overlaps) is 2.63 kg/m² and the conversion factor to 1 kg is 0.38.

Membrane theoretical reference service life (RSL) of 30 years is provided as default value in EN 17388 (PCR) for flexible sheets for waterproofing and it can be used exclusively for theoretical calculations. It is not representative of the real service lifetimes. Service lifetime is influenced by type of membrane, thickness, design, application, use conditions and regular maintenance according to manufacturer's indications.

SOFTWARE

OneClick LCA

ENVIRONMENTAL IMPACT ASSESSMENT METHOD

The life cycle impact assessment was performed in accordance with EN 15804:2012+A2:2019/AC:2021.

The global warming potential indicator (GWP100) was calculated using the EN 15804+A2 impact assessment method, based on the Environmental Footprint (EF) reference package version 3.1 (February 2023).

MAIN DATABASES FOR GENERIC DATA

Ecoinvent 3.10 (allocation, cut-off by classification).

GEOGRAPHICAL SCOPE FOR WHICH GEOGRAPHICAL LOCATION OF END-OF-LIFE THE PRODUCT'S PERFORMANCE HAS BEEN CALCULATED

Europe

REPRESENTATIVE YEAR FOR THE INVENTORY FOR THE MANUFACTURING

2023

CUT OFF

A minimum of 99% of energy consumption in manufacturing facilities is accounted for, and 99% of the raw material mass is considered.

Excluded Processes:

- Manufacturing of production equipment, buildings, or other capital goods
- Transportation of personnel to and within the plant
- Research and development activities
- Long-term emissions

ALLOCATION

Whenever possible, allocations have been avoided. When unavoidable, a mass-based physical allocation has been applied. Data on system composition have been directly obtained and analyzed following the principles of modularity and the polluter-pays principle. Additionally, the process incorporates externally recycled PVC from post-industrial sources, with pre-consumer recycled materials allocated based on their economic value relative to virgin material.

The allocations in the Ecoinvent 3.10.1 datasets used in this study follow the Ecoinvent system model 'Allocation, cut-off, EN15804'.

AVERAGING

The products have been grouped into a single EPD due to their shared manufacturing process. To achieve this, a weighted average of the environmental impacts was calculated based on the surface area produced for each product in 2023. This approach ensures that the average environmental impacts reflect the proportional contribution of each product to the total production.

The variation in GWP-GHG among different membranes exceeds 10%. Therefore, the variations in other impact categories are also presented in this document.

DATA QUALITY

This EPD is based on specific data and system information.

The data collected on components and energy correspond to the year 2023 and include information on raw material consumption and energy use. The plausibility and consistency of the collected data have been verified, ensuring good data quality.

Material and energy consumption invoices have been collected and checked. The study covers at least 95% of the materials and energy per module and at least 99% of the total material and energy use of each unit process.

Content Declaration including Packaging

The average composition of the products, as a representative range for all the type and thicknesses, is provided in the table below, along with average packaging composition. Based on our knowledge,

no substance listed as a candidate for Authorization (Candidate List SVHC) or subject to Authorization (Annex XIV - REACH) is contained in the product at a concentration greater than 0.1% weight/weight.

PRODUCT COMPONENTS	AVERAGE COMPOSITION kg/m ²	COMPOSITION RANGE %	POST-CONSUMER RECYCLED MATERIAL WEIGHT %	BIOGENIC MATERIAL WEIGHT % PRODUCT	BIOGENIC MATERIAL kg C/m ²
PVC	1,838	48-87 %	0%	0%	0,00
Plasticisers	0,522	8-37 %	0%	0%	0,00
Additives and charges	0,268	0-16 %	0%	0%	0,00
Reinforcing and backing material	0,004	0-4 %	0%	0%	0,00
Total	2,63	100%	0%	0%	0,00

PACKAGING MATERIALS	WEIGHT kg/m ²	WEIGHT % (VERSUS THE PRODUCT)	BIOGENIC MATERIAL kg C/m ²
Pallet	0,061	2,3%	0,028
Cardboard core	0,033	1,3%	0,013
Plastic film	0,007	0,2%	0,000
Total	0,101	3,8%	0,041

BIOGENIC CARBON CONTENT	QUANTITY (kg C)
BIOGENIC CARBON CONTAINED IN THE PRODUCT	0,000
BIOGENIC CARBON CONTAINED IN PACKAGING	0,041

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂

Production process

FLAGON PVC membranes for civil works are primarily produced on Line 1, and occasionally on Line 2, at the Chignolo d’Isola plant. The co-extrusion process used in manufacturing enables the production of membranes with varying chemical properties on each side, while ensuring full homogeneity between layers.

During production, reinforcements can be embedded, or laminated protective geotextiles can be incorporated in the membrane. Thickness is automatically regulated by an electronic control system that adjusts the extrusion head and calender opening, ensuring consistent quality.

The result is a homogeneous single-layer membrane with:

- High tensile strength
- Excellent static and dynamic puncture resistance
- Optional dual-colour configuration with a signal layer

The signal layer system allows for immediate detection of damage (e.g., holes or tears), as the darker underlying layer becomes visible when breached.

On average, the production process incorporates more than 5% of pre-consumer recycled PVC.

EXTRUSION CHAMBER LOADING

EACH CHAMBER LOADED WITH THE RAW MATERIALS MIXTURE, BY MEANS OF A HOPPER

CO-EXTRUSION

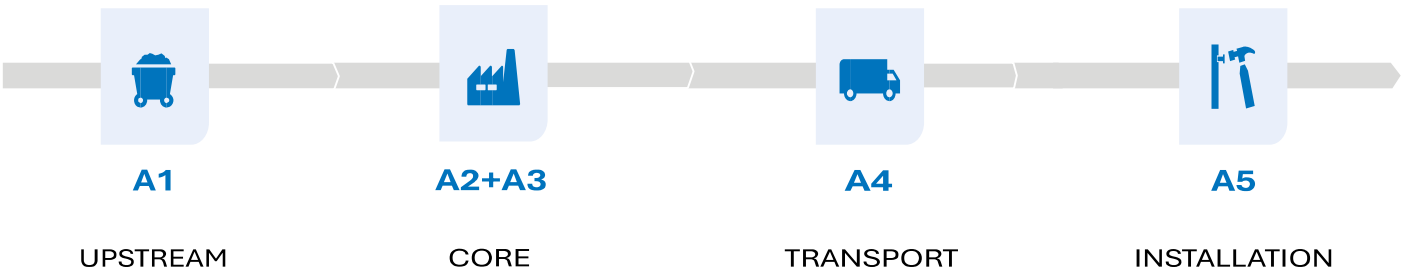
MIXTURE HEATED AND COMPRESSED BY SCREW, THEN FORCED TO A CO-EXTRUSION DIE, WHERE THE EXTRUDERS CONVERGE

LAMINATING

USING A CALENDER, THE DESIRED THICKNESS IS OBTAINED



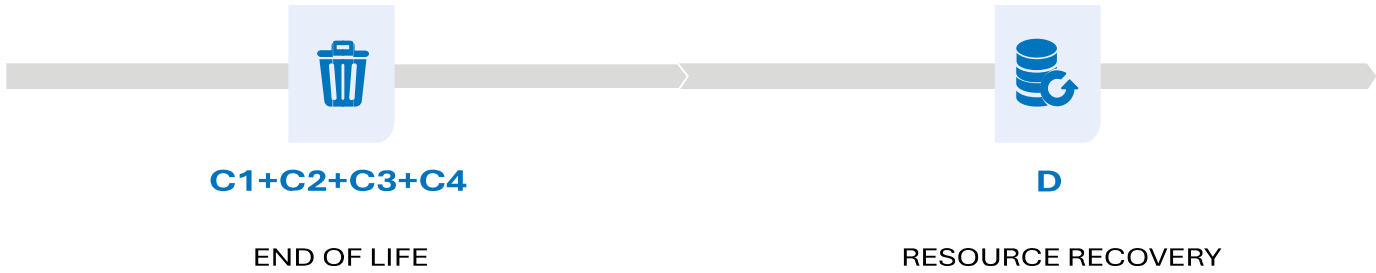
Calculation rules



PRODUCT STAGE
A1 - A3 - Raw material supply. (A1) - Energy sources used in manufacturing. (A1) - Raw materials transport to the plant, taking into account the specific distances provided by the company, considering >32 ton Euro VI trucks and medium cargo ship for sea transport. (A2) - Manufacturing process. (A3) - The electricity mix used in manufacturing, based on the manufacturer's energy mix of 0,64 kgCO2/kWh. (A3) - Water usage. (A3) - Emissions to air. (A3) - Manufacturing waste treatment and transport using specific distances data. (A3)

CONSTRUCTION PROCESS STAGE
A4- A5 - Module A4 covers membrane transport from production to application site, including fuel combustion, fuel production, and transport infrastructure emissions. Impacts are calculated using weighted average distances based on sales distribution to final destinations. - Average distance: 621 km land and 938 km sea. - Truck with an average load of >32 t (Euro VI – for Europe and Euro V for RoW) for land transport and medium cargo ship for sea transport. - Module A5 covers product installation, including packaging waste, in the most representative scenario of application: - Overlapping factor: 5% - Electricity consumption: 0.010 kWh/m² - On-site installation product waste: 3% - 0,075 kg/m² - An average consumption of 0,24 kg/m² of PVC accessories, including PVC disks and PVC waterstops. - Waste collection and treatment based on Eurostat and PSR-0014 v2 (2023).

Calculation rules



END OF LIFE STAGE

C1+C2+C3+C4

- The consumption of energy and natural resources in the demolition process is assumed to be negligible due to the allocation to the waterproofing membranes. (C1)
- This module includes the out-of-service membranes transportation to waste treatment sites. A realistic average distance of 50 km was assumed for the material sent for landfill; 100 km was assumed for the material sent for incineration and 800 km for the material sent for recycling considering 16-35 ton Euro V trucks. (C2)
- According to the PEF guidelines, the end-of-life scenario for PVC waste from the building and construction sector assumes 32% is recycled and 31% undergoes energy recovery. (C3)
- In line with the PEF values, 37% of PVC waste from the building and construction sector is considered to be sent to landfill. (C4)

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES

D

Module D quantifies the environmental benefits of product reuse, recycling, and energy recovery across the life cycle, using the same scenarios applied in stages A5 and C3. Recycling benefits are calculated following the EN 15804 standard formula.

$$e_{module\ D1} = \sum_i (M_{MR\ out\ |i} - M_{MR\ in\ |i}) \cdot \left(E_{MR\ after\ EoW\ out\ |i} - E_{VM\ Sub\ out\ |i} \cdot \frac{Q_{R\ out}}{Q_{Sub}} \right) |i$$

Environmental Performance

Results are declared per 1m² of average product

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3). 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.

ENVIRONMENTAL IMPACT

IMPACT CATEGORY	UNIT	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	5,26E+00	1,96E-01	1,14E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,71E-01	2,09E+00	1,32E-01	-1,68E+00
GWP-fossil	kg CO ₂ eq	5,40E+00	1,96E-01	9,84E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,71E-01	2,08E+00	1,25E-01	-1,68E+00
GWP-biogenic	kg CO ₂ eq	-1,56E-01	4,12E-05	1,55E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,35E-05	1,43E-02	7,13E-03	6,42E-04
GWP-luluc	kg CO ₂ eq	1,23E-02	8,03E-05	1,20E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,03E-05	3,25E-04	7,60E-06	-1,69E-03
ODP	kg CFC-11 eq	1,10E-06	3,92E-09	2,41E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,40E-09	9,37E-09	3,01E-10	-2,80E-07
AP	mol H+ eq	2,24E-02	1,18E-03	3,46E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,34E-04	1,65E-03	8,27E-05	-8,77E-03
EP-freshwater	kg P eq	1,36E-03	1,27E-05	3,21E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E-05	1,04E-04	1,22E-06	-5,90E-04
EP-marine	kg N eq	4,24E-03	2,99E-04	6,85E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,80E-04	5,73E-04	2,75E-04	-1,45E-03
EP-terrestrial	mol N eq	4,04E-02	3,30E-03	6,29E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,96E-03	4,61E-03	3,37E-04	-1,46E-02
POCP	kg NMVOC eq	2,50E-02	1,28E-03	3,53E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,37E-04	1,47E-03	1,47E-04	-5,87E-03
ADPE¹	kg Sb eq	8,37E-05	5,11E-07	1,13E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,59E-07	2,83E-06	2,62E-08	-1,24E-05
ADPF¹	MJ	1,22E+02	2,87E+00	2,15E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,40E+00	3,57E+00	2,58E-01	-2,84E+01
WDP¹	m³ depriv.	1,27E+00	1,39E-02	3,82E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,18E-02	2,41E+00	1,26E-03	-3,55E-01
GWP-GHG²	kg CO ₂ eq	5,41E+00	1,96E-01	9,86E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,71E-01	2,08E+00	1,25E-01	-1,68E+00

(1) 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 experience with the indicator. (2) This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

ADDITIONAL ENVIRONMENTAL IMPACT

IMPACT CATEGORY	UNIT	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	disease incident	2,22E-07	1,73E-08	2,71E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,34E-08	1,65E-08	1,87E-09	-1,03E-07
IRP¹	kBq U235 eq	4,63E-01	3,21E-03	1,61E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,06E-03	1,61E-02	2,57E-04	-1,79E-01
ETP-fw²	CTUe	2,51E+01	3,24E-01	7,35E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,15E-01	1,01E+02	3,85E-01	-5,79E+00
HTP-c²	CTUh	5,16E-09	3,39E-11	1,06E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,91E-11	6,53E-10	6,08E-12	-1,34E-09
HTP-nc²	CTUh	5,33E-08	1,73E-09	1,02E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,51E-09	1,03E-08	1,20E-09	-1,40E-08
SPQ²	dimensionless	2,70E+01	2,59E+00	4,37E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,43E+00	2,38E+00	6,03E-01	-6,38E+00

(1) 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 soil, radon, and from some construction materials is also not measured by this indicator. (2) The results of this environmental impact indicator should be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Results are declared per 1m² of average product

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).
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.

USE OF RESOURCES

IMPACT CATEGORY	UNIT	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	5,46E+00	4,39E-02	4,06E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,14E-02	3,55E-01	4,04E-03	-2,25E+00
PERM	MJ	1,55E+00	0,00E+00	-1,30E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-1,59E-01	-9,46E-02	2,50E-01
PERT	MJ	7,00E+00	4,39E-02	-8,89E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,14E-02	1,96E-01	-9,05E-02	-2,00E+00
PENRE	MJ	8,26E+01	2,87E+00	1,24E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,40E+00	-5,52E+01	-4,05E+01	-3,55E+01
PENRM	MJ	3,81E+01	0,00E+00	-3,33E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-2,37E+01	-1,41E+01	8,04E+00
PENRT	MJ	1,21E+02	2,87E+00	1,20E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,40E+00	-7,89E+01	-5,46E+01	-2,74E+01
SM	kg	5,49E-02	1,26E-03	6,36E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,10E-03	4,19E-03	9,36E-05	3,58E-01
RSF	MJ	3,11E-02	1,42E-05	4,74E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,39E-05	3,26E-04	1,75E-06	-3,80E-04
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	3,27E-02	3,98E-04	1,08E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,23E-04	5,59E-02	-3,84E-03	-9,70E-03

OUTPUT FLOWS

IMPACT CATEGORY	UNIT	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	2,99E-01	4,11E-03	6,39E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,44E-03	5,69E-01	4,54E-04	-1,20E-01
MHWD	kg	8,07E+01	7,96E-02	1,83E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,26E-02	2,49E+00	5,17E+00	-2,48E+01
RWD	kg	1,20E-04	7,95E-07	4,35E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,60E-07	4,11E-06	6,28E-08	-4,52E-05

WASTE PRODUCTION

IMPACT CATEGORY	UNIT	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
CRU	kg	4,41E-02	0,00E+00	1,32E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	1,25E-02	0,00E+00	7,59E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	9,26E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	3,48E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	7,38E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	1,46E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,11E+00	0,00E+00	0,00E+00

ALTERNATIVE END-OF-LIFE SCENARIOS

Alternative End-of-Life scenarios assessed: 100% recycling, 100% Incineration with energy recovery and 100% Landfill

100% RECYCLING						
IMPACT CATEGORY	UNIT	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	0,00E+00	4,44E-01	4,98E-01	0,00E+00	-2,68E+00
GWP-fossil	kg CO ₂ eq	0,00E+00	4,44E-01	4,79E-01	0,00E+00	-2,68E+00
GWP-biogenic	kg CO ₂ eq	0,00E+00	8,81E-05	1,87E-02	0,00E+00	0,00E+00
GWP-luluc	kg CO ₂ eq	0,00E+00	1,57E-04	2,61E-04	0,00E+00	-1,55E-03
ODP	kg CFC-11 eq	0,00E+00	8,83E-09	1,28E-09	0,00E+00	-1,26E-06
AP	mol H+ eq	0,00E+00	1,39E-03	7,52E-04	0,00E+00	-8,42E-03
EP-freshwater	kg P eq	0,00E+00	2,94E-05	4,86E-05	0,00E+00	-8,62E-04
EP-marine	kg N eq	0,00E+00	4,68E-04	4,77E-04	0,00E+00	-1,60E-03
EP-terrestrial	mol N eq	0,00E+00	5,09E-03	2,36E-03	0,00E+00	-1,52E-02
POCP	kg NMVOC eq	0,00E+00	2,18E-03	7,10E-04	0,00E+00	-1,15E-02
ADPE	kg Sb eq	0,00E+00	1,45E-06	1,71E-06	0,00E+00	-5,35E-05
ADPF	MJ	0,00E+00	6,24E+00	1,45E+00	0,00E+00	-7,50E+01
WDP	m ³ depriv.	0,00E+00	3,06E-02	6,82E-02	0,00E+00	-8,20E-01
GWP-GHG	kg CO ₂ eq	0,00E+00	4,44E-01	4,79E-01	0,00E+00	-2,68E+00
PERE	MJ	0,00E+00	1,08E-01	1,92E-01	0,00E+00	-3,66E+00
PERM	MJ	0,00E+00	0,00E+00	-2,42E+00	0,00E+00	2,31E-01
PERT	MJ	0,00E+00	1,08E-01	-2,22E+00	0,00E+00	-3,43E+00
PENRE	MJ	0,00E+00	6,24E+00	-1,20E+02	0,00E+00	-1,08E+02
PENRM	MJ	0,00E+00	0,00E+00	-4,18E+01	0,00E+00	3,37E+01
PENRT	MJ	0,00E+00	6,24E+00	-1,62E+02	0,00E+00	-7,41E+01
SM	kg	0,00E+00	2,86E-03	9,56E-03	0,00E+00	1,64E+00
RSF	MJ	0,00E+00	3,61E-05	7,75E-05	0,00E+00	-1,48E-04
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	0,00E+00	8,39E-04	1,04E-03	0,00E+00	-2,20E-02
HWD	kg	0,00E+00	8,95E-03	3,03E-02	0,00E+00	-1,40E-01
MHWD	kg	0,00E+00	1,89E-01	9,36E-01	0,00E+00	-1,05E+02
RWD	kg	0,00E+00	1,98E-06	3,19E-06	0,00E+00	-1,08E-04
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	2,87E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

100% INCINERATION WITH ENERGY RECOVERY

IMPACT CATEGORY	UNIT	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	0,00E+00	5,55E-02	6,14E+00	0,00E+00	-3,55E+00
GWP-fossil	kg CO ₂ eq	0,00E+00	5,55E-02	6,11E+00	0,00E+00	-3,55E+00
GWP-biogenic	kg CO ₂ eq	0,00E+00	1,10E-05	2,72E-02	0,00E+00	0,00E+00
GWP-luluc	kg CO ₂ eq	0,00E+00	1,96E-05	7,65E-04	0,00E+00	-4,39E-03
ODP	kg CFC-11 eq	0,00E+00	1,10E-09	2,84E-08	0,00E+00	-1,61E-08
AP	mol H+ eq	0,00E+00	1,74E-04	4,45E-03	0,00E+00	-2,26E-02
EP-freshwater	kg P eq	0,00E+00	3,68E-06	2,79E-04	0,00E+00	-1,30E-03
EP-marine	kg N eq	0,00E+00	5,85E-05	1,33E-03	0,00E+00	-3,57E-03
EP-terrestrial	mol N eq	0,00E+00	6,37E-04	1,22E-02	0,00E+00	-3,68E-02
POCP	kg NMVOC eq	0,00E+00	2,72E-04	3,93E-03	0,00E+00	-1,09E-02
ADPE	kg Sb eq	0,00E+00	1,82E-07	7,21E-06	0,00E+00	-2,30E-06
ADPF	MJ	0,00E+00	7,80E-01	9,84E+00	0,00E+00	-3,87E+01
WDP	m ³ depriv.	0,00E+00	3,83E-03	7,59E+00	0,00E+00	-5,68E-01
GWP-GHG	kg CO ₂ eq	0,00E+00	5,55E-02	6,11E+00	0,00E+00	-3,55E+00
PERE	MJ	0,00E+00	1,35E-02	9,30E-01	0,00E+00	-5,02E+00
PERM	MJ	0,00E+00	0,00E+00	-2,42E+00	0,00E+00	2,31E-01
PERT	MJ	0,00E+00	1,35E-02	-1,49E+00	0,00E+00	-4,79E+00
PENRE	MJ	0,00E+00	7,80E-01	-5,20E+01	0,00E+00	-3,87E+01
PENRM	MJ	0,00E+00	0,00E+00	-4,18E+01	0,00E+00	1,19E-01
PENRT	MJ	0,00E+00	7,80E-01	-9,38E+01	0,00E+00	-3,86E+01
SM	kg	0,00E+00	3,57E-04	3,50E-03	0,00E+00	-1,63E-03
RSF	MJ	0,00E+00	4,51E-06	9,56E-04	0,00E+00	-1,14E-03
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	0,00E+00	1,05E-04	1,76E-01	0,00E+00	-1,58E-02
HWD	kg	0,00E+00	1,12E-03	1,78E+00	0,00E+00	-2,91E-01
MHWD	kg	0,00E+00	2,36E-02	6,95E+00	0,00E+00	-6,35E+00
RWD	kg	0,00E+00	2,47E-07	9,79E-06	0,00E+00	-6,93E-05
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	9,88E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	1,36E+01	0,00E+00	0,00E+00

100% LANDFILL

IMPACT CATEGORY	UNIT	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	0,00E+00	2,78E-02	0,00E+00	3,63E-01	-1,60E-02
GWP-fossil	kg CO ₂ eq	0,00E+00	2,78E-02	0,00E+00	3,44E-01	-1,60E-02
GWP-biogenic	kg CO ₂ eq	0,00E+00	5,50E-06	0,00E+00	1,90E-02	0,00E+00
GWP-luluc	kg CO ₂ eq	0,00E+00	9,81E-06	0,00E+00	2,10E-05	-2,14E-05
ODP	kg CFC-11 eq	0,00E+00	5,52E-10	0,00E+00	8,30E-10	-3,53E-10
AP	mol H+ eq	0,00E+00	8,68E-05	0,00E+00	2,28E-04	-8,64E-05
EP-freshwater	kg P eq	0,00E+00	1,84E-06	0,00E+00	3,38E-06	-7,74E-06
EP-marine	kg N eq	0,00E+00	2,93E-05	0,00E+00	7,60E-04	-1,39E-05
EP-terrestrial	mol N eq	0,00E+00	3,18E-04	0,00E+00	9,31E-04	-1,40E-04
POCP	kg NMVOC eq	0,00E+00	1,36E-04	0,00E+00	4,05E-04	-6,16E-05
ADPE	kg Sb eq	0,00E+00	9,08E-08	0,00E+00	7,23E-08	-5,29E-08
ADPF	MJ	0,00E+00	3,90E-01	0,00E+00	7,13E-01	-3,33E-01
WDP	m ³ depriv.	0,00E+00	1,91E-03	0,00E+00	3,49E-03	-4,74E-03
GWP-GHG	kg CO ₂ eq	0,00E+00	2,78E-02	0,00E+00	3,44E-01	-1,60E-02
PERE	MJ	0,00E+00	6,74E-03	0,00E+00	1,12E-02	1,36E-01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	-2,42E+00	2,31E-01
PERT	MJ	0,00E+00	6,74E-03	0,00E+00	-2,40E+00	3,68E-01
PENRE	MJ	0,00E+00	3,90E-01	0,00E+00	-1,12E+02	-3,33E-01
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	-4,18E+01	1,19E-01
PENRT	MJ	0,00E+00	3,90E-01	0,00E+00	-1,53E+02	-2,14E-01
SM	kg	0,00E+00	1,79E-04	0,00E+00	2,58E-04	2,09E-03
RSF	MJ	0,00E+00	2,25E-06	0,00E+00	4,84E-06	3,18E-06
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	0,00E+00	5,25E-05	0,00E+00	-1,06E-02	-1,70E-04
HWD	kg	0,00E+00	5,59E-04	0,00E+00	1,25E-03	-9,84E-04
MHWD	kg	0,00E+00	1,18E-02	0,00E+00	1,43E+01	-7,66E-02
RWD	kg	0,00E+00	1,24E-07	0,00E+00	1,73E-07	-9,76E-07
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Additional LCA results

ENVIRONMENTAL IMPACT

The tables below shows the results variations between each product range name and the average ecoprofile. The variations in the results are due, in addition to the different composition of the membranes, mainly to the different average thicknesses.

IMPACT CATEGORY	UNIT	FLAGON A family	FLAGON AT family	FLAGON BFR/SL family	FLAGON BFR/SL 500 family	FLAGON BFR/SL XE family	FLAGON BFR/SL XET family	FLAGON BFR/SL XT family	FLAGON BSL family	FLAGON BLS OBV family
GWP-total	kg CO ₂ eq	8%	-8%	-2%	27%	52%	-3%	14%	-13%	28%
GWP-fossil	kg CO ₂ eq	8%	-8%	-2%	27%	52%	-3%	14%	-13%	28%
GWP-biogenic	kg CO ₂ eq	-17%	-25%	226%	-10%	17%	-23%	-17%	-32%	-7%
GWP-luluc	kg CO ₂ eq	-55%	-62%	-64%	-47%	-39%	-61%	-55%	-56%	-48%
ODP	kg CFC-11 eq	10%	-16%	0%	-3%	48%	-5%	9%	-13%	25%
AP	mol H ⁺ eq	14%	7%	-14%	22%	64%	-11%	8%	-15%	36%
EP-freshwater	kg P eq	13%	-3%	-12%	29%	56%	-4%	12%	-13%	32%
EP-marine	kg N eq	9%	0%	-12%	24%	54%	-8%	7%	-10%	28%
EP-terrestrial	mol N eq	11%	3%	-13%	26%	57%	-8%	6%	-10%	29%
POCP	kg NMVOC eq	16%	5%	-13%	24%	69%	-9%	9%	-15%	36%
ADPE	kg Sb eq	-15%	-32%	-38%	-14%	17%	-30%	-16%	-12%	-1%
ADPF	MJ	16%	-4%	-6%	30%	66%	-8%	12%	-16%	37%
WDP	m ³ depriv.	-1%	-21%	1%	26%	34%	4%	20%	-8%	18%
GWP-GHG	kg CO ₂ eq	8%	-8%	-2%	27%	52%	-3%	14%	-13%	28%
PM	Disease incident	14%	12%	-13%	23%	73%	-13%	10%	-20%	43%
IRP	kBq U235 eq	13%	-17%	-5%	19%	52%	-1%	13%	-9%	28%
ETP-fw	CTUe	-7%	-22%	6%	27%	24%	4%	21%	-9%	13%
HTP-c	CTUh	11%	-13%	-10%	6%	50%	-1%	14%	-10%	29%
HTP-nc	CTUh	16%	6%	-2%	18%	53%	-7%	10%	-16%	27%
SPQ	dimensionless	4%	-2%	-6%	21%	51%	-1%	8%	-11%	20%
PERE	MJ	18%	-15%	-1%	24%	60%	-6%	12%	-13%	32%
PERT	MJ	18%	-15%	-1%	24%	60%	-6%	12%	-13%	32%
PENRE	MJ	545%	686%	-376%	103%	1039%	-341%	-32%	-300%	462%
PENRT	MJ	561%	686%	-376%	89%	1044%	-335%	-29%	-307%	470%
SM	kg	6%	-5%	1%	21%	39%	1%	11%	-8%	18%
RSF	MJ	-4%	-36%	-3%	40%	21%	15%	11%	-6%	10%
FW	m ³	-2%	-21%	11%	26%	31%	4%	19%	-9%	15%
HWD	kg	-4%	-5%	-2%	26%	31%	2%	19%	-10%	18%
MHWD	kg	3%	-24%	-14%	5%	39%	0%	16%	-9%	36%
RWD	kg	11%	-18%	5%	17%	50%	-2%	11%	-10%	27%
CRU	kg	-100%	-100%	87%	59%	-100%	74%	18%	54%	-96%
MFR	kg	-9%	-32%	10%	23%	21%	8%	16%	-4%	14%
MER	kg	-11%	-35%	8%	21%	17%	9%	26%	-6%	12%
EE	MJ	-12%	-35%	8%	21%	18%	9%	27%	-6%	12%

IMPACT CATEGORY	UNIT	FLAGON BT family	FLAGON BT/I family	FLAGON CS family	FLAGON CSL family	FLAGON PZ family	FLAGON PZ SL family	FLAGON RP family	FLAGON SR/AT family	GEODAM SL family
GWP-total	kg CO ₂ eq	27%	26%	-63%	-28%	-23%	9%	-8%	-11%	53%
GWP-fossil	kg CO ₂ eq	25%	24%	-63%	-28%	-23%	9%	-8%	-11%	51%
GWP-biogenic	kg CO ₂ eq	-6%	-2%	-73%	-44%	232%	263%	-22%	-27%	9%
GWP-luluc	kg CO ₂ eq	1277%	1269%	-86%	421%	-53%	-59%	-62%	453%	1087%
ODP	kg CFC-11 eq	62%	23%	-66%	-28%	-19%	20%	-7%	61%	49%
AP	mol H ⁺ eq	41%	34%	-69%	-18%	-35%	-3%	-16%	-2%	108%
EP-freshwater	kg P eq	35%	32%	-67%	-24%	-33%	3%	-7%	-11%	55%
EP-marine	kg N eq	45%	40%	-66%	-18%	-32%	-2%	-13%	-2%	116%
EP-terrestrial	mol N eq	33%	30%	-67%	-21%	-33%	-3%	-14%	-2%	118%
POCP	kg NMVOC eq	39%	38%	-67%	-20%	-36%	-3%	-14%	0%	90%
ADPE	kg Sb eq	-1%	-3%	-75%	169%	58%	-25%	-32%	-37%	8%
ADPF	MJ	35%	35%	-67%	-26%	-28%	7%	-11%	-9%	54%
WDP	m ³ depriv.	13%	10%	-59%	-36%	-17%	10%	-1%	-22%	31%
GWP-GHG	kg CO ₂ eq	28%	27%	-60%	-25%	-24%	8%	-9%	-9%	52%
PM	Disease incident	41%	36%	-68%	-16%	-38%	-4%	-19%	10%	75%
IRP	kBq U235 eq	31%	28%	-68%	-36%	-23%	10%	-3%	-23%	31%
ETP-fw	CTUe	30%	19%	-57%	-26%	-12%	13%	-1%	-18%	52%
HTP-c	CTUh	32%	26%	-63%	-30%	-30%	8%	-3%	-21%	44%
HTP-nc	CTUh	29%	27%	-65%	-11%	-22%	11%	-11%	2%	82%
SPQ	dimensionless	47%	44%	-56%	-16%	-26%	4%	-10%	25%	81%
PERE	MJ	44%	42%	-76%	-30%	-23%	9%	-7%	-17%	47%
PERT	MJ	44%	41%	-77%	-30%	-23%	9%	-7%	-17%	47%
PENRE	MJ	919%	860%	-410%	364%	-474%	-175%	-405%	531%	951%
PENRT	MJ	936%	857%	-411%	365%	-475%	-177%	-412%	542%	959%
SM	kg	20%	19%	-51%	-34%	-13%	12%	-1%	-9%	29%
RSF	MJ	12%	9%	-33%	-31%	-4%	14%	1%	47%	70%
FW	m ³	9%	9%	-59%	-37%	-6%	21%	-1%	-24%	30%
HWD	kg	8%	8%	-60%	-24%	-22%	7%	-3%	-16%	57%
MHWD	kg	13%	14%	-63%	-41%	-32%	6%	-2%	-33%	22%
RWD	kg	29%	26%	-68%	-37%	-12%	21%	-4%	-25%	29%
CFR	kg	-100%	-100%	7%	-100%	77%	-100%	71%	-100%	-100%
MFR	kg	-3%	-2%	-51%	-43%	-7%	16%	5%	-28%	18%
MER	kg	-5%	-5%	-53%	-44%	-9%	13%	2%	-30%	16%
EE	MJ	-6%	-5%	-53%	-44%	-9%	12%	2%	-31%	16%

Additional Environmental Information

ECOPROFILE CONVSERION THROUGHT THE THICKNESS

By means of the following formula, the environmental impact value for the PVC membrane with a different thickness compared to the one obtained for the average ecoprofile can be calculated.

$$Y = X \cdot \frac{\text{new membrane thickness}x}{\text{average thickness}}$$

Where X is the environmental impact value obtained for the average ecoprofile and Y is the interpolated value for the new membrane thickness.

PRODUCT RANGE NAME	AVERAGE MEMBRANE THICKNESS (mm)
FLAGON A	1,80
FLAGON AT	1,42
FLAGON BFR/SL	2,07
FLAGON BFR/SL 500	2,00
FLAGON BFR/SL XE	2,20
FLAGON BFR/SL XET	2,04
FLAGON BFR/SL XT	2,16
FLAGON BSL	1,84
FLAGON BSL OBV	2,05
FLAGON BT	2,00
FLAGON BT/I	2,00
FLAGON CS	1,00
FLAGON CSL	1,23
FLAGON PZ	1,83
FLAGON PZ SL	2,10
FLAGON RP	2,00
FLAGON SR/AT	1,42
GEODAM SL	2,50
AVERAGE ECOPROFILE	1,89

Version History

Original version of the EPD and LCA, 2026-05-19.

Abbreviations

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CPC	Central product classification
PEFCR	Product Environmental Footprint Category Rules
PVC	Polyvinyl Chloride
PVC-P	Plasticised Polyvinyl Chloride
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO ₂ eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO ₂ eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO ₂ eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO ₂ eq.)
GWP-total	Total Global Warming Potential (kg CO ₂ eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO ₂ eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H ⁺ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADPE	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADPF	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m ³)
Additional Environmental Impact Indicators	
PM	Particulate Matter emissions
IRP	Ionizing radiation, human health
ETP-fw	Eco-toxicity, freshwater
HTP-c	Human Toxicity, cancer effect
HTP-nc	Human Toxicity, non-cancer effect
SPQ	Land use related impacts soil quality
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m ³)

Abbreviation	Definition
Waste Indicators	
HWD	Hazardous Waste (disposed) (kg)
NHWD	Non-Hazardous Waste (disposed) (kg)
RWD	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CRU	Components for Reuse (kg)
MFR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)
EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
A4	Transport to site
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
EC	European Community Number
MJ	Megajoule
kg	Kilogram
mm	Millimeter
m ²	Square Meter
m ³	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO ₂ eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO ₂ eq.	Kilograms of Carbon Dioxide Equivalent

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Contacts

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Since 1908, SOPREMA has been improving people's well-being and protecting their environment with innovative and sustainable solutions for builders in the roofing, building envelope and civil engineering sectors.



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