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

PROGRAMME OPERATOR:
EPD International AB

REGISTRATION CODE
EPD-IES-0001604:001

REGISTRATION DATE
2019/07/22

YEAR
2023

UNTIL DATE
2030/01/21

EPD VERSION
6

REVISION DATE
2025/01/21

FLAGON® PVC

ENVIRONMENTAL PRODUCT DECLARATION

waterproofing

This environmental declaration refers to an average of multiple products, based on the group's findings. Refer from page 7 to 9 for the complete list of products included

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

EPD® ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

SOPREMA

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 11,000 people worldwide and a turnover of 4.84 billion Euros in 2023, the SOPREMA Group has a global industrial and commercial presence, comprising 128 production plants, more than 120 branches, and over 70 distributors. It operates in 90 countries with 23 Research and Development centers consistently focused on environmentally respectful development, and has 48 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.

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Programme Information

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

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

ACCOUNTABILITIES FOR PCR, LCA AND INDEPENDENT, THIRD-PARTY VERIFICATION

PRODUCT CATEGORY RULES (PCR)

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

PCR 2019:14 Construction products, version 1.3.3 and c-PCR EN 17388. The reference for the characterization factors (CF) is based on version 3.1 of PEF framework (EF 3.1).

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.

LIFE CYCLE ASSESSMENT (LCA)

LCA accountability: Life Cycle Engineering SpA

THIRD-PARTY VERIFICATION

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third-party verifier: Ugo Pretato

Approved by: The International EPD® System

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

☐ YES ☑ NO

FLAGON® PVC

FLAGON® PVC membranes, manufactured by Flag, now Soprema, have been in production since 1963 and are primarily used in the construction sector for roofing waterproofing applications.

General features of FLAGON® PVC are high degradation and atmospheric conditions resistance, high mechanical resistance, flexibility at low temperatures. In addition, they are rotproof, insensible to hot-cold cycles and resistant to roots growing. They are also hot air-weldable and glueable, thus fostering flame-free construction-sites.

However, there are specific membranes with special formulation which are characterized by some peculiar features, like external fire performance.

Some membranes are marketable as "Energy plus" version, characterized by a special white pigment to increase the solar reflectance index.

The roofing membranes are CE-marked products in accordance with EN 13956.

Products included in the EPD

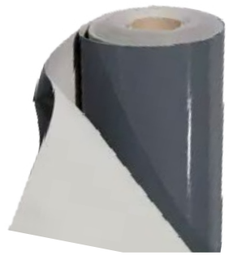
FLAGON SR SC / FLAGON SR SC ENERGY PLUS

Synthetic PVC-P membrane reinforced with polyester mesh, equipped with signal layer, produced by co-extrusion, UV-resistant.

APPLICATIONS

- Roofing: Exposed, mechanically fixed.

FLAGON SR / FLAGON SR ENERGY PLUS



Synthetic PVC-P membrane reinforced with polyester mesh, equipped with signal layer, produced by co-extrusion, UV-resistant.

APPLICATIONS

- Roofing: Exposed, mechanically fixed.

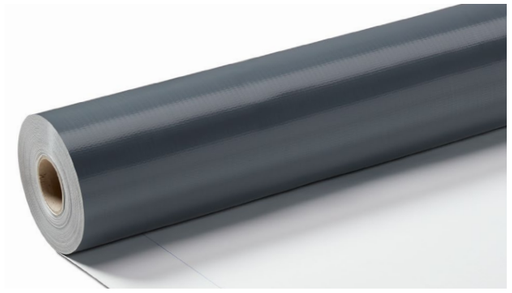
FLAGON SR FR M2 / FLAGON SR FR M2 ENERGY PLUS

Synthetic PVC-P membrane reinforced with polyester mesh, equipped with signal layer, produced by co-extrusion, UV-resistant.

APPLICATIONS

- Roofing: Exposed, mechanically fixed.

FLAGON SR DE / FLAGON SR DE ENERGY PLUS



Synthetic PVC-P membrane reinforced with polyester mesh, equipped with signal layer, produced by co-extrusion, UV-resistant.

APPLICATIONS

- Roofing: Exposed, mechanically fixed.

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

FLAGON SA 300

Synthetic membrane made of PVC-P by co-extrusion, coupled on the back with non woven fleece.

APPLICATIONS

- Roofing: Fully adhered, under ballast.

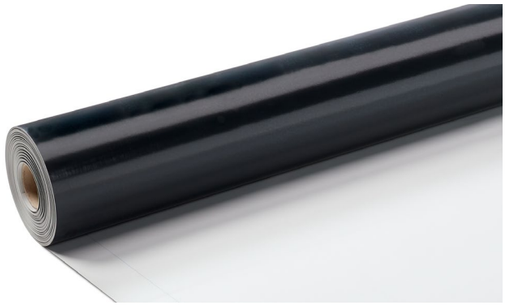
FLAGON SB / FLAGON SB ENERGY PLUS

Membrane composed of flexible PVC coupled on the back (except the overlap) with a non woven polypropene fleece, UV resistant.

APPLICATIONS

- Exposed, fully adhered.

FLAGON SV / FLAGON SV ENERGY PLUS



Synthetic membrane made of PVC-P by coextrusion dimensionally stabilized with glass veil, UV resistant.

APPLICATIONS

- Roofing:
  - Loose laid under ballast
  - Vertical finishes, connecting stripes
  - Fully adhered on verticals/details

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

Scope end type of EPD

System diagram of the processes included in the LCA, divided into the life cycle stages and information modules defined according to EN 15804.Due to the common production flow for the membrane, all FLAGON products have been grouped in one EPD, even when the GWP-GHG results differ more than 10%, as show in the table below. FLAGON products have been grouped into a single EPD due to their shared manufacturing process, and the only difference among them being the installation method.

MND: module not declared

PRODUCT STAGE			CONSTRUCTION PROCESS 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
✓	✓	✓	✓	✓	MND	MND	MND	MND	MND	MND	MND	✓	✓	✓	✓	✓
GEOGRAPHY																
GLO	GLO	IT	GLO	GLO								GLO	GLO	GLO	GLO	GLO
SPECIFIC DATA USED																
19%																
VARIATIONS PRODUCTS																
-6%/+98%																
VARIATIONS SITES																
0%																

+ TYPE OF EPD

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

This scheme is compliant with the standard EN 15804: 2012+A2:2019/AC:2021 as presented in the table above.

+ UN CPC

3699

+ DECLARED UNIT

The declared unit is the reference to which input, output are normalized. This parameter, according to international standards, shall provide reference in terms of function, quantity, quality and duration. According to the PCR 2019:14, version 1.3.3, the declared unit is 1 m^2 of installed membrane (namely 1 m^2 produced multiplied by the membrane installation overlapping factor). The average thickness is 1.49 mm.

The reference service life (RSL) of the membranes is expected to be at least 30 years. Membrane service life value is provided by EN17388 PCR for flexible sheets for waterproofing and used exclusively for calculations. They may not be representative of the real service lifetimes. Service lifetime is also influenced by type of membrane, thickness, design and use conditions and regular maintenance according to the manufacturer's indications.

+ CONVERSION TO MASS

1.87 kg/m^2

+ SOFTWARE

SimaPro 9.6.0.1

+ ENVIRONMENTAL IMPACT ASSESSMENT METHOD

EN 15804 reference package based on EF 3.1

+ MAIN DATABASES FOR GENERIC DATA

Ecoinvent v 3.10, Plastics europe, carbon minds

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

Global

+ REPRESENTATIVE YEAR FOR THE INVENTORY FOR THE MANUFACTURING

2023

+ ENERGY SOURCES BEHIND THE ELECTRICITY GRID IN MODULE A3

Italian residual mix
(GWP GHG) 0.6 kg CO_2 eq/kWh

+ CUT OFF

LCA model has been processed considering all main input/output associated with core process in accordance with the threshold valued stated PCR 2019:14, version 1.3.3. More in detail, the following aspects were considered negligible:

- Input materials related to the Bill of Material (BoM) lower than 0.01 kg/m^2
- Poduction of packaging for the raw materials input process
- Water emissions from core process
- De-construction and demolition phase
- Infrastructure and capital goods

+ ALLOCATION

Allocation occurs anytime a system is producing more than a single output. In this case it is necessary to choose a technique to proper split the environmental burdens among the output flows; international standards PCR 2019:14, version 1.3.3 provides guidelines about how to deal with this issue, that have been implemented in this project as well.

Soprema produces several product types that are not object of the study. Therefore, it is important to establish an allocation method based on physical variables to split input and output flows to the multi-products: allocation by square-meter of membrane produced has been chosen as most representative tool for the system understudy.

+ AVERAGING

The company has supplied a list of product codes, each one of them associated with a specific product range name. The purpose of the LCA study is to determine the average environmental impact of Flagon membranes belonging their product range name. To accomplish this, a weighted average of the environmental impacts for each product range name produced in 2023 is calculated; the averaging procedure is based on the surface produced for each product range name. This method ensures that the average environmental impacts reflect the proportional contribution of each product range name with respect to the total production.

+ OMITTED LIFE CYCLE STAGES

After a competitive positioning analysis performed by the company, it was decided to take in consideration the same system boundaries of the competitors; for this reason, modules from B1 to B7 are not included.

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	WEIGHT %	POST-CONSUMER RECYCLED MATERIAL; WEIGHT - %	BIOGENIC MATERIAL; WEIGHT - % OF PRODUCT	BIOGENIC MATERIAL kg C/m²
PVC	50%	0%	0%	0.00
Additive and charges	15%	0%	<1%	0.003
Reinforcing material	5%	0%	0%	0.00
Plasticisers	30%	0%	0%	0.00
Total	**1.87 kg/m² - 100%**	**0%**	**<1%**	**0.003**

PACKAGING MATERIALS	WEIGHT kg/m²	WEIGHT - % (VERSUS THE PRODUCT)	BIOGENIC MATERIAL kg C/m²
PALLET	0.06	2%-3%	0.028
CARDBOARD CORE	0.05	1%-2%	0.020

Production process

FLAGON® PVC membranes analysed are produced in line 1 (FLAGON® SA and FLAGON® SB) and 2 (all the others Flagon® PVC membranes except FLAGON® SA and FLAGON® SB).

The scheme below shows the synthetic membranes manufacturing process, characteristic of both production lines. The production process incorporates, in average, more than 5% post-industrial recycled materials.

A single-layer homogeneous membrane is obtained, whose thickness is regulated by calender and co-extrusion die control devices.

A non-woven fabrics-coupling is possible for line 1 products (such as FLAGON® SA-300). The exclusive production method created by Soprema allows the direct co-extrusion on both reinforcing material sides, so as to achieve its complete embedment, peculiar feature of all reinforced FLAGON® PVC membranes (such as FLAGON® SR).

The co-extrusion allows also the manufacturing of FLAGON® PVC membranes in a two-tone version: production of monolayer membranes with different chemical-physical properties on the two sides (signal-layer technique).

This system permits the immediate recognition of potential membrane damages (holes or lacerations), since the underlying dark colour would appear. FLAGON® PVC membranes can be also produced in white color in all layers (Energy Plus).

EXTRUSION CHAMBER LOADING

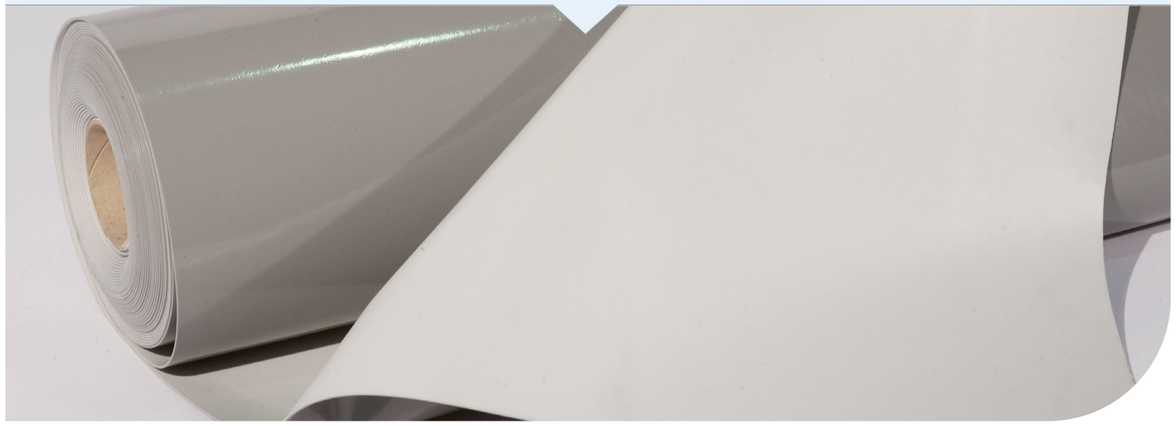
EACH CHAMBER LOADED WITH THE RAW MATERIALS MIXTURE, BY MEANS OF A HOPPER

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

A1
UPSTREAM

A2+A3
CORE

A4
TRANSPORT

A5
INSTALLATION

C1+C2+C3+C4
END OF USE

D
RESOURCE RECOVERY

Calculation rules

A1
UPSTREAM

A2+A3
CORE

A4
TRANSPORT

A5
INSTALLATION

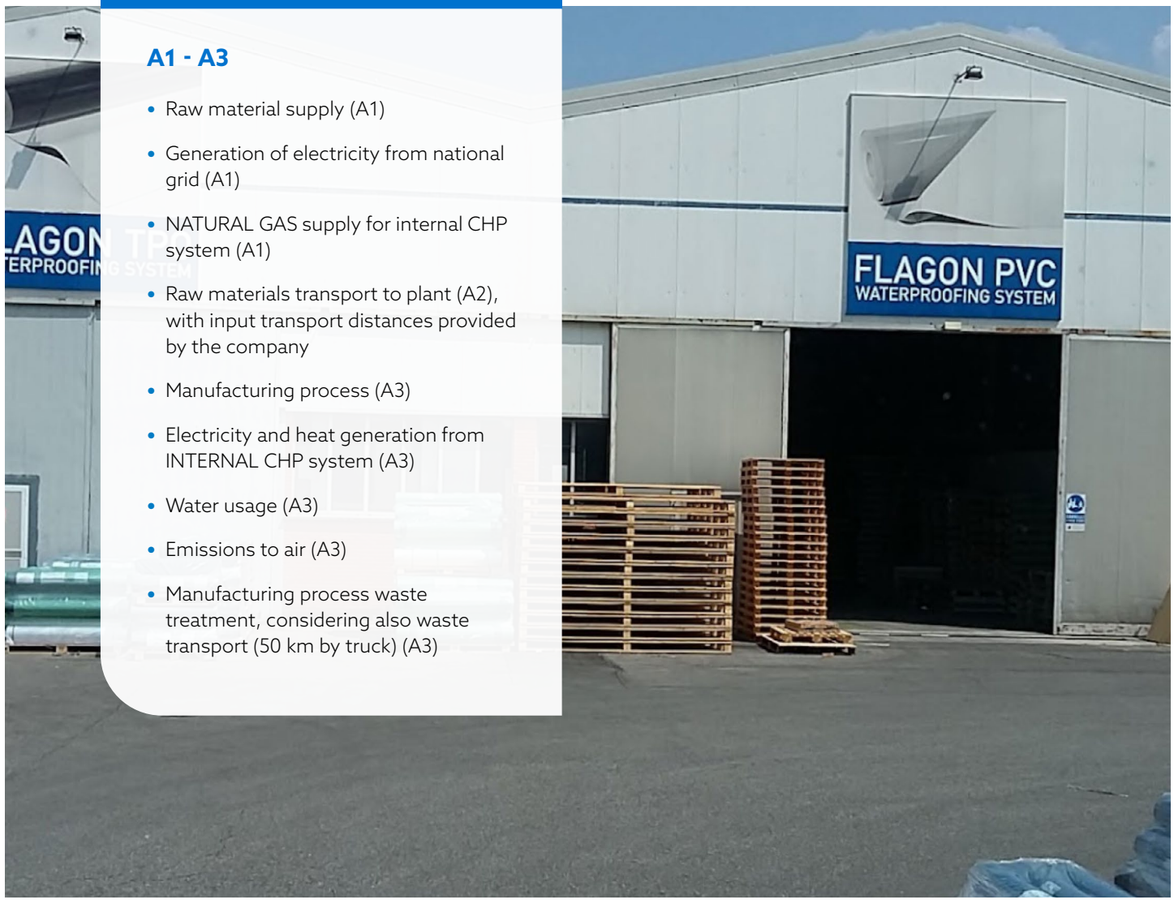
C1+C2+C3+C4
END OF USE

D
RESOURCE RECOVERY

PRODUCT STAGE

A1 - A3

- Raw material supply (A1)
- Generation of electricity from national grid (A1)
- NATURAL GAS supply for internal CHP system (A1)
- Raw materials transport to plant (A2), with input transport distances provided by the company
- Manufacturing process (A3)
- Electricity and heat generation from INTERNAL CHP system (A3)
- Water usage (A3)
- Emissions to air (A3)
- Manufacturing process waste treatment, considering also waste transport (50 km by truck) (A3)



CONSTRUCTION PROCESS STAGE

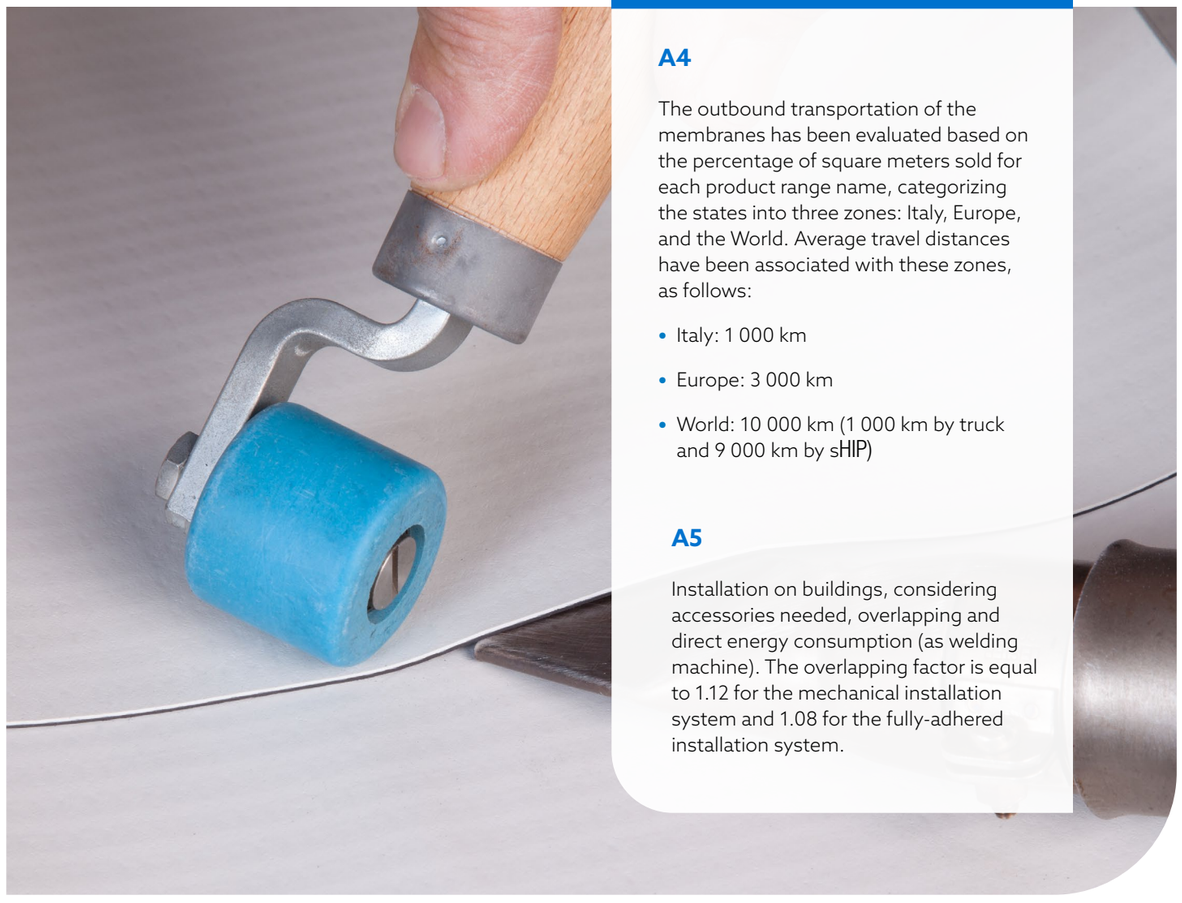
A4

The outbound transportation of the membranes has been evaluated based on the percentage of square meters sold for each product range name, categorizing the states into three zones: Italy, Europe, and the World. Average travel distances have been associated with these zones, as follows:

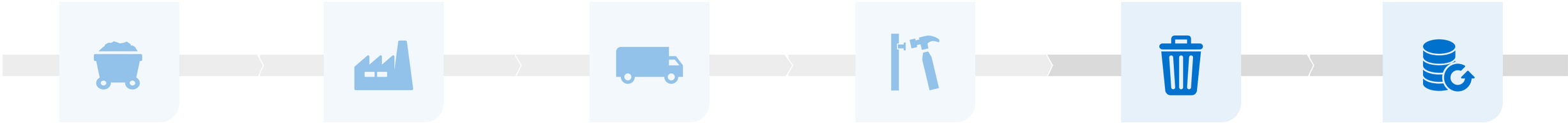
- Italy: 1 000 km
- Europe: 3 000 km
- World: 10 000 km (1 000 km by truck and 9 000 km by sHIP)

A5

Installation on buildings, considering accessories needed, overlapping and direct energy consumption (as welding machine). The overlapping factor is equal to 1.12 for the mechanical installation system and 1.08 for the fully-adhered installation system.



Calculation rules



END OF LIFE STAGE

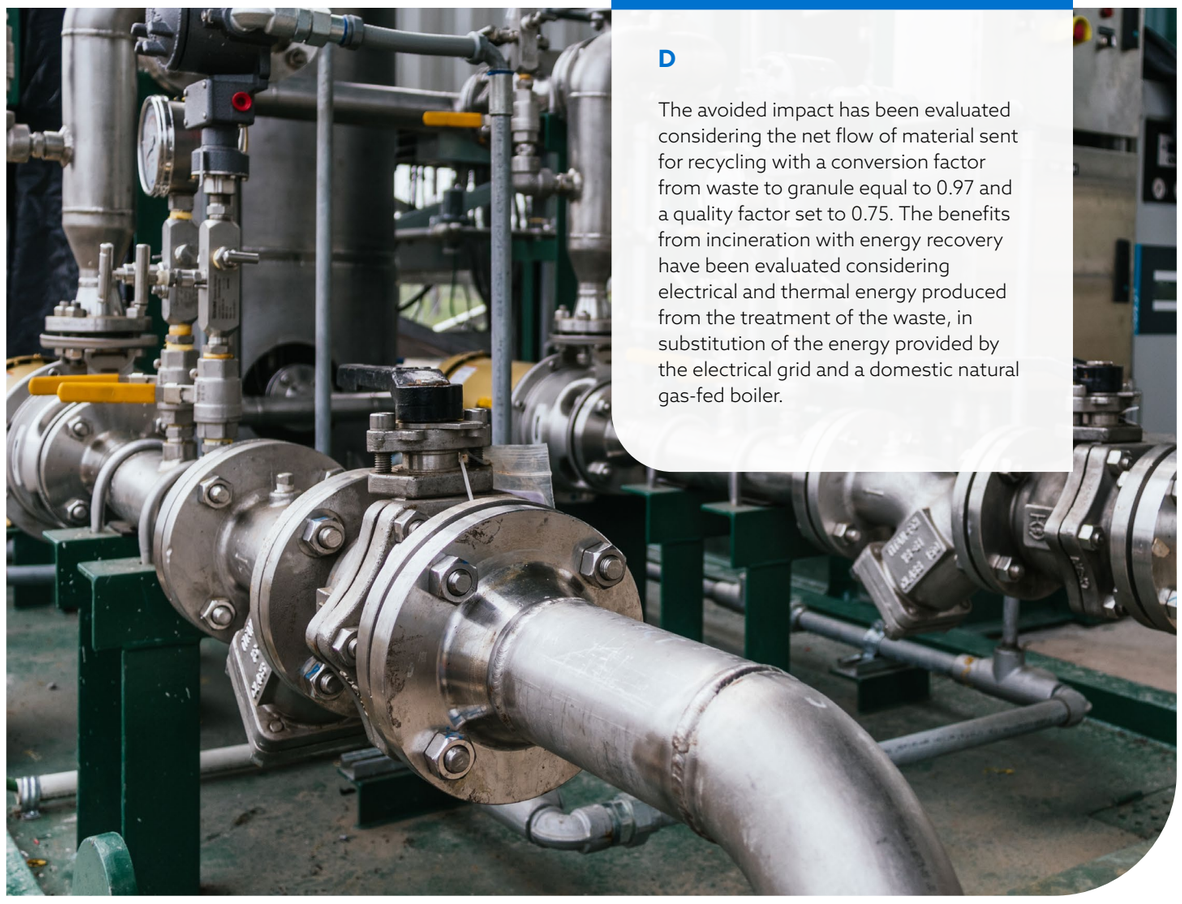
C1+C2+C3+C4

- Energy consumption associated to DE-CONSTRUCTION has been considered negligible (C1)
- Transportation to waste treatment sites (50 km) (C2)
- Material for recycling is 32% (R2,EU) and incineration with energy recovery is 31% (C3)
- Product at the end of life is sent to landfill by 37% (C4)

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES

D

The avoided impact has been evaluated considering the net flow of material sent for recycling with a conversion factor from waste to granule equal to 0.97 and a quality factor set to 0.75. The benefits from incineration with energy recovery have been evaluated considering electrical and thermal energy produced from the treatment of the waste, in substitution of the energy provided by the electrical grid and a domestic natural gas-fed boiler.



Results are declared per 1m² of average product

ENVIRONMENTAL IMPACT

FLAGON® PVC		PRODUCT STAGE	CONSTRUCTION PROCESS STAGE		END OF LIFE STAGE				RESOURCE RECOVERY STAGE
IMPACT CATEGORY	UNIT	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP. t	kg CO_2 eq	6.01E+00	1.00E+00	1.46E-01	0.00E+00	4.80E-02	1.52E+00	7.08E-02	-1.39E+00
GWP. f	kg CO_2 eq	5.96E+00	1.00E+00	1.46E-01	0.00E+00	4.80E-02	1.52E+00	7.08E-02	-1.38E+00
GWP. b	kg CO_2 eq	3.02E-02	3.44E-05	7.51E-05	0.00E+00	1.64E-06	8.42E-05	2.30E-06	-2.35E-03
GWP. luluc	kg CO_2 eq	2.00E-02	2.48E-05	3.70E-04	0.00E+00	1.18E-06	6.85E-06	5.92E-07	-2.21E-03
GWP. GHG	kg CO_2 eq	6.01E+00	1.00E+00	1.46E-01	0.00E+00	4.80E-02	1.52E+00	7.08E-02	-1.39E+00
ODP	kg CFC-11 eq	9.58E-07	2.05E-08	4.97E-09	0.00E+00	9.78E-10	5.20E-10	2.48E-10	-2.50E-07
AP	mol H+ eq	2.52E-02	4.28E-03	6.61E-04	0.00E+00	2.06E-04	3.29E-04	4.88E-05	-5.41E-03
EPf	kg P eq	3.71E-04	8.44E-07	5.38E-06	0.00E+00	4.02E-08	2.94E-07	2.61E-08	-5.76E-05
EPm	kg N eq	4.89E-03	1.84E-03	1.19E-04	0.00E+00	9.14E-05	1.59E-04	7.98E-05	-8.27E-04
EPt	mol N eq	5.24E-02	2.01E-02	1.36E-03	0.00E+00	1.00E-03	1.63E-03	2.25E-04	-9.14E-03
POCP	kg NMVOC eq	2.00E-02	6.77E-03	5.11E-04	0.00E+00	3.31E-04	4.06E-04	1.03E-04	-3.05E-03
ADPe	kg Sb eq	3.75E-04	3.31E-08	5.35E-07	0.00E+00	1.58E-09	2.07E-08	3.27E-09	-6.24E-06
ADPf	MJ	1.24E+02	1.33E+01	2.52E+00	0.00E+00	6.33E-01	2.52E-01	1.71E-01	-2.90E+01
WDP	m^3 de-priv.	1.77E+00	5.64E-03	4.43E-02	0.00E+00	2.69E-04	4.77E-02	-4.41E-03	-4.21E-01

GWP - total Global Warming Potential Total
GWP - fossil Global Warming Potential Fossil fuels
GWP - biogenic Global Warming Potential Biogenic
GWP - luluc Global Warming Potential Land use and lnd use change
GWP - GHG Global Warming Potential Irreversible
ODP Ozone Depletion Potential
AP Acidification Potential
EP - freshwater Eutrophication Potential Aquatic freshwawter
EP - marine Eutrophication Potential Aquatic marine
EP - terrestrials Eutrophication Potential Terrestrial
POCP Photochemical Ozone Creation Potential
ADP - minerals&metals Abiotic Depletion Potential - Non fossil resources (elements)
ADP - fossil Abiotic Depletion Potential - Fossil resources
WDP Water Deprivation Potential

Results are declared per 1m² of average product

USE OF RESOURCES

FLAGON® PVC		PRODUCT STAGE	CONSTRUCTION PROCESS STAGE		END OF LIFE STAGE				RESOURCE RECOVERY STAGE
IMPACT CATEGORY	UNIT	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3.98E+00	4.60E-02	1.77E+00	0.00E+00	2.20E-03	6.26E-02	4.64E-03	-2.17E+00
PERM	MJ	1.76E+00	0.00E+00	-1.63E+00	0.00E+00	0.00E+00	-5.42E-02	0.00E+00	0.00E+00
PERT	MJ	5.73E+00	4.60E-02	1.44E-01	0.00E+00	2.20E-03	8.41E-03	4.64E-03	-2.17E+00
PENRE	MJ	7.96E+01	1.33E+01	2.52E+00	0.00E+00	6.33E-01	1.90E+01	1.71E-01	-2.90E+01
PENRM	MJ	4.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.87E+01	0.00E+00	0.00E+00
PENRT	MJ	1.24E+02	1.33E+01	2.52E+00	0.00E+00	6.33E-01	2.52E-01	1.71E-01	-2.90E+01
SM	kg	3.76E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	3.19E-02	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
FW	m^3	4.39E-02	3.40E-04	1.31E-03	0.00E+00	1.62E-05	1.68E-03	-3.51E-03	-1.32E-02

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.

The results obtained for modules A1-A5 should not be interpreted without considering also the results of module C.

Option B is adopted for the accounting of use of resources indicators: with this option, the energy used as raw material has been declared as an input to the module where it enters the product system (module A1-A3) and as an output from the product system if it exits the product system as useful energy (often from modules A5 or C3). Energy content that is wasted (e.g. in landfill or in incineration), remains as part of the indicator for energy used for raw materials, and shall not be reported as an input of energy used for energy carriers.

PERE Primary Renewable energy (carrier)
PERM Primary Renewable energy (feedstock)
PERT Primary Renewable energy (total)
PENRE Primary Non-renewable energy (carrier)
PENRM Primary Non-renewable energy (feedstock)
PENRT Primary Non-renewable energy (total)
SM Use of secondary materials
RSF Use of renewable secondary fuels
NSRF Use of non-renewable secondary fuels
FW Use of Net Fresh Water

Results are declared per 1m² of average product

OUTPUT FLOWS AND WASTE PRODUCTION

FLAGON® PVC		PRODUCT STAGE	CONSTRUCTION PROCESS STAGE		END OF LIFE STAGE				RESOURCE RECOVERY STAGE
IMPACT CATEGORY	UNIT	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	9.52E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	4.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.79E-01	0.00E+00
RWD	kg	1.61E-07	1.89E-08	5.35E-08	0.00E+00	9.02E-10	2.04E-09	8.62E-10	-5.83E-07

FLAGON® PVC		PRODUCT STAGE	CONSTRUCTION PROCESS STAGE		END OF LIFE STAGE				RESOURCE RECOVERY STAGE
IMPACT CATEGORY	UNIT	A1-A3	A4	A5	C1	C2	C3	C4	D
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
MFR	kg	5.59E-02	0.00E+00	9.78E-02	0.00E+00	0.00E+00	6.70E-01	0.00E+00	0.00E+00
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
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.40E+00	0.00E+00	0.00E+00

The impact values related to 'Output flows and waste production' refer to the primary data provided by the company regarding the waste produced by the plant. The Radioactive Waste Disposed indicator, on the other hand, considers the spent nuclear fuel generated outside of the plant, due to, for example, electricity production.

HWD Hazardous Waste Disposed
NHWD Non-Hazardous Waste Disposed
RWD Radioactive Waste Disposed

CRU Components For Re-Use
MFR Material For Recycling
MER Materials For Energy Recovery
EE Exported Energy

Results variation

FLAGON® PVC

ENVIRONMENTAL IMPACT

The table 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.

For some impact indicators the differences are very marked, this is due to the absence or presence of particular substances (which for some membranes may be less than 1% and therefore not considered as a result of the cut off).

IMPACT CATEGORY	FLAGON SA 300	FLAGON SB	FLAGON SR	FLAGON SR DE	FLAGON SR FR M2	FLAGON SR SC	FLAGON SV
GWP. t Global Warming Potential Total	98%	76%	-6%	1%	2%	33%	14%
GWP, f Global Warming Potential Fossil Fuels	97%	75%	-6%	1%	2%	33%	14%
GWP, b Global Warming Potential Biogenic	77%	42%	-7%	0%	11%	23%	3%
GWP, luluc Global Warming Potential Land use and Ind use change	736%	509%	-61%	-44%	202%	136%	107%
GWP, GHG Global Warming Potential Irreversible	98%	76%	-6%	1%	2%	33%	14%
AP Acidification Potential	124%	121%	-8%	0%	1%	63%	11%
EP - freshwater Eutrophication Potential Aquatic freshwawter	575%	401%	-45%	-31%	148%	115%	71%
EP - marine Eutrophication Potential, acquatic marine	96%	103%	-8%	1%	4%	55%	10%
EP - terrestrials Eutrophication Potential, terrestrial	89%	112%	-8%	1%	1%	65%	9%
POCP Photochemical Ozone Creation Potential	91%	96%	-7%	1%	1%	54%	8%
ODP Ozone Depletion Potential	121%	75%	-5%	3%	1%	36%	-7%
ADP minerals and metals Abiotic Depletion Potential - Non fossil resources (elements)	-87%	6001%	-94%	-93%	14%	5389%	-88%
ADP fossil Abiotic Depletion Potential - Fossil resources	130%	100%	-6%	1%	1%	46%	5%
WDP Water Deprivation Potential	125%	90%	-7%	0%	1%	46%	12%

Additional information

ECOPROFILE CONVERSION THROUGH THE THICKNESS PARAMETER

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.

$$Y = X * \frac{new\ membrane\ thickness}{PVC\ average\ thickness}$$

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 SA-300	1.93
FLAGON SB	1.55
FLAGON SR	1.43
FLAGON SR DE	1.54
FLAGON SR FR M2	1.52
FLAGON SR SC	1.61
FLAGON SV	1.45
PVC AVERAGE THICKNESS	1.49

RECYCLED CONTENT

The analyzed products incorporate a quote (minimum 5% of the total composition of the membrane) of recycled PVC derived from post-industrial scrap. The contribution of the post-industrial recycled content to the modules A1-A3 for the GWP-GHG indicator is equal to 16% (GWP-GHG intensity of the scrap is approx. 3 $kgCO_2eq/kg$).

To ensure a precise evaluation of the environmental impacts associated with the use of this recycled material, an economic allocation methodology was applied.

This approach takes into account the relative purchase prices of virgin PVC and recycled PVC, allocating the impacts proportionally based on their respective market values. This method provides a balanced assessment, reflecting the contribution of each material within the production process.

Additional information

RESULTS COMPARISON WITH PREVIOUS VERSION OF THE EPD

The listed indicators considered for comparison are limited to those for which the assessment methods and units have remained unchanged.

As evidenced by the impact variation from 2019 to 2025, despite the change in methodology, results remained substantially constant with respect to GWP, while they decreased with regard to ODP and consumption of fossil resources; on the other hand, consumption of minerals and metals increased due to a change in database selected (e.g. from Ecoinvent 3.5 to 3.10).

IMPACT CATEGORY	UNIT	AVERAGE PVC FLAGON 2025 (A1-A3)	FLAGON SA 300/SV 2019 (A1-A3)	FLAGON SR 2019 (A1-A3)
GWP, GHG - EF3.1 Global Warming Potential Irreversible	kg CO_2 eq	100%	89%	99%
ODP Ozone Depletion Potential	kg CFC11 eq	100%	131%	223%
ADP minerals and metals Abiotic Depletion Potential - Non fossil resources (elements)	kg Sb eq	100%	<1%	<1%
ADP fossil Abiotic Depletion Potential - Fossil resources	MJ	100%	101%	112%

General information

REFERENCES

www.ecoinvent.org

General Programme Instructions of the International EPD® System, version 4.0

PCR 2019:14, version 1.3.3

c-PCR EN 17388

Product Category Rules PCR 2007:08 v 3.1 "Electricity, steam and hot/cold water generation and distribution"

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

ISO 14040:2006/AMD:2020

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ISO 14025:2006

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ISO 14025:2010

CONTACTS

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