Environmental Product Declaration

according to ISO 14025 and EN 15804

This declaration is for:

Flagon EP/PV-F

Provided by:

SOPREMA SRL

program operator

Stichting MRPI®

publisher

Stichting MRPI®

www.mrpi.nl

MRPI® registration

1.1.00184.2021

date of first issue

18-01-2021

date of this issue

18-01-2021

expiry date

18-01-2026

COMPANY INFORMATION

SOPREMA SRL
Via Industriale dell'Isola 3
24040
Chignolo

www.soprema.it

PRODUCT

Flagon EP/PV-F

DECLARED UNIT/FUNCTIONAL UNIT

1 m² of installed membrane

DESCRIPTION OF PRODUCT

flexible sheets for roof waterproofing

VISUAL PRODUCT

MRPI® REGISTRATION

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MORE INFORMATION

www.soprema.it

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Pieter Stadhouders, Ecoreview.**
The LCA study has been done by **Riccardo Novelli/Davide Burlon, LCE.**
The certificate is based on an LCA-dossier according to ISO14025 and NEN-EN15804+A1. It is verified according to the 'EPD-MRPI® verification protocol May 2017.v3.1'. EPDs of construction products may not be comparable if they do not comply with NEN-EN15804+A1. Declaration of SVHC that are listed on the 'Candidate List of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043GR
Amsterdam

ir. J-P den Hollander, Managing director MRPI®

DEMONSTRATION OF VERIFICATION
CEN standard EN15804 serves as the core PCR[a]
Independent verification of the declaration and data, according to EN ISO 14025:2010: internal: external: X
Third party verifier: Pieter Stadhouders, Ecoreview
[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

The product is reinforced with polyester net and coupled with a polyester non-woven fabric (EP/PR-F) and UV-resistant. Suitable for flat or sloped roofing. The waterproofing system is mechanically fixed to the support, in order to prevent the wind from removing or damaging it. Such system must resist to atmospheric agents and UV rays, as well as to a moderate pedestrian use due to maintenance.

COMPONENT (> 1%)	[kg / %]
TPO	56%
Additives and charges	34%
Reinforcing material	2%
Polyester non-woven fabric	9%

(*) > 1% of total mass

SCOPE AND TYPE

The product is manufactured in the Chignolo d'Isola plant in Italy and sold worldwide. The software used is Simapro 9 with the Ecoinvent 3.5 and the Plastics Europe databases.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to 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
X	X	X	X	X	MNA	MNA	MNA	X	MNA	MNA	MNA	MNA	X	X	X	X

X = Module assessed

MNA = Module not assessed

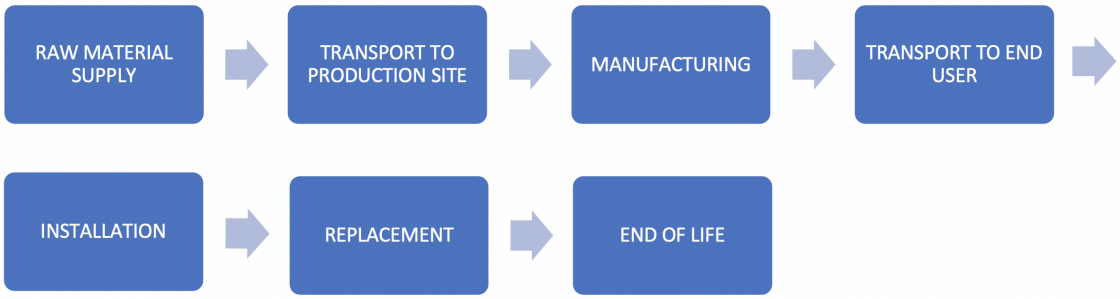

Figure: LCA process diagram according to EN 15804(7.2.1)

REPRESENTATIVENESS

The EPD is representative for products manufactured in Chignolo d'Isola (Italy) plant and sold worldwide.

ENVIRONMENTAL IMPACT per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
ADPE	kg Sb-eq.	3.48 E-9	1.51 E-10	1.86 E-10	3.82 E-9	3.13 E-11	1.43 E-9	1.06 E-8	1.36 E-12	0.00	2.67 E-12	0.00
ADPF	MJ	1.51 E+0	3.52 E-2	5.93 E-2	1.60 E+0	1.50 E-1	1.99 E-1	3.91 E+0	9.73 E-3	0.00	3.87 E-3	0.00
GWP	kg CO2-eq.	5.95 E-2	2.51 E-3	3.96 E-3	6.60 E-2	1.06 E-2	1.20 E-2	1.77 E-1	6.88 E-4	0.00	4.83 E-3	0.00
ODP	kg CFC11-eq.	2.80 E-8	4.68 E-10	4.31 E-11	2.85 E-8	1.98 E-9	5.17 E-11	6.11 E-8	1.29 E-10	0.00	3.65 E-11	0.00
POCP	kg ethene-eq.	1.57 E-5	2.49 E-7	4.63 E-7	1.64 E-5	1.63 E-6	4.53 E-6	4.51 E-5	9.83 E-8	0.00	8.40 E-7	0.00
AP	kg SO2-eq.	2.17 E-4	8.78 E-6	8.61 E-6	2.34 E-4	4.12 E-5	3.93 E-5	6.30 E-4	3.05 E-6	0.00	2.18 E-6	0.00
EP	kg (PO4)3--eq.	4.65 E-5	1.67 E-6	7.95 E-7	4.90 E-5	7.43 E-6	5.64 E-6	1.24 E-4	6.24 E-7	0.00	1.40 E-6	0.00
Toxicity indicators (Dutch market)												
HTP	kg DCB-eq.	4.58 E-3	7.04 E-4	2.55 E-4	5.54 E-3	8.56 E-4	4.72 E-4	1.37 E-2	1.65 E-4	0.00	1.91 E-4	0.00
FAETP	kg DCB-eq.	1.21 E-3	2.53 E-5	1.14 E-5	1.25 E-3	4.30 E-5	8.83 E-5	2.77 E-3	7.52 E-6	0.00	4.39 E-4	0.00
MAETP	kg DCB-eq.	1.14 E+1	1.32 E-1	6.97 E-1	1.22 E+1	2.14 E-1	8.52 E-1	2.65 E+1	3.29 E-2	0.00	5.40 E-1	0.00
TETP	kg DCB-eq.	2.46 E-5	2.01 E-6	1.22 E-6	2.78 E-5	3.04 E-6	1.36 E-5	8.88 E-5	5.25 E-7	0.00	7.02 E-8	0.00
Environmental Cost Indicator (Dutch market)												
ECI	Euro	1.14 E-2	8.58 E-4	6.56 E-4	1.29 E-2	1.71 E-3	2.23 E-3	3.36 E-2	2.65 E-4	0.00	4.18 E-4	0.00

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator

RESOURCE USE per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
PERE	MJ	7.79 E-2	5.06 E-5	5.68 E-4	7.85 E-2	2.76 E-4	5.61 E-3	1.69 E-1	2.55 E-5	0.00	1.56 E-4	0.00
PERM	MJ	0.00	0.00	1.87 E-3	1.87 E-3	0.00	0.00	3.74 E-3	0.00	0.00	0.00	0.00
PERT	MJ	7.79 E-2	5.06 E-5	2.44 E-3	8.04 E-2	2.76 E-4	5.61 E-3	1.73 E-1	2.55 E-5	0.00	1.56 E-4	0.00
PENRE	MJ	8.23 E-1	3.53 E-2	1.55 E-2	8.74 E-1	1.50 E-1	1.43 E-1	2.33 E+0	9.78 E-3	0.00	4.68 E-3	0.00
PENRM	MJ	8.69 E-1	0.00	5.11 E-2	9.20 E-1	0.00	8.24 E-2	2.01 E+0	0.00	0.00	0.00	0.00
PENRT	MJ	1.69 E+0	3.53 E-2	6.66 E-2	1.79 E+0	1.50 E-1	2.25 E-1	4.33 E+0	9.78 E-3	0.00	4.68 E-3	0.00
SM	kg	1.31 E-3	0.00	0.00	1.31 E-3	0.00	0.00	2.62 E-3	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m3	1.89 E-1	1.50 E-6	9.57 E-3	1.99 E-1	7.07 E-3	1.71 E-1	7.56 E-4	4.61 E-4	0.00	9.23 E-4	0.00

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials
PENRM = Use of non-renewable primary energy resources used as raw materials
PENRT = Total use of non-renewable primary energy resources
SM = Use of secondary materials
RSF = Use of renewable secondary fuels
NRSF = Use of non renewable secondary fuels
FW = Use of net fresh water

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
HWD	kg	6.07 E-9	0.00	0.00	6.07 E-9	0.00	0.00	1.21 E-8	0.00	0.00	0.00	0.00
NHWD	kg	4.38 E-3	0.00	5.76 E-4	4.96 E-3	0.00	0.00	9.91 E-3	0.00	0.00	6.46 E-2	0.00
RWD	kg	2.43 E-6	0.00	0.00	2.43 E-6	0.00	0.00	4.85 E-6	0.00	0.00	0.00	0.00
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ETE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

CALCULATION RULES

CUT-OFF RULES

LCA model has been processed considering all main input/output associated with core process in accordance with the threshold valued stated in PCR 2012:01 v2.3 (ch. 7.6), namely the sum of the excluded material flows to the core module shall not exceed 1% of mass and energy. Hence, the following aspects were considered negligible:

- Production of packaging for the raw materials input process, except for PE packaging film;
- Drill electricity consumption related to mechanical installation;
- Water emissions from core process.

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 ISO 14044 and PCR 2012:01 v2.3 provide 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-metre of membrane produced has been chosen as most representative tool for the system understudy.

TRANSPORTATIONS

Impacts calculations related to transports in SimaPro are performed according to the EcoInvent model. All the transports is assumed by truck or by ship. For Module A2, since no specific data are available, 500 km is used as average value (provided by Soprema) for raw materials transportation from suppliers to the plant. For module A4, specific information are provided, such as quantity transported and destination per each trip.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1 - RAW MATERIALS SUPPLY

This module considers the extraction and processing of all raw materials and energy (generation of electricity from national grid and NG supply for internal CHP system) which occur upstream to the Flagon manufacturing process.

A2 - RAW MATERIALS TRANSPORT

This module includes the raw materials transportation to the manufacturing plant, performed via road. Soprema provided the list of suppliers for all raw material, helpful to calculate the distance to the Flagon® manufacturing plant. No information was available for the externally ground PP. Hence, a distance of 50 km was used as hypothesis. Calculations in SimaPro are performed according to the EcoInvent model.

PARAMETER	TRUCK
Vehicle type	lorry 16-32 metric ton, EURO 4
Capacity (average load factor)	5.79 ton

A3 - MANUFACTURING

This module covers the manufacturing of the Flagon TPO membranes and includes all processes linked to production. Use of electricity (overall plant energy consumption, namely considering services too), production of electricity and heat from the CHP system, water usage, manufacturing emissions to air and waste treatment (considering also waste transport) are included in this module. All data was provided by Soprema itself, related to the production site in Chignolo d'Isola. For electricity production, the 2017 Italian residual mix was used. Yearly water consumption (from grid and from well) has been allocated to the total Flagon production at the site. Regarding packaging, only PE film was considered, being all other packaging types inside 1% cut-off. Air emission data provided by Soprema per total TPO membranes production, since no specific data at product-level are given. Production waste data is provided by Soprema for the whole plant as well, hence allocated to the whole production. Distance from the manufacturing plant to the waste treatment site assumed equal to 50 km, regardless of the waste type.

A4 - TRANSPORT TO BUILDING SITE

Transports were modelled according to the EcoInvent model. Quantity transported and destination per each trip provided by Soprema. Depending on the destination, transports were assumed by truck for European destinations (using the ACI italian truck mix for EURO classes) and by ship for transcontinental ones. A production-weighted average distance travelled per each transportation means was assessed.

PARAMETER	TRUCK	SHIP
Transport Type	Lorry, 16-32 ton, mix ACI, Italy	Transoceanic freight ship
Weighted distance	746 km	313 km
Capacity (average load factor)	5.79 ton	65% load factor

A5 - INSTALLATION

This module includes the environmental impacts associated with the products installation on the roof. Loose-laying procedures is considered for this product. Product packaging (PE film) end-of-life municipal incineration is considered in this module.

PARAMETER	LOOSE-LAID INSTALLATION
Contiguous membranes overlap	1.08 m2/m2 installed
Gravel - by mass	81.549 kg/m2
Electricity consumption	0.02 kWh/m2

B4 - REPLACEMENT

According to the PCR 2014:12, a standard reference service lifetime of 30 years for the roof waterproofing system was used for calculations, with a total service lifetime of 90 years. Two replacements were thus considered. Replacement module includes all the previous stages doubled (A1, A2, A3, A4 and A5).

C2 - WASTE TRANSPORTATION

This module includes the out-of-service membranes transportation to waste treatment sites. No specific information were provided by the company, a realistic average distance to the waste treatment site was assumed, regardless of the treatment type. Transport assumed by truck (using the ACI italian truck mix for EURO classes).

PARAMETER	TRUCK
Vehicle Type	Lorry, 7.5-16 ton, mix ACI, Itly
Distance	50 km
Capacity (average load factor)	3.29 ton

C3 - WASTE PROCESSING

This module includes waste processing for recycling and energy recovery. Regarding recycling, only plastic materials (such as generic plastics, PP, PE from masterbatches and PET from fleeces and nets) are considered among the raw materials used for the membranes production, because they accounted for around 90% of the total raw materials mass. Although considered for mass flows, no environmental burden is associated to recycling in C3 module. The only burden related to recycling is the waste transportation to waste processing site, considered in C2 module.

PARAMETER	
Share to Incineration with energy recovery	30%
Share to Mechanical recycling	70%

D - AVOIDED IMPACTS

This module assesses the benefits and loads beyond the product system due to the recycling/incineration processes analysed in C3 module.

DECLARATION OF SVHC

The product considered does not contain any of the substances listed in the "Candidate List of Substances of very High Concern for authorisation"

REFERENCES

- General Programme Instructions for the International EPD® System v. 2.5, 2015
- Product Category Rules PCR 2012:01 v 2.3 “Construction products and construction services”
- PCR 2014:12 v 1.0 “Flexible sheets for waterproofing - bitumen , plastic or rubber sheets for roof waterproofing”
- Product Category Rules PCR 2007:08 v 3.1 “Electricity, steam and hot/cold water generation and distribution”
- EN 15804:2012+A1:2013
- ISO 14040:2006
- ISO 14044:2017
- ISO 14025:2010

REMARKS

None