Environmental Product Declaration

according to ISO 14025 and EN 15804

This declaration is for:

Flagon PVC SR

Provided by:

SOPREMA SRL

program operator

Stichting MRPI®

publisher

Stichting MRPI®

www.mrpi.nl

MRPI® registration

1.1.00185.2021

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 PVC SR

DECLARED UNIT/FUNCTIONAL UNIT

1 m² of installed membrane

DESCRIPTION OF PRODUCT

flexible sheets for roof waterproofing

VISUAL PRODUCT

MRPI® REGISTRATION

1.1.00185.2021

DATE OF ISSUE

18-01-2021

EXPIRY DATE

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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 EN15804+A2 (incl. A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2 (incl. 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 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 / %]
PVC	51%
Additives and charges	46%
Reinforcing material	3%
Polypropylene non-woven fabric	0%

(*) > 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	ND	ND	ND	X	ND	ND	ND	ND	X	X	X	X

X = Modules Assessed

ND = Not Declared

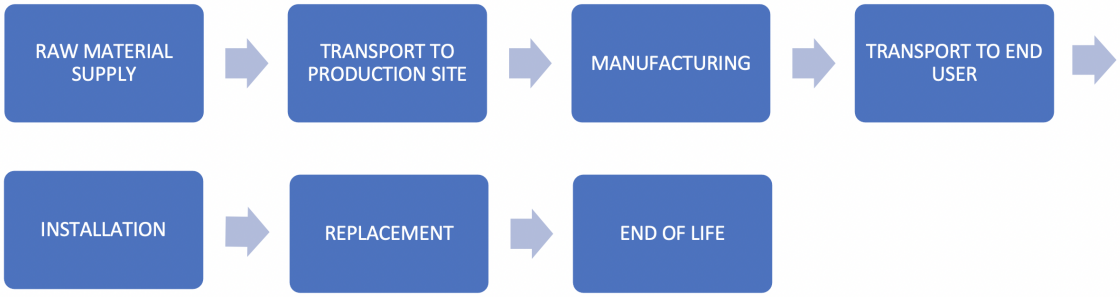

Figure: LCA process diagram according to EN 15804 (7.2.1)

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 (indicators A1)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
ADPE	kg Sb. eq.	3.89 E-9	3.55 E-10	1.93 E-10	4.44 E-9	7.62 E-12	1.66 E-9	1.22 E-8	1.26 E-12	0.00	2.19 E-12	0.00
ADPF	MJ	1.45 E+0	8.31 E-2	6.21 E-2	1.60 E+0	5.44 E-2	4.61 E-3	3.31 E+0	8.99 E-3	0.00	2.74 E-3	0.00
GWP	kg CO2 eq.	5.99 E-2	5.93 E-3	4.28 E-3	7.01 E-2	3.82 E-3	2.59 E-3	1.53 E-1	6.35 E-4	0.00	4.32 E-3	0.00
ODP	kg CFC 11 eq.	2.34 E-8	1.10 E-9	5.31 E-11	2.46 E-8	7.19 E-10	1.89 E-11	5.06 E-8	1.19 E-10	0.00	2.65 E-11	0.00
POCP	kg ethene eq.	1.47 E-5	6.92 E-7	4.79 E-7	1.59 E-5	5.80 E-7	1.05 E-7	3.31 E-5	9.09 E-8	0.00	7.53 E-7	0.00
AP	kg SO2 eq.	1.87 E-4	2.58 E-5	9.14 E-6	2.22 E-4	1.79 E-5	1.38 E-6	4.82 E-4	2.82 E-6	0.00	1.66 E-6	0.00
EP	kg (PO4)3- eq.	5.54 E-5	5.24 E-6	8.69 E-7	6.15 E-5	3.61 E-6	1.73 E-7	1.31 E-4	5.77 E-7	0.00	1.93 E-6	0.00

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB-eq.	8.40 E-3	1.67 E-3	2.71 E-4	1.03 E-2	1.09 E-3	5.62 E-4	2.18 E-2	1.52 E-4	0.00	8.48 E-5	0.00
FAETP	kg DCB-eq.	1.57 E-3	7.10 E-5	1.22 E-5	1.65 E-3	4.66 E-5	1.40 E-5	3.32 E-3	6.95 E-6	0.00	1.04 E-4	0.00
MAETP	kg DCB-eq.	1.17 E+1	3.11 E-1	7.25 E-1	1.27 E+1	2.04 E-1	1.13 E-1	2.58 E+1	3.04 E-2	0.00	2.71 E-1	0.00
TETP	kg DCB-eq.	2.92 E-4	5.14 E-6	1.28 E-6	2.98 E-4	3.36 E-6	2.66 E-6	6.02 E-4	4.85 E-7	0.00	4.69 E-7	0.00
ECI	Euro	ND	ND	ND	7.37 E-3	4.21 E-4	2.00 E-4	1.58 E-2	6.61 E-5	0.00	2.80 E-4	0.00
ADPF	kg Sb. eq.	6.97 E-4	4.00 E-5	2.99 E-5	7.67 E-4	2.62 E-5	2.22 E-6	1.59 E-3	4.32 E-6	0.00	1.32 E-6	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
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]
ND = Not Declared

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
GWP-total	kg CO2 eq.	6.29 E-2	2.39 E-3	4.62 E-3	6.99 E-2	4.68 E-3	2.60 E-3	1.54 E-1	7.88 E-4	0.00	5.45 E-3	0.00
GWP-fossil	kg CO2 eq.	6.04 E-2	2.39 E-3	4.62 E-3	6.74 E-2	4.67 E-3	2.60 E-3	1.49 E-1	7.88 E-4	0.00	5.45 E-3	0.00
GWP-biogenic	kg CO2 eq.	4.70 E-4	8.43 E-7	5.51 E-6	4.76 E-4	1.70 E-6	2.66 E-7	9.57 E-4	3.24 E-7	0.00	1.51 E-7	0.00
GWP-luluc	kg CO2 eq.	2.09 E-3	9.41 E-7	1.94 E-6	2.09 E-3	1.63 E-6	2.33 E-9	4.19 E-3	3.39 E-7	0.00	2.14 E-8	0.00
ODP	kg CFC11 eq.	2.81 E-8	5.40 E-10	9.86 E-11	2.87 E-8	1.07 E-9	2.20 E-11	5.97 E-8	1.76 E-10	0.00	5.36 E-11	0.00
AP	mol H+ eq.	2.28 E-4	2.01 E-5	1.20 E-5	2.60 E-4	3.03 E-5	1.69 E-6	5.84 E-4	4.90 E-6	0.00	3.27 E-6	0.00
EP-freshwater	kg PO4 eq.	1.13 E-5	1.78 E-8	8.03 E-8	1.14 E-5	3.66 E-8	1.48 E-8	2.29 E-5	7.19 E-9	0.00	2.06 E-9	0.00
EP-marine	kg N eq.	4.63 E-5	5.95 E-6	2.49 E-6	5.48 E-5	1.13 E-5	3.37 E-7	1.33 E-4	1.81 E-6	0.00	4.74 E-6	0.00
EP-terrestrial	mol N eq.	4.32 E-4	6.58 E-5	2.76 E-5	5.25 E-4	1.25 E-4	3.82 E-6	1.31 E-3	2.00 E-5	0.00	1.48 E-5	0.00
POCP	kg NMVOC eq.	1.89 E-4	1.81 E-5	1.15 E-5	2.19 E-4	3.46 E-5	1.17 E-6	5.09 E-4	5.53 E-6	0.00	5.24 E-6	0.00
ADP-minerals& metals	kg Sb eq.	1.57 E-5	5.96 E-8	2.58 E-8	1.58 E-5	1.26 E-7	1.66 E-9	3.18 E-5	2.82 E-8	0.00	2.15 E-10	0.00
ADP-fossil	MJ, net calorific value	1.46 E+0	3.57 E-2	6.76 E-2	1.56 E+0	7.10 E-2	4.10 E-3	3.28 E+0	1.18 E-2	0.00	4.83 E-3	0.00
WDP	m3 world eq. deprived	3.53 E-1	9.45 E-5	2.55 E-3	3.56 E-1	3.05 E-4	8.54 E-2	8.83 E-1	3.59 E-5	0.00	2.58 E-2	0.00

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 land use change
ODP = Depletion potential of the stratospheric ozone layer
AP = Acidification Potential, Accumulated Exceedence
EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment
EP-terrestrial = Eutrophication Potential, Accumulated Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]
ND = Not Declared

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.

ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
PM	Disease incidence	2.07 E-9	1.61 E-10	9.96 E-11	2.33 E-9	4.46 E-10	1.46 E-11	5.59 E-9	6.57 E-11	0.00	7.97 E-11	0.00
IRP	kBq U235 eq.	3.92 E-3	1.56 E-4	7.92 E-5	4.16 E-3	3.09 E-4	1.75 E-5	8.97 E-3	5.17 E-5	0.00	3.00 E-5	0.00
ETP-fw	CTUe	6.41 E-1	2.80 E-2	3.24 E-2	7.01 E-1	5.66 E-2	4.19 E-3	1.52 E+0	9.94 E-3	0.00	1.50 E-1	0.00
HTP-c	CTUh	2.38 E-11	8.83 E-13	9.26 E-13	2.56 E-11	2.50 E-12	1.11 E-12	5.85 E-11	4.48 E-13	0.00	9.08 E-14	0.00
HTP-nc	CTUh	1.15 E-9	2.98 E-11	2.18 E-11	1.20 E-9	7.21 E-11	1.57 E-11	2.58 E-9	1.21 E-11	0.00	2.81 E-11	0.00
SQP	---	2.28 E-1	2.26 E-2	1.15 E-2	2.62 E-1	4.85 E-2	1.35 E-4	6.21 E-1	6.97 E-3	0.00	1.19 E-2	0.00

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]
ND = Not Declared

Disclaimer [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 the soil, from radon and from some construction materials is also not measured by this indicator.

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.

RESOURCE USE per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
PERE	MJ	9.81 E-2	1.19 E-4	6.60 E-4	9.89 E-2	1.43 E-4	3.03 E-4	1.99 E-1	2.36 E-5	0.00	1.50 E-4	0.00
PERM	MJ	1.49 E-2	0.00	1.87 E-3	1.68 E-2	0.00	0.00	3.35 E-2	0.00	0.00	0.00	0.00
PERT	MJ	1.13 E-1	1.19 E-4	2.53 E-3	1.16 E-1	1.43 E-4	3.03 E-4	2.32 E-1	2.36 E-5	0.00	1.50 E-4	0.00
PENRE	MJ	1.29 E+0	8.33 E-2	1.86 E-2	1.39 E+0	5.47 E-2	5.10 E-3	2.90 E+0	9.04 E-3	0.00	3.39 E-3	0.00
PENRM	MJ	2.90 E-1	0.00	5.11 E-2	3.41 E-1	0.00	0.00	6.82 E-1	0.00	0.00	0.00	0.00
PENRT	MJ	1.58 E+0	8.33 E-2	6.97 E-2	1.73 E+0	5.47 E-2	5.10 E-3	3.59 E+0	9.04 E-3	0.00	3.39 E-3	0.00
SM	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	1.86 E+0	3.53 E-6	9.96 E-3	1.87 E+0	2.59 E-3	2.91 E-3	3.76 E-3	4.26 E-4	0.00	6.58 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
ND = Not Declared

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
HWD	kg	2.20 E-9	0.00	0.00	2.20 E-9	0.00	0.00	4.41 E-9	0.00	0.00	0.00	0.00
NHWD	kg	4.87 E-4	0.00	5.71 E-3	6.20 E-3	0.00	0.00	1.24 E-2	0.00	0.00	6.73 E-2	0.00
RWD	kg	2.81 E-7	0.00	0.00	2.81 E-7	0.00	0.00	5.61 E-7	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
ND = Not Declared

BIOGENIC CARBON CONTENT per functional unit or declared unit (A2)

	UNIT	A1	A2	A3	A1-A3	A4	A5	B4	C2	C3	C4	D
BCCpr	kg C	2.59 E-2	0.00	0.00	2.59 E-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCCpa	kg C	0.00	0.00	3.99 E-3	3.99 E-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging
ND = Not Declared

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 or via sea. Soprema provided the list of suppliers for all raw material, helpful to calculate the distance to the Flagon® manufacturing plant. Calculations in SimaPro are performed according to the EcoInvent model.

PARAMETER	TRUCK	SHIP
Vehicle type	Lorry 16-32 metric ton, EURO 4	Transoceanic freight ship
Capacity (average load factor)	5.79 ton	65%

A3 - MANUFACTURING

This module covers the manufacturing of the FlagonPVC 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 PVC 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	1151 km	109 km
Capacity (average load factor)	5.79 ton	65%

A5 - INSTALLATION

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

PARAMETER	MECHANICAL INSTALLATION
Contiguous membranes overlap	1.12 m2/m2 installed
Normalised nails mass	0.0075 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 (landfilling). No specific information were provided by the company, a realistic average distance to the waste treatment site was assumed. Transport assumed by truck (using the ACI italian truck mix for EURO classes).

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

C4 - WASTE DISPOSAL

This module includes waste processing for product disposal, considering a 100% sanitary landfill scenario. Only plastics and inert materials are considered.

PARAMETER	
Share to landfill disposal	100%

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