

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021
for:

MAPEPLAN T WT (TPO/FPO Waterproofing Membranes)

Programme:	The International EPD [®] System; www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-01007
Publication date:	2017-06-08
Valid until:	2028-05-31
Revision date:	2023-06-01
Geographical scope:	<i>Global</i>

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

Mapeplan[®] T

Figure 1: Production equipment

1 Company description / Goal & Scope

The Company's headquarter is located in Ponte di Piave, Treviso (Italy). Over 90.000 m² of surface, 25.000 m² covered. The plant has 4 production lines of polymer-bitumen membranes, 3 production lines of synthetic PVC-P and TPO/FPO membranes.

In October 2008 Polyglass was taken over by the MAPEI Group, an international Company in the chemical industry for construction, with 67 production plants in 5 continents, in 32 countries.

Polyglass SpA is ISO 14001 certified since 2010 and ISO 9001 since 1995 and ISO 45001 since 2022.

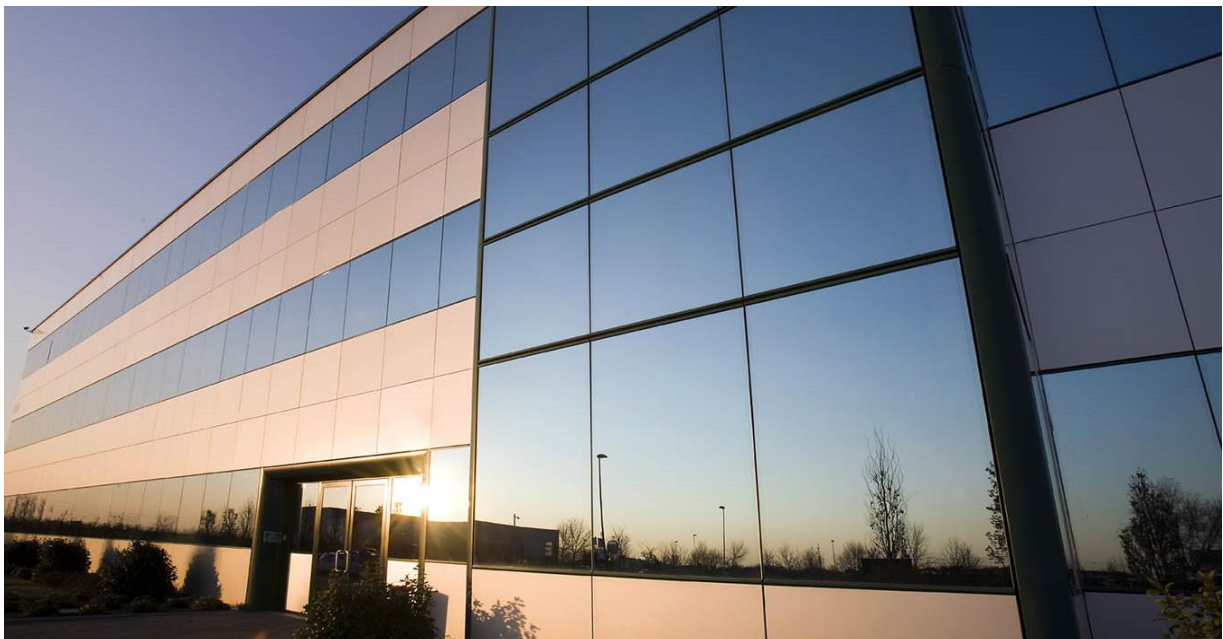
The goal of the study is to provide necessary data and documentation to produce an EPD according to the requirements of PCR Environdec (version 1.11, 2021-02-05) under EN 15804:2012+A2:2019/AC:2021 and to have more comprehension about the environmental impacts related to Mapeplan T WT, manufactured in Polyglass SpA located in Ponte di Piave (TV - Italy), including packaging of the finished product.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **MAPEPLAN T WT**.



This analysis shall not support comparative assertions intended to be disclosed to the public.

Figure 2: Polyglass S.p.A. head quarter



2 Product description

Mapeplan T WT is a synthetic waterproofing membrane in flexible polyolefin TPO/FPO produced in multi extrusion coating process, with high quality raw materials, reinforced with glass mat.

Mapeplan T WT membrane is compliant with EN 13361 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of reservoirs and dams”; EN 13362 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of canals”; EN 13491 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of tunnels and underground structures” EN 13492 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of liquid waste disposal sites, transfer stations or secondary containment”.

The product is sold in:

PACKAGING

- Pallet with 14 rolls
- Length of rolls: 20m / 15 mm
- Width of rolls: 2,10 m

Figure 3:: Membrane MAPEPLAN T WT on water reservoir



3 Content declaration

The main components and ancillary materials of Mapeplan T WT polymeric waterproofing membranes are the following:

Table 1: Composition referred to 1 kg of finished product with packaging

Materials	Percentage (%) by mass
TPO/FPO Compound	< 90%
Pigments	< 5%
Reinforcing material	< 5%
Additives	< 5%
Packaging	Percentage (%) by mass
Pallet (WOOD)	< 5% (1,9% of biogenic Carbon)
Cardboard	< 3% (0,1% of biogenic Carbon)
Plastic PP	< 3%
Plastic PE	< 0,5%

The product does not contain a concentration higher than 0,1% (by unit weight) of either carcinogenic substances or substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency.

4 Declared Unit and RSL (Reference Service Life)

The declared unit is 1m² of finished product having a 1,5 mm thickness.

Packaging materials include:

- Wooden pallet
- Cardboard
- LDPE used as wrapping material

The reference service life of the roofing membrane, according to Polyglass experience, is estimated at least 30 years, if professionally installed and properly used.

5 System Boundaries & additional technical information

The approach is “cradle to gate” (A1–A3) with modules C1–C4 and module D and optional modules (A1–A3 + A4 – A5 + C + D).

- A1, A2, A3 (Product stage): extraction and processing of raw materials and packaging (A1), transportation up to the factory gate (A2), manufacturing of the finished product (A3).

- A4 – A5 (Construction process stage): transport of the finished product to final customers and installation into the building.
- C1, C2, C3, C4 (End of Life stage): With a collection rate of 100% as C&D waste, the transports are carried out by lorry over 100 km (C2). The recycling ratio (C3) is considered as 0% and the 100% is landfilled (C4).
- D (Resource recovery stage): reuse, recovery and/or recycling potentials, expressed as net impacts and benefit)

Table 2: System boundaries (X=included, MND= module not declared)

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage	
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Modules declared	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X	
Geography	EU, IT	EU, IT	IT	EU	EU	-	-	-	-	-	-	-	EU, IT	EU, IT	EU	EU	IT	
Specific data	> 90%					-	-	-	-	-	-	-	-	-	-	-	-	
Variation – products	Not-relevant					-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not-relevant					-	-	-	-	-	-	-	-	-	-	-	-	-

A brief description of production process, is the following:

The production process of TPO/FPO waterproofing membranes is a multi-extrusion coating process. The production plant produces waterproofing membranes with an internal reinforcing material made of glass mat. TPO/FPO granulate is stored in silos and sent to multi extrusion coating plant. The hot melt compound comes out from the extruders where the reinforced material is combined and totally encapsulated. The membrane is cooled and finally sent to the packaging area, ready to ship.

Figure 4: Production process detail

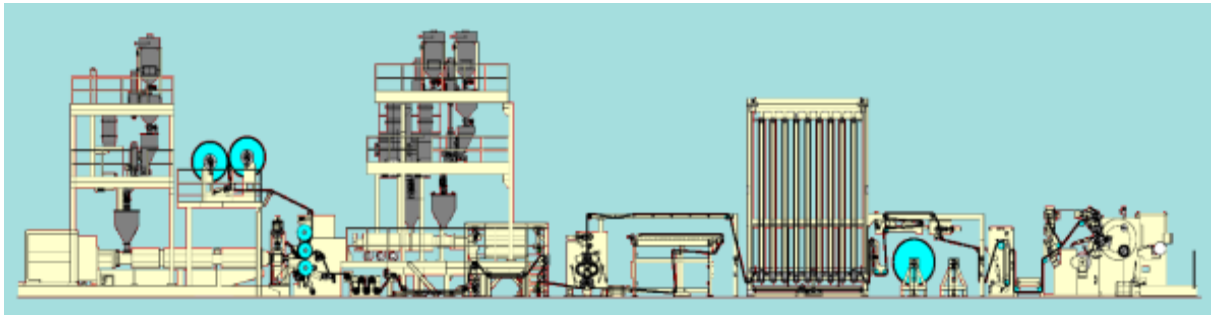


Table 3: Transport to the building site (A4)

Scenario information	Value	Unit
Means of transport: truck-trailer euro 5, gross weight 34-40 t, payload capacity 27 t		
Litres of fuel	0,002	l/100km
Transport distance (truck)	1300	km
Transport distance (ship)	500	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	-	kg/m ³
Capacity utilisation volume factor	100	%

Table 4: Installation into the building (A5)

Scenario information	Value	Unit
Ancillary materials for installation	0	kg
Water use	0	m ³
Other resources use	0	kg
Electricity for installation	0,0464	MJ
Material loss (membrane)	3	%
Overlaps (membrane)	5	%
Waste materials on building site before waste processing, generated by the product's installation (specified by type)	0,0641 (paper) 2,72E-005 (PP) 0,0039 (PE) 0,0629 (wood) 0,03 (Membrane Loss)	kg
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	0,131 (Incineration)	kg
Direct emission to ambient air, soil and water	0	kg

Table 5: End of Life (C1-C4)

Scenario information	Value	Unit
Collected separately	1	m ²
Collected with mixed construction waste	0	m ²
Reuse	0	m ²
Recycling	0	m ²
Energy recovery	0	m ²
Landfill	1	m ²

Transport to recycling	0	km
Transport to landfill	150	km

6 Cut-off rules & allocation

Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA and information modules and any additional information are intended to support an efficient calculation procedure. They are not applied in order to hide data.

The following procedure is followed for the exclusion of inputs and outputs:

- All inputs and outputs to a unit process are included in the calculation, for which data are available.
- Less than 1 % of the total mass inputs / outputs of the unit process A1 and A3, are cut off (see table 6).

Input flows are covered for the whole formula.

Table 6: Cut-off criteria

Process excluded from study	Cut-off criteria	Quantified contribution from process
A3: production (auxiliary materials)	less than 10^{-5} kg / kg of finished product	Sensitivity study demonstrates a relative contribution lower than 0,5%
A3: production (particle emissions to air)	Less than 10^{-4} kg / kg of finished product	Sensitivity study demonstrates a relative contribution lower than 0,5%

For the allocation procedure and principles, consider the following table (Table 7):

Table 7: Allocation procedure and principles

Module	Allocation Principle
A1	All data are referred to $1m^2$ of product <ul style="list-style-type: none"> • A1: electricity is allocated to the specific production line
A3	All data are referred to $1m^2$ of packaged product <ul style="list-style-type: none"> • A3-wastes: all data are allocated to the whole plant production

7 Environmental performance & interpretation

The following tables show the environmental impacts for the products considered according to the requirements of EN15804:2012+A2:2019/AC:2021.

The results are referred to the declared unit (see § 4). The additional environmental indicators are not declared.

**MAPEPLAN T WT
(1 m² of product packaged)**

Table 8: MAPEPLAN T WT- Potential environmental impact – mandatory indicators according to en 15804 referred to 1 m² of packaged finished product

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP _{TOTAL}	(kg CO ₂ eq.)	3,50E+00	1,05E-01	4,32E-01	0,00E+00	1,62E-02	0,00E+00	2,02E-02	0,00E+00
GWP _{FOSSIL}	(kg CO ₂ eq.)	3,51E+00	1,04E-01	1,70E-01	0,00E+00	1,61E-02	0,00E+00	2,01E-02	0,00E+00
GWP _{BIOGENIC}	(kg CO ₂ eq.)	-1,35E-02	2,99E-04	2,62E-01	0,00E+00	5,70E-05	0,00E+00	6,76E-05	0,00E+00
GWP _{LULUC}	(kg CO ₂ eq.)	1,60E-03	5,24E-04	3,26E-06	0,00E+00	1,09E-04	0,00E+00	3,71E-05	0,00E+00
ODP	(kg CFC 11 eq.)	3,73E-08	6,21E-15	9,70E-14	0,00E+00	1,59E-15	0,00E+00	4,72E-14	0,00E+00
AP	(mol H ⁺ eq.)	1,27E-02	9,24E-04	9,65E-05	0,00E+00	8,82E-05	0,00E+00	1,42E-04	0,00E+00
EP _{FRESHWATER}	(kg P eq.)	2,15E-04	2,83E-07	2,94E-08	0,00E+00	5,80E-08	0,00E+00	3,41E-08	0,00E+00
EP _{MARINE}	(kg N eq.)	2,30E-03	3,61E-04	3,58E-05	0,00E+00	4,26E-05	0,00E+00	3,64E-05	0,00E+00
EP _{TERRESTRIAL}	(mol N eq.)	2,45E-02	3,98E-03	4,07E-04	0,00E+00	4,73E-04	0,00E+00	4,00E-04	0,00E+00
POCP	(kg NMVOC eq.)	1,16E-02	7,82E-04	9,38E-05	0,00E+00	8,28E-05	0,00E+00	1,11E-04	0,00E+00
ADP _{MINERALS&METALS*}	(kg Sb eq.)	1,12E-05	8,23E-09	1,97E-09	0,00E+00	1,64E-09	0,00E+00	2,06E-09	0,00E+00
ADP _{FOSSIL*}	(MJ)	1,06E+02	1,38E+00	1,62E-01	0,00E+00	2,13E-01	0,00E+00	2,63E-01	0,00E+00
WDP*	(m ³ world eq.)	1,23E+00	8,61E-04	2,18E-02	0,00E+00	1,82E-04	0,00E+00	2,20E-03	0,00E+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; **EP_{FRESHWATER}**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **EP_{TERRESTRIAL}**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **ADP_{MINERALS&METALS*}**: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL*}**: Abiotic Depletion Potential for fossil resources; **WDP***: Water Deprivation Potential.

*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is a limited experienced with the indicator.

Table 9: MAPEPLAN T WT – Potential environmental impact – additional mandatory and voluntary indicators referred to 1 m² of packaged finished product

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	(kg CO ₂ eq.)	3,33E+00	1,02E-01	1,70E-01	0,00E+00	1,59E-02	0,00E+00	1,98E-02	0,00E+00

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

Table 10 MAPEPLAN T WT – Use of resources referred to 1 m² of packaged finished product

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4,14E+00	7,18E-02	6,42E-02	0,00E+00	1,48E-02	0,00E+00	3,95E-02	0,00E+00
PERM	MJ	1,70E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	5,84E+00	7,18E-02	6,42E-02	0,00E+00	1,48E-02	0,00E+00	3,95E-02	0,00E+00
PENRE	MJ	1,06E+02	1,38E+00	1,62E-01	0,00E+00	2,14E-01	0,00E+00	2,64E-01	0,00E+00
PENRM	MJ	1,34E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,06E+02	1,38E+00	1,62E-01	0,00E+00	2,14E-01	0,00E+00	2,64E-01	0,00E+00
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	2,91E-02	8,15E-05	5,34E-04	0,00E+00	1,71E-05	0,00E+00	6,69E-05	0,00E+00

PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM:** Use of renewable primary energy resources used as raw materials; **PERT:** Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); **PENRE:** Use of non-renewable primary energy excluding non-renewable primary 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 (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water.

Table 11: MAPEPLAN T WT – Waste production and output flows referred to 1 m² of packaged finished product

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	5,76E-04	6,53E-12	1,50E-11	0,00E+00	1,13E-12	0,00E+00	1,35E-11	0,00E+00
NHWD	kg	1,73E-02	1,92E-04	2,26E-02	0,00E+00	3,49E-05	0,00E+00	1,35E+00	0,00E+00
RWD	kg	3,29E-04	1,69E-06	1,72E-05	0,00E+00	3,97E-07	0,00E+00	2,93E-06	0,00E+00
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	7,89E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	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

Exported energy, thermal	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
HWD: Hazardous waste disposed; NHWD: Non-Hazardous waste disposed; RWD: Radioactive waste disposed									

Table 12: MAPEPLAN T WT – Information on biogenic carbon content at the factory gate referred to 1 m2 of packaged finished product

Indicator	Unit	Quantity
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in packaging	kg C	3,91E-02

To calculate results for different thicknesses (1,5, 2,0 and 2,5 mm), please use following multiplicative coefficients for the environmental indicators considered (Elx):

Table 13: Calculation rules for Environmental Categories of different thickness

	1,5 mm thickness	2,0 mm thickness	2,5 mm thickness
Mapeplan T WT	$E_{1,5} * 1$	$E_{1,5} * 1,33$	$E_{1,5} * 1,67$

$E_{1,5}$: Environmental Indicator for Mapeplan TWT with 1,5 mm thickness

Module **A1** has the highest contribution for each impact category and weights up to 90% of the total impact in the whole system boundary. In particular, TPO/FPO compounds, reinforcing materials, which are the main components in Mapeplan T WT formulation, carry a significant impact for all environmental categories.

Figure 5: Installation process detail

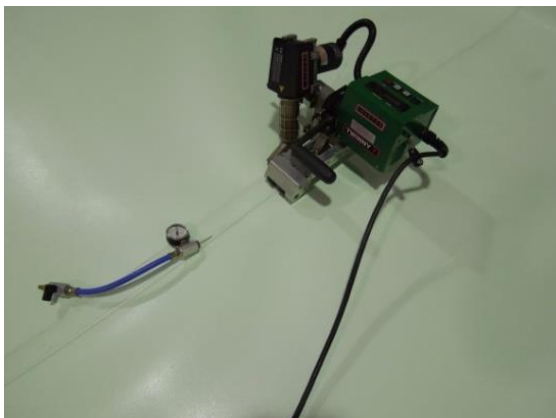


Figure 6: Installation of Membrane MAPEPLAN T WT on a water tank

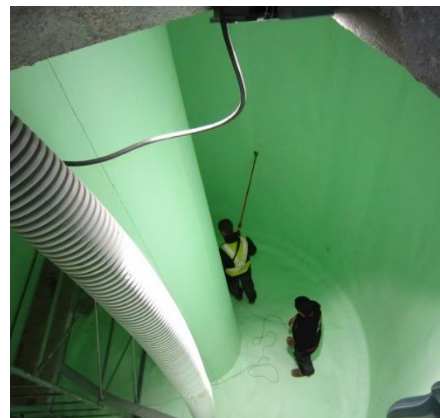


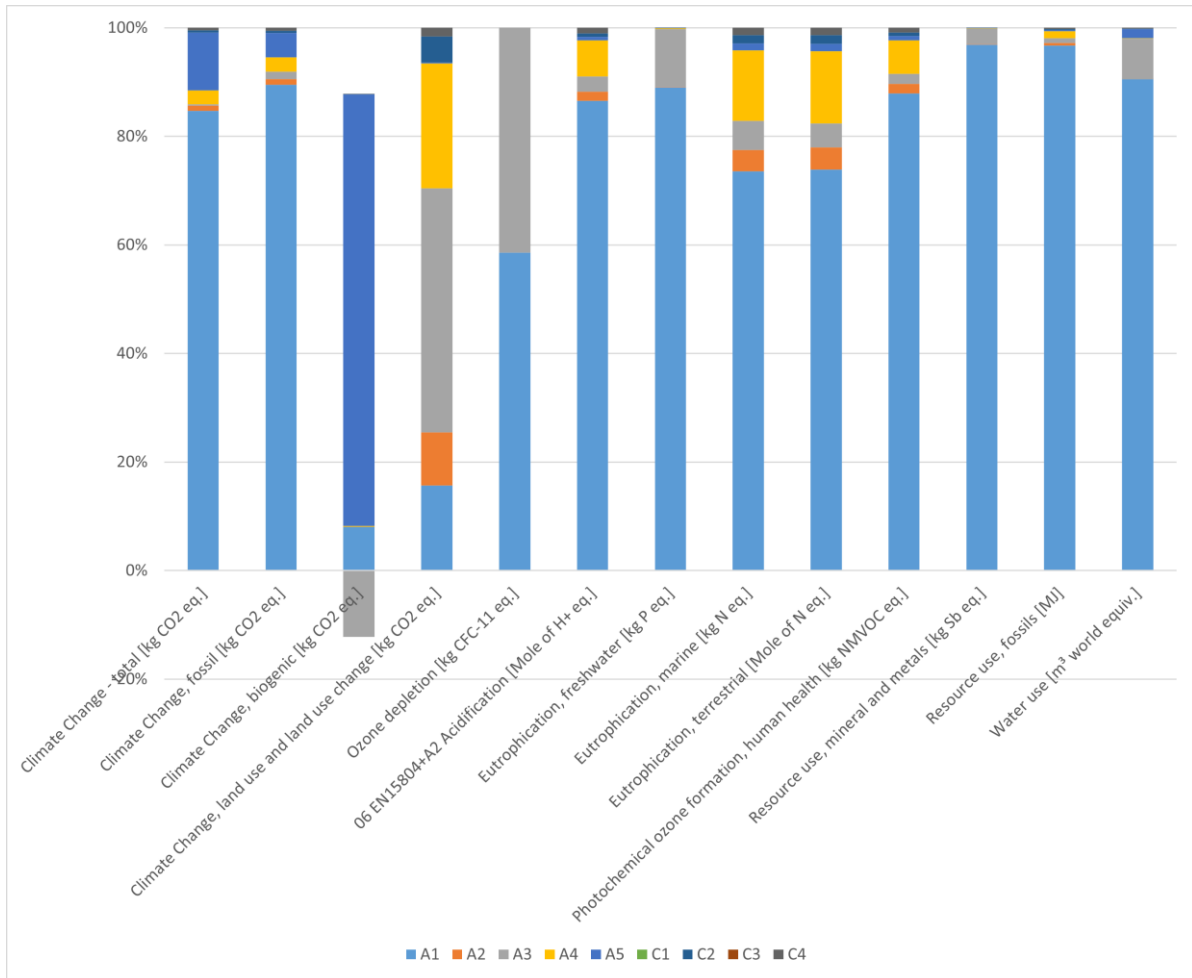
Figure 7: Reservoir waterproofing with Membrane MAPEPLAN T WT



Figure 8: Installation of Membrane MAPEPLAN T WT on a water tank



Table 14: Some environmental impact as percentage



More details about electrical mix used in this EPD is shown below:

Data source	Amount	GWP	Unit
Residual electricity grid mix (IT) – 2021	AIB	0,524*	kg CO ₂ -eqv/kWh

*CML2001 – Aug. 2016

8 Data Quality

Table 15: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1		
TPO compounds	Ecoinvent 3.8	2021
Polymers	Sphera Database	2021
Reinforcing material	Sphera Database	2021
Additives	Ecoinvent Database 3.8	2021
Residual electricity grid mix (IT)	AIB; Sphera Database	2021
A2 (Transport)		
Truck transport (27ton payload – GLO)	Sphera Database	2021
Diesel for transport (EU)	Sphera Database	2018
A3 (production)		
Packaging (EU)	Sphera Database & Ecoinvent 3.8	2005 – 2021
Diesel for transport (EU)	Sphera Database	2018
A4 (Transport)		
Truck transport (27ton payload – GLO)	Sphera Database	2021
Diesel for transport (EU)	Sphera Database	2018
Ocean ship (27500 DWT payload – GLO)	Sphera Database	2021
Heavy fuel oil for ship transport (EU)	Sphera Database	2018
A5 (Installation)		
Commercial waste in municipal waste incineration plant (EU)	Sphera Database	2021
Electricity grid mix (EU)	Sphera Database	2018
C1-C4 (End of Life)		
Truck transport (9,3 ton payload – GLO)	Sphera Database	2021
Diesel for transport (EU)	Sphera Database	2018
Construction waste dumping (EU)	Sphera Database	2021

All data included in table above refer to a period between 2005 and 2021; the most relevant ones are specific from supplier, while the others (i.e. transport and minor contribution dataset), come from European and global databases.

All datasets are not more than 10 years old according to EN 15804 §6.3.8.2 “Data quality requirements”. The Quality level concerning datasets used in the EPD can be considered as “very good” or “good” according to Annex E of the EN 15804 (current version); the only exception is represented by a packaging component which has a quality level classified as “poor” in terms of time representativeness.

Primary data concern the year 2021 and represent the whole annual production.

9 Disassembly

The finished product is potentially suitable for disassembly through selective demolition.

10 Differences versus previous version

In this version, new primary data referred to 2021 has been adopted. New modelling in application stage (A5) has been developed and added in chapter 5. Moreover, additional data quality information has been included in chapter 8. Chapter 9: Disassembly, has been added. Minor editorial changes

have been made in the document. Since new version of GPI and PCR have been considered, results have been revised and updated. Disclaimer has been added in cover page.

11 Verification and Registration

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.


CEN standard EN15804 served as the core PCR	
PCR:	PCR 2019:14 Construction products (EN 15804:A2), Version 1.11, 2021-02-05, UN CPC code 54
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC 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 .
Independent verification of the declaration and data, according to ISO 14025	<input checked="" type="checkbox"/> EPD Process Certification (Internal) <input type="checkbox"/> EPD Verification (external)
Third party verifier:	Certiquality S.r.l. Number of accreditations: 003H rev15
Accredited or approved by:	Accredia
Procedure for follow-up of data during EPD validity involves third-party verifier	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

References

- EN 13361 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of reservoirs and dams”;
- EN 13362 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of canals”;
- EN 13491 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of tunnels and underground structures”
- EN 13492 “Geosynthetic barriers. Characteristics required for use as fluid barrier in the construction of liquid waste disposal sites, transfer stations or secondary containment”.
- EN 15804: SUSTAINABILITY OF CONSTRUCTION WORKS - ENVIRONMENTAL PRODUCT DECLARATIONS - CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS
- EUROPEAN DIRECTIVE 2008/98/EC

- EUROPEAN RESIDUAL MIXES VERSION 1.0, 2022-05-31 (AIB: ASSOCIATION OF ISSUING BODIES)
- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD[®] SYSTEM. VERSION 3.01
- ISO 14025 ENVIRONMENTAL LABELS AND DECLARATIONS - TYPE III ENVIRONMENTAL DECLARATIONS - PRINCIPLES AND PROCEDURES
- ISO 14044 ENVIRONMENTAL MANAGEMENT – LIFE CYCLE ASSESSMENT – REQUIREMENTS AND GUIDELINES
- PCR 2019:14 CONSTRUCTION PRODUCTS (EN 15804: A2), UN CPC CODE 54; VERSION 1.11

Contact information

<p>EPD owner:</p>	<p>POLYGLASS[®]  Polyglass SpA www.polyglass.com</p>
<p>LCA author:</p>	<p> ADHESIVES • SEALANTS • CHEMICAL PRODUCTS FOR BUILDING Mapei SpA www.mapei.it; Environmental Sustainability Office</p>
<p>Programme operator:</p>	<p> The International EPD[®] System Address: EPD International AB Box 210 60 SE-100 31 Stockholm Sweden Website: www.environdec.com E-mail: info@environdec.com</p>