EPD

Environmental product declaration for Solid Polyester sheets

In accordance with EN 15804+A2 and ISO 14025

Declaration number: NA

Issue date: 13.09.2022
Valid until: 13.09.2027

Owner of Declaration:
Exolon Group NV,
Wakkensesteenweg 47,
8700 Tielt, Belgium.

General Information

Declared product(s):

Polyester Sheets

Functional Unit:

1 kg of a polyester sheets over a reference service life of 30 years

Declared LCA stages with options:

A1-A3, A4, C1-C4, D

PCR (Product Category Rule):

EN15804:2012+A2:2019

Year of Study:

September 2022

Validity:

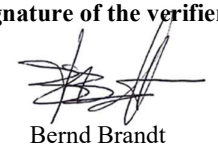
This EPD is valid for 5 years from the date of publication.

Verification:

☐ **Internal** ☑ **External**

Third party verification conform to EN15804+A2.

Signature of the verifier



Bernd Brandt
bernd@brandtconsulting.eu

Manufacturing site:

Exolon Group NV,
Wakkensesteenweg 47,
8700 Tielt, Belgium.

The EPD has been prepared by:

Arthur De Jaegher
info@enperas.com

Varun Gowda Palahalli Ramesh
info@enperas.com

Hannah Van Hees

Life cycle stages and modules (MND = module not declared)

Product stage			Construction installation stage		Use stage							End of life stage					Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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	MND	☒	☒	☒	☒		☒

Product Description

Product name

The EPD is the representative of the two products i.e Solid polyester Sheets manufactured using Bottle grade PET and Polyethylene terephthalate- glycol modified (PETG).

Product description and intended use

Polyester sheets are solid transparent sheets, with high impact resistance and good fire classifications, which can be used for a wide range of glazing applications.
Solid polyester sheets are used in various applications, such as:

- Signage & light covers
- Shop fitting in supermarkets
- Trays, covers and other machined and formed parts
- Machine guards
- Light domes for roof glazing

Description of the production process and technology

Sheets are formed by extrusion. Polyester powder or pellets are heated to a molten state and pushed through a die of the desired cross section and then transported over rollers to cool down in a continuous process.

.

Product Composition and content

The product does not contain materials listed in the "Candidate list of Substances of Very High Concern for authorization".

Furthermore, since the data record representing environmental profile of PETG is unavailable, a simplification has been made by choosing the same data record as the one used for modelling bottle grade PET i.e "Polyethylene terephthalate, granulate, bottle grade, at plant/RER" to model the impact originating from PETG. By doing so there is a good chance that the results can be underestimated. Hence, as a conservative approach which is based on the EPD on "3form® Varia Ecoresin®". Thus an estimation was made to increase the input amount of PETG by 15% of the original amount and thus not underestimating the impact originating from PETG.

Table 1 Composition of the product in percentages

Components	Composition / content / ingredients	Quantity (range)
Product	Polyethylene terephthalate granulates	83%
	Regrinded polyethylene granulates	16%
	UV-granulates	<1%
	Pigments (white, grey, brown/bronze, blue, violet, red)	<1%

Technical data / Physical Characteristics

- Fire class EN13501: B s1 d0 up to 8 mm thickness
- Minimal usage temperature: -20°C for Axpet, -40°C for Vivak
- Maximum usage temperature: 65 °C
- Thermoform temperature around 140°C depending on the process and thickness.
- Can be cold bended to a min radius of 150 times the thickness
- Light Transmission range: depending on thickness between 89 % (2 mm) and 84 % (8 mm)

LCA STUDY

DATE OF LCA STUDY
August 2022

SOFTWARE
For the calculation of the LCA results, the software program SimaPro 9.2.0.1 (PRé Consultants, 2021) and Enperas Quadrant tool has been used.

REFERENCE FLOW / DECLARED UNIT
Functional unit chosen for the LCA study is the production of 1 kg of a "polyester sheet". The thickness and density depend on the application. The weight per m^2 can be calculated based on the density and thickness used in the specific application.

Table 3 Functional unit, thickness, and density for solid wall polyester sheets

Solid wall Polyester sheet	Value	Unit
Functional unit	1	kg
Density range	1,27 (PET-G) 1,33 (Bottle grade PET)	g/cm^3
Thickness range	0,6 - 15	mm

INFORMATION ON ALLOCATION

At the manufacturing sites of Exolon, different types of sheets are produced. In some cases, polyester sheets are produced only on certain production lines, with no co-products being produced as part of the process. In some cases, only facility-level data were available for electricity use, the use of natural gas, etc. The facility-level data have been allocated to the analysed product using their respective annual production volume (physical relationship), therefore volume allocation is applied. Material inputs and outputs which were not available at the product level, such as waste, were allocated similarly.

INFORMATION ON CUT OFF
All major raw materials and all the essential energy is included. The amount was very small, negligible, and considered under the cut-off threshold.

REFERENCE SERVICE LIFE
Average reference service life is of 30 years

DESCRIPTION OF GEOGRAPHICAL REPRESENTATIVITY
Europe

PRODUCTION SITES
Single manufacturing site in Tielt, Belgium.

INFORMATION ON CARBON OFFSETTING
Carbon offsetting is not allowed in the EN 15804:2012+A2:2019 and hence not considered in the calculations.

INFORMATION ON CARBONATION OF CEMENTITIOUS MATERIALS
Nothing to declare

INFORMATION ON EXCLUDED PROCESSES
Environmental impacts caused by the personnel of the production plants are not included in the LCA, e.g., waste from the cafeteria and sanitary installations, accidental pollution caused by human mistakes, or environmental effects caused by commuter traffic. Heating or cooling of the plants in order to ensure a comfortable indoor climate for the personnel for example is also neglected

Data

Specificity
The life cycle inventory for this study is performed by EXOLON and Enperas/VITO according to the ISO 14040 and ISO 14044 (data inventory) standards (ISO, 2006). Specific data have been collected for the processes under operational control of EXOLON company. Generic data have been used for the processes EXOLON cannot influence. The data used for this study is the weighted average (based on production volume) of the two Polyester sheets manufactured using Bottle grade PET and PETG.

Period of data collection
Data was collected for the year 2019.

Information on data collection
Company-specific data concern the data about the production of the polyester sheets. All required data about the production process have been delivered to Enperas/VITO by EXOLON. Enperas/VITO uses publicly available generic data for all background processes such as the production of electricity, transportation by means of a specific truck, etc.

Database used for background data
The main LCI source used in this study is the Ecoinvent 3.6 database (Wernet et al., 2016).

Energy mix
The European electricity mix (consumption mix + import) has been used to model electricity use in life cycle stages A3, C1, C3, C4 and D. The used record is the Ecoinvent record Electricity, medium voltage {BE}| market for | Cut-off and 'Electricity, low voltage {Europe without Switzerland}| market group for | Cut-off, U' (Wernet et al., 2016).

Details of the underlying scenarios used to calculate the impacts

A1 – raw material supply
This module considers the extraction and processing of all raw materials and energy which occurs upstream to the studied manufacturing process.

A2 – transport to the manufacturer
The raw materials are transported to the manufacturing site. Primary data was collected for each raw material from each manufacturer.

A3 – manufacturing
This module considers the production process.

A4 – transport to the building site

Transport type	Unit	Comment
Truck 3,5 - 7,5t, Euro5	km	Transportation from merchant to installation
Truck 7,5 - 16t, Euro5	km	Transportation from merchant to installation
Truck 16 - 32t, Euro5	km	Transportation from factory to merchant
Truck > 32t, Euro5	km	Transportation from factory to merchant
Transoceanic freight ship	km	Transportation from factory to merchant

A5 – Installation
The scope of the study is established as cradle-to-gate with options, where A4 is included but A5 is not. For the installation there are multiple build-up alternatives, depending on the application. Accounting for all of them is not possible within the framework of this study. However, the disposal of waste generated from the packaging of the final product is allocated to the installation phase.

B – use stage (excluding potential savings)
B1, B2, B3, B4, B5, B6: Modules are not declared. Since no maintenance, replacement or operational energy use are necessary during the Reference Service Life (RSL) of the product (30 years), no environmental impacts occur during these modules

C – End of life
Transport scenarios for the transport to the end-of-life treatment were provided by Exolon. The polyester solid sheets are 39,0% landfilled, 32,2% incinerated and 28,8% recycled. The EU scenarios for the transport of waste are:

- 50 km with a 16–32-ton EURO 5 lorry from demolition site to sorting and landfilling.
- 150 km with a 16–32-ton EURO 5 lorry from demolition site to sorting and incineration.
- 800 km with a 16–32-ton EURO 5 lorry from demolition site to sorting and recycling

C1: Dismantling
It is assumed that the dismantling of the solid polyester sheets will only cover the un-screwing the polyester sheet from whatever build-up it is installed. A generic assumption is that around 8 screws are necessary for the FU of 1 kg of solid wall polyester sheet, where an amount of 0,0216 kWh per screw is used. The dataset used to model the impacts is "Electricity, low voltage {Europe without Switzerland} | market group for | Cut-off, U".

C2-C4: The polyester solid sheets are 39,0% landfilled, 32,2% incinerated and 28,8% recycled.

C2 – Transport to waste processing

Type of vehicle (truck/boat/etc.)	Distance (km)	Capacity utilisation (%), Density of products (kg/m^3) and assumptions
Truck 16-32 ton	50	Ecoinvent scenario
Truck 16-32 ton	150	Ecoinvent scenario
Truck 16-32 ton	800	Ecoinvent scenario

End-of-life modules – C3 and C4

Parameter	Unit	Value
Waste for re-use	kg	0
Waste for recycling	kg	0,29
Waste for energy recovery	kg	0,32
Waste for final disposal	kg	0,39

D – Benefits and loads beyond the system boundaries
The benefits beyond the system boundaries include the end-of-waste: 28,8% recycled polyester and 32,2% incinerated polyester of the final product at its end-of-life. Packaging waste is also considered, following the average European End of Life (EoL) (Annex C of the PEFCR guidance) scenarios from the below table.

Product	Landfill	Incineration and/or energy recovery	Recycling	Reuse
Wooden pallets	38%	32%	30%	0%
PE foil packaging	39%	32%	29%	0%
PE straps	39%	32%	29%	0%
PE packaging	39%	32%	29%	0%
Cardboard sheet	14%	11%	75%	0%
Container with PE-liner	39%	32%	29%	0%
Octabin	14%	11%	75%	0%

Potential environmental impacts per reference flow

	Production			Construction process stage		Use stage							End-of-life stage					
	A1 Raw material	A2 Transport	A3 Manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
GWP - total (kg CO2 equiv/FU)	2,52E+00	2,64E-01	1,31E-01	1,61E-01	2,37E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,36E-03	4,98E-02	8,19E-04	6,95E-01	-6,23E-01	4,07E+00
GWP - fossil (kg CO2 equiv/FU)	2,53E+00	2,64E-01	3,05E-01	1,61E-01	4,06E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,27E-03	4,98E-02	8,08E-04	6,95E-01	-6,21E-01	4,06E+00
GWP - biogenic (kg CO2 equiv/FU)	-1,23E-02	9,24E-05	-1,75E-01	6,57E-05	1,96E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,49E-05	2,03E-05	1,04E-05	3,29E-05	-9,61E-04	9,45E-03
GWP – luluc (kg CO2 equiv/FU)	4,61E-05	1,31E-04	8,32E-04	5,63E-05	2,81E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,16E-05	1,74E-05	7,61E-07	3,90E-06	-4,76E-04	1,11E-03
ODP (kg CFC 11 equiv/FU)	1,79E-05	5,69E-08	5,21E-08	3,65E-08	1,77E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,81E-10	1,13E-08	6,47E-11	1,95E-09	-1,59E-06	1,81E-05
AP (kg mol H+ equiv/FU)	1,10E-02	4,34E-03	9,39E-04	6,35E-04	5,98E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,41E-05	2,03E-04	3,78E-06	1,88E-04	-2,21E-03	1,74E-02
EP - freshwater (kg P equiv/FU)	7,06E-05	1,64E-06	1,14E-05	1,27E-06	1,20E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,90E-07	3,91E-07	9,42E-08	3,45E-07	-2,48E-05	8,68E-05
EP - marine (kg N - equiv/FU)	1,94E-03	1,10E-03	2,31E-04	1,84E-04	2,56E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,87E-06	6,03E-05	1,14E-06	1,37E-04	-3,67E-04	3,68E-03
EP – terrestrial (mol N – equiv/FU)	2,10E-02	1,22E-02	2,60E-03	2,03E-03	2,58E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,46E-05	6,67E-04	1,39E-05	9,55E-04	-4,19E-03	3,98E-02
POCP (kg NMVOC equiv/FU)	9,18E-03	3,25E-03	8,97E-04	6,30E-04	7,40E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E-05	2,04E-04	3,46E-06	2,53E-04	-1,49E-03	1,45E-02
ADP – minerals&metals (kg Sb equiv/FU)	2,52E-07	3,79E-07	2,33E-07	3,14E-07	1,38E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,26E-08	9,69E-08	1,10E-09	1,25E-08	-3,05E-07	1,31E-06
ADP fossil (MJ/FU)	7,18E+01	3,72E+00	1,05E+01	2,43E+00	1,23E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,91E-01	7,50E-01	1,10E-02	1,57E-01	-1,37E+01	8,97E+01
WDP (m3 world eq. deprived/FU)	2,94E+00	8,40E-03	2,04E-01	6,76E-03	6,53E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E-03	2,09E-03	3,66E-05	1,98E-03	-3,02E-01	3,16E+00

GWP total = total Global Warming Potential (Climate Change); GWP – fossil = Global Warming Potential (Climate Change) fossil, GWP-biogenic= Global Warming Potential (Climate change) biogenic GWP-luluc = Global Warming Potential (Climate Change) land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; EP-marine = Eutrophication Potential, marine; EP-marine = Eutrophication Potential, terrestrial; POCP = Photochemical Ozone Creation; ADP-minerals&metals = Abiotic Depletion Potential – minerals and metals; ADP fossil = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water (user) deprivation potential, deprivation-weighted water consumption

Resource use

Resource use	Production			Construction process stage		Use stage							End-of-life stage					
	A1 Raw material	A2 Transport	A3 Manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
PERE (MJ equiv/FU)	-3,10E-02	4,07E-02	3,54E+00	3,36E-02	5,46E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,57E-02	1,04E-02	1,53E-03	9,63E-03	-2,84E+00	3,65E+00
PERM (MJ equiv/FU)	1,07E-01	0,00E+00	6,26E-02	0,00E+00	-2,28E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,67E-01
PERT (MJ equiv/FU)	7,56E-02	4,07E-02	3,61E+00	3,36E-02	3,18E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,57E-02	1,04E-02	1,53E-03	9,63E-03	-2,84E+00	3,82E+00
PENRE (MJ	6,94E+01	3,73E+00	9,74E+00	2,44E+00	2,09E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,29E-01	7,55E-01	1,39E-02	-9,74E-01	-1,50E+01	8,55E+01
PENRM (MJ equiv/FU)	4,65E+00	0,00E+00	1,36E+00	0,00E+00	-8,25E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,14E+00	0,00E+00	7,07E+00
PENRT (MJ equiv/FU)	7,41E+01	3,73E+00	1,11E+01	2,44E+00	1,27E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,29E-01	7,55E-01	1,39E-02	1,71E-01	-1,50E+01	9,26E+01
SM (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,49E-01	0,00E+00
RSF (MJ equiv/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	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 water eq/FU)	6,84E-02	2,10E-04	6,21E-03	1,76E-04	7,39E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,41E-04	5,42E-05	2,59E-06	2,81E-04	-8,57E-03	7,56E-02

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; 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; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

Waste categories & output flows

Waste categories and output flows

	Production			Construction process stage		Use stage							End-of-life stage					
	A1 Raw material	A2 Transport	A3 Manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
Hazardous waste disposed (kg/FU)	7,00E-05	7,24E-06	5,72E-06	6,35E-06	2,93E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,27E-07	1,97E-06	1,80E-08	3,16E-07	-1,35E-05	9,20E-05
Non-hazardous waste disposed (kg/FU)	5,50E-01	1,11E-01	3,40E-02	1,16E-01	1,04E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,74E-04	3,59E-02	4,09E-05	3,97E-01	-6,44E-02	1,35E+00
Radioactive waste disposed (kg/FU)	3,00E-06	2,55E-05	7,30E-05	1,65E-05	7,93E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,35E-06	5,12E-06	5,17E-08	8,35E-07	-2,77E-05	1,26E-04
Components for re-use (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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/FU)	0,00E+00	0,00E+00	9,72E-02	0,00E+00	5,16E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,49E-01	1,49E-01
Materials for energy recovery (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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 (MJ/FU)	0,00E+00	0,00E+00	1,60E-02	0,00E+00	8,98E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,10E+00	-4,01E+00	4,01E+00

Impact categories additional to EN 15804+A2

	Production			Construction process stage		Use stage							End-of-life stage					
	A1 Raw material	A2 Transport	A3 Manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling	Total excl module D
PM (disease incidence eq/FU)	7,76E-08	1,39E-08	1,04E-08	1,11E-08	8,30E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,42E-10	3,46E-09	5,91E-11	1,70E-09	-1,10E-08	1,19E-07
IRP (kg U235 eq/FU)	1,08E+00	1,61E-02	8,78E-02	1,06E-02	5,25E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,65E-03	3,28E-03	3,74E-05	6,26E-04	-1,25E-01	1,20E+00
ETP - fw (CTUe/FU)	4,35E+00	2,75E+00	4,04E+00	1,94E+00	1,19E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,31E-01	6,01E-01	8,83E-03	3,58E-01	-2,93E+00	1,43E+01
HTP - c (CTUh/FU)	5,28E-10	1,16E-10	6,69E-10	5,46E-11	2,74E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,37E-12	1,69E-11	2,81E-13	1,11E-10	-1,36E-10	1,53E-09
HTP - nc (CTUh/FU)	2,20E-08	2,72E-09	2,51E-09	2,11E-09	1,97E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,15E-10	6,55E-10	8,03E-12	1,54E-09	-4,19E-09	3,18E-08
SQP (/)	1,08E+00	1,75E+00	2,31E+01	1,67E+00	1,23E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,66E-02	5,17E-01	6,65E-03	2,57E-01	-1,80E+01	2,86E+01

PM = Particulate Matter (Potential incidence of disease due to PM emissions); IRP = Ionizing Radiation Potential – human health effects (Potential Human exposure efficiency relative to U235); ETP-fw = Ecotoxicity – freshwater; (potential comparative toxic unit); HTP- c = Human Toxicity – cancer effects; HTP-nc = Human Toxicity – non cancer effects; SQP = Soil Quality Index, land use related impacts

Information on Biogenic Carbon content

There is no biogenic carbon content in the product. Uptake of biogenic CO_2 within the pallets and the carton is reported in module A3, release in module A5. The table below shows the biogenic carbon content per functional unit.

	Biogenic carbon content (kg C / FU)
Biogenic carbon content in product (at the gate)	0,00E+00
Biogenic carbon content in accompanying packaging (at the gate)	5,50E-02

Global Warming Potential	*The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.* *It is split up in 4:* - *GWP-total is the sum of GWP-fossil, GWP-biogenic and GWP-luluc. It is the indicator of potential global warming due to carbon emissions (CO2, CO and CH4) or greenhouse gases to air.* - *GWP-fossil is an indicator of potential global warming due to carbon emissions (CO2, CO and CH4) or greenhouse gases to air due to transformation or degradation of fossil fuels i.e., combustion, digestion, etc.* - *Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO_2, CO and CH4) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO_2 uptake from the atmosphere through photosynthesis during biomass growth – i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood.* - *Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO_2, CO and CH4) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions).*
Ozone Depletion Potential	*Indicator of emissions to air that cause the destruction of the stratospheric ozone layer. destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.*
Acidification Potential	*This indicator measures the increase in acid content in terrestrial and aquatic systems. It occurs due to emissions such as SO_2, NO_X and NH_3. Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating, and transport.*
Eutrophication Potential	*The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects.* *It is split up in 3:* - *Eutrophication potential – freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects.* - *Eutrophication potential – marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects.* - *Eutrophication potential – terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects.*
Photochemical ozone Creation Potential	*Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.*
Abiotic depletion potential for non-fossil resources	*Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimony (Sb).* *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.*
Abiotic depletion potential for fossil resources	*Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ).* *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.*

Ecotoxicity for aquatic fresh water	*The impacts of chemical substances on ecosystems (freshwater).* *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.*
Human toxicity (carcinogenic effects)	*The impacts of chemical substances on human health via three parts of the environment: air, soil and water.* *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.*
Human toxicity (non-carcinogenic effects)	*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.*
Particulate matter	*Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NO_X, SO_X, NH_3)*
Resource depletion (water)	*Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not.* *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.*
Ionizing radiation - human health effects	*This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation 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.*
Land use related impacts	*The indicator is the "soil quality index" which is the result of an aggregation of following four aspects:* - *Biotic production* - *Erosion resistance* - *Mechanical filtration* - *Groundwater* *The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.* *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.*

Additional information on Release of dangerous substances to indoor air, soil and water during the use stage

Indoor air
Not applicable

Soil and water
Not applicable

BIBLIOGRAPHY

- 3form® Varia Ecoresin® ETG panels “https://www.3-form.com/tech-specs/800”.
- EN15804:2012+A2:2019. CEN TC 350. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. European standard.
- EN 13501-1 Fire classification of construction products and building elements
- Enperas (2021). QUADRANT [Computer Software]. Antwerpen, Belgium
- Enperas project report of EXOLON: Life cycle assessment for polyester sheets produced by Exolon; May 2022, authors: Arthur De Jaegher, Hannah Van Hees, and Varun Gowda Palahalli Ramesh.
- European Commission 2017 European Commission. (2017). PEFCR Guidance Document-Guidance for the development of Product Environmental Footprint Category Rules (PEFCRs), version 6.3, December 2017. European Commission.
- French Ministry of the environment, energy, and the sea French Ministry of sustainable housing: “Generic data to be used for compliance with the “Energy Carbon” guidelines for new buildings” issued in 2019, provided by EXOLON
- International Organization for Standardization, Switzerland, ISO standards:
    - ISO 14025:2010: Environmental labels and declarations - General principles.
    - ISO 14040:2006: Environmental management – Life cycle assessment – Principles and framework.
    - ISO 14044:2006: Environmental management – Life cycle assessment – Requirements and guidelines.
- Liebich, A., & Giegrich, J. (2010). Eco-profiles of the European plastics industry: Polyethylene terephthalate (PET) (bottle grade). IFEU-Institut für Energie-und Umweltforschung Heidelberg GmbH, Heidelberg.
- Pré Consultants (2021). SimaPro 9.2.0.1 [Computer Software]. Amersfoort, The Netherlands
- Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016). The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, 21(9), 1218-1230.

General information

Owner of the EPD, Responsible for the data, LCA and information	EXOLON Group
Based on following PCR documents	EN 15804:2012+A2:2019 NBN/DTD B 08-001 and its complement EN16757:2017
Author(s) of the LCA and EPD	Arthur De Jaegher / Varun Gowda Palahalli Ramesh / Hannah Van Hees arthur@enperas.com / varun@enperas.com
Identification of the project report	Life cycle assessment for polyester sheets produced by Exolon
Verification	External independent verification of the declaration and data according to EN ISO 14025 and relevant PCR documents Verifier: Bernd Brandt, bernd@brandtconsulting.eu

Comparing EPDs is not possible unless they are conform to the same PCR and taking into account the building context.