# Environmental Product Declaration

In accordance with ISO 14025 for:

# Ecocrylic® XT

PyraSied

# PYRASIED XTREME ACRYLIC®

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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Programme information

	The International EPD <sup>®</sup> System
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Product category rules (PCR): Multi-purpose films. PCR 2021:01. Version 1.0 UN CPC 231.				
PCR review was conducted by: Marta Mancin, Aequilibira S.r.I., mmancin@aequilibria.com				
Independent third-party verification of the declaration and data, according to ISO 14025:2006:				
$\Box$ EPD process certification $\boxtimes$ EPD verification				
Third party verifier: Angela Schindler, Umweltberatung, Salem, Germany				
Approved by: The International EPD <sup>®</sup> System				
Procedure for follow-up of data during EPD validity involves third party verifier:				

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. 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 <u>www.environdec.com</u>. The underlying LCA and this EPD have been performed in accordance with the standard: ISO 14025

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# **Company information**

### Owner of the EPD:

Company name: PyraSied BV Address: Apolloweg 26, 8938 AT Leeuwarden (The Netherlands) CEO S. de Boer

### Description of the organisation:

PyraSied BV is importer, distributor and developer of PMMA. Founded by Sied Kooistra in 1983. PyraSied expects to receive the ISO 14024, ISO 9001 and ISO14001 in 2022. PyraSied is member of the EPDA and Sied Kooistra is vice-chair of the environmental committee. Name and location of production site: XT Production site Thailand

## **Product information**

### Product identification: Ecocrylic XT

Ecocrylic is an extruded acrylic sheet made from 70% recycled pre-and post-consumer acrylic and 30% virgin acrylic.

### **Product description:**

Ecocrylic® XT is a new and unique material and is the first extruded acrylic that is almost entirely made from recycled XT acrylic. We are extremely proud that we are the first supplier in the Netherlands to add this beautiful, high-quality material to our range. Ecocrylic® is extruded acrylic (plexiglass/PMMA), which is made from at least 70% recycled pre-and post-consumer acrylic and 30% virgin (not recycled) acrylic. The XT acrylic used for these sheets comes from used LCD screens and production waste.

Ecocrylic® is recycled extruded acrylic with all the good characteristics of virgin extruded acrylic. This allows recycled acrylic to be used for the same applications as normally extruded (not recycled) acrylic. The material is particularly suitable for projects where sustainability is very important. Ecocrylic® is often used in shop interiors, stand- and set constructions and the signing branch as secondary windows, glazing, showcases, displays, protective covers, furniture and wall presentations for example. This material is less suitable for very demanding optical applications such as light guide plates. The reference service life (RSL) of the Ecocrylic sheet is predominantly determined by the final product form and function.

Technical specifications				
Coefficient of expansion	0.6 mm/m/10ºC			
Density	1.18 g/cm3			
Thickness tolerance	+/- 5%			
Saw tolerance	+/- 1mm			
<u>E-Module</u>	<u>3300 MPA</u>			
Fire classification	E according to EN13501			
Bending strength	1200 kg/cm			
User temperature	- <u>40°C - +80°C</u>			
Protective film	All sheets are provided with a two-sided PE-foil			

Ecocrylic® XT consists of recycled material. With recycled material, it is possible that small variations will occur in some specifications. After all, you are dealing with a waste flow that varies in composition. Properties where this could possibly happen are underlined.

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UN CPC code: UN CPC Division 36, Group 363

Geographical scope: Global

## LCA information

The functional unit has been defined as follow:

Description	Value	Unit
Declared functional unit	1	m²
Thickness	4	mm
Final weight	4.72	kg/m²

**Time representativeness:** Data(sets) used for the LCA calculation originates from the time period between 2015-2020

### Database(s) and LCA software used:

Databases used are Ecoinvent v3.3 (2016) and PlasticsEurope (2015). The following LCA software was used: SimaPro version 9.1.1.

### System diagram (PCR):

In the *PCR* – *Multipurpose films*, processes are formulated which are to be taken into account for the EPD report. In the figure below, it can be seen that the main processes are divided into three sub categories: upstream, core and downstream. The highlighted (bold) processes are processes that are applicable for the production system of Ecocrylic (in a cradle-to-gate analyses). Data in regard to remaining processes has been requested via questionnaires which were send to the value chain partners; they where stated to be 'not applicable' or insignificant.

### Upstream

- •Extraction of resources
- Transport of resources to refinement
- Impacts due to the production of electricity and fuels used in the upstream module
- Production of auxiliary products used such as detergents for cleaning, etc.
- Production of semi-finished products used in the core process, if applicable
- Manufacturing of primary and secondary packaging

### Core

- •External transportation to the core processes
- •Manufacturing of the product
- Storage
- •Maintenance (e.g., of the machines)
- Waste treatment of waste genereated during manufacturing
- Impacts due to the production of electricity and fuels used in the core module

### Downstream

- •Transport to converter, if applicable
- Transportation to an average retailer-/distribution platform
- Production of electricity and fuels used in the downstream module

In the figure below the processes can be found for the three subsections that are applicable for the Ecocrylic production system.

Upstream	Core	Downstream
<ul> <li>Impacts due to virgin PMMA Beads production</li> <li>Impacts due to pre- treatment process</li> <li>Transportation of input materials to the factory</li> <li>Treatment of waste generated by the pre- treatment process</li> <li>Impacts due to packaging materials</li> </ul>	<ul> <li>Manufacturing of the product</li> <li>Impacts due to the production of electricity and fuels</li> <li>Treatment of waste generated during manufacturing</li> </ul>	<ul> <li>Transport to distribution platform/retailer</li> <li>Transport to an average Europe based customer</li> </ul>

Description of system boundaries: cradle to gate with final distribution to a Europe-based customer.

### Excluded life cycle stages:

The product use phase and the End-of-Life (EoL) phase are not considered in this study as the product assessed is an intermediate product. This means that any activities in the use and EoL phase are subject to change in relation to the use-case of the sheet. For example, sheets can be reformed or cut into smaller sheet by customers depending on the final function. E.g. the final function can be fashion/trend sensitive (meaning a relatively shorter life time).

### Additional LCA information:

Assumptions & cut-off: In the underlying LCA, a cradle to gate approach has been taken in which also final distribution to an average customer has been taken into account. Lastly, packaging material for distribution of the rPMMA material was neglected due to the very small quantities used (totally < 0,5% by weight) and most material is reused. In the Ecocrylic production chain, material losses take place during pre-treatment and extrusion, these losses are taken into account for the total required input material. As an indication: for the production of 4.72 kg (1m2) Ecocrylic, approximately 5.2 kg of feedstock is needed (virgin and recycled material). Allocation was avoided during the assessment.

*Data quality:* The raw material data and quantities of products and by-products come from the Ecocrylic XT production site itself and are therefore of high accuracy. Data for transportation and packaging where derived both from the distribution partner in the Ecocrylic value chain as well as from the Ecocrylic production site. A data quality assessment has been included in the LCA and can be requested from the LCA owner.

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### General supply chain description of Ecocrylic

In the first stage, the recyclable (PMMA) materials are collected in Europe and Asia and transported directly to the Thailand based factory where Ecocrylic XT is produced. Virgin PMMA beads (resin) are imported from Japan and other parts of Thailand. At the production site, the recyclable materials are pre-treated (washing, drying, manual foil removal, and LCD scratching). Once the recyclable material is turned into granules, it is mixed with the virgin PMMA material and fed to the extrusion line. Extrusion lumps are directly refed to the feedstock and are not accounted for in the environmental assessment. After extrusion, a protection foil is applied to both sides of the PMMA sheet, the sheets are cut and stacked onto a pallet, which thereafter is packaged and send back to the distributor (PyraSied).



Figure: general supply chain overview

More information: www.pyrasied.nl

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# **Content declaration**

### Product

The final product contains a mixture of recycled and virgin PMMA. The contents are specified in the table below.

Materials / chemical substances	Content %	Origin	Post- or pre-consumer
EoL LCD PMMA material	30	Europe	post-consumer
Off-cut PMMA sheets	35	Europe	pre-consumer
Extrusion lumps	5	Asia	pre-consumer (extrusion lumps that are generated by the production of Ecocrylic are excluded)
Virgin PMMA beads	30	Asia	-

### Packaging

<u>Distribution packaging:</u> Packaging materials required for the transportation and distribution of Ecocrylic consists of: PE Protection foil, PE Sealing film, PP sheet, PET strap, wooden pallet.

Packaging materials	Kg per functional unit (4.72 kg Ecocrylic)
PE Protection foil	0.0029
PE Sealing film	0.0033
PP Sheet	0.0011
PET straps	0.022
Wooden pallet	0.19



# **Environmental performance**

# Potential environmental impact

Parar	neter	Unit	Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO <sub>2</sub> eq.	7.41	2.26	1.42	11.1
	Biogenic	kg CO <sub>2</sub> eq.	-0.11	0.007	0.00001	-0.11
	Land use and land transformation	kg CO <sub>2</sub> eq.	0.002	0.005	0.0008	0.008
	TOTAL	kg CO <sub>2</sub> eq.	7.30	2.27	1.42	11.0
Acidification po	tential (AP)	kg SO <sub>2</sub> eq.	0.04	0.006	0.02	0.07
Eutrophication p	ootential (EP)	kg PO <sub>4</sub> ³- eq.	0.008	0.005	0.003	0.02
Photochemical of formation poten	oxidant tial (POFP)	kg NMVOC eq.	0.03	0.004	0.02	0.05
Abiotic depletion Elements	n potential –	kg Sb eq.	2.31E-05	1.26E- 05	2.27E-05	5.84E-05
Abiotic depletion Fossil resources	n potential – S	MJ, net calorific value	154	27.8	19.2	201
Water scarcity p	otential	m³ eq.	205	0.31	0.05	205

### Use of resources

Para	meter	Unit	Upstream	Core	Downstream	TOTAL
Primary Use as energy energy resources- carrier		MJ, net calorific value	0	0.85	0.18	1.03
Renewable Used as material	Used as raw materials*	MJ, net calorific value	3.2	0	0	3.2
	TOTAL	MJ, net calorific value	3.2	0.85	0.18	4.23
Primary energy resources – Non- renewable	Use as energy carrier	MJ, net calorific value	45	30.8	20.6	96.4
	Used as raw materials**	MJ, net calorific value	127	0	0	127
TOTAL		MJ, net calorific value	172.4	30.8	20.6	224
Secondary n	naterial	kg	3.69	0	0	3.69
Renewable s fuels	econdary	MJ, net calorific value	0	0	0	0
Non-renewal fuels	ole secondary	MJ, net calorific value	0	0	0	0

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Net use of fresh water***	m <sup>3</sup>	ND	ND	ND	ND
* PERM declares the available pr ** PERNM declares the available	imary energy content primary energy conte	t contained in th ent contained in	e packagir the PMMA	ng material used A material, in respec	t to the final

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product weight \*\*\*This indicator was not assessed due to the missing impact data available in the Eco-profile dataset.

### Waste production and output flows

### Waste production

Parameter	Unit	Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	1.06E-4	1.62E-5	3.37E-5	1.56E-4
Non-hazardous waste disposed	kg	0.51	0.18	0.48	1.16
Radioactive waste disposed	kg	3.01E-4	7.58E-6	2.82E-4	5.91E-4

### **Output flows**

Parameter	Unit	Upstream	Core	Downstream	TOTAL
Components for reuse	kg	0	0	0	0
Material for recycling	kg	0.05	0.24	0	0.29
Materials for energy recovery	kg	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0

# **Additional information**

Table: Environmental indicators and their corresponding assessment method used for the LCA, based on the requirements for the EPD

EPD

Environmental impact indicators	Unit	Assessment method
GWP: Global warming potential*	kg CO₂-eq	EN 15804 + A2 Method / EF 3.0 normalization and weighting set
AP: Acidification potential	Kg SO <sub>2</sub> -eq	CML 2001 Non-Baseline V. 2016
EP: Eutrophication potential (Fresh water and Terrestrial)	Kg PO₄³-eq	CML 2001 Baseline V. 2016
POF: Photochemical oxidant formation potential	Kg NMVOC-eq	ReCiPe 2008 Used the new version ReCiPe v. 2016
W-Sc: Water Scarcity footprint	m <sup>3</sup> -eq	AWARE method
AD-EL: Abiotic depletion potential - elements	Kg Sb-eq	CML 2001 Baseline V. 2016
AD-FF: Abiotic depletion potential – Fossil Fuels	MJ, Net calorific value	CML 2001 Baseline V. 2016
CED: Cumulative energy demand**	MJ	Ecoinvent v. 2.0 and Pré Consultants V. 1.11
Hazardous waste disposed***	Kg	Own customized assessment method provided by LCA/EPD expert
Inert waste disposed (Non hazardous waste)***	Kg	Own customized assessment method provided by LCA/EPD expert
Radioactive waste disposed***	Kg	Own customized assessment method provided by LCA/EPD expert

\* For the EPD it is required to split the emissions into fossil-based carbon, biogenic carbon and land use/land use change.

\*\* For the EPD it is required to split the required energy in primary and secondary fuels and if they are nonrenewable or renewable. Furthermore, there has to be specified if the material is used as an energy carrier or raw materials

\*\*\* There was no existing assessment method to determine these indicators. After consulting an expert, an own assessment method was made with provided characterisation factors based on expert judgement.



## References

[1] 'Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] 'Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[3] 'Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[4] 'General Programme Instructions for the International EPD® System', version 3, International EPD® System

[5] Product Category Rules PCR Multipurpose films 2021-01 (version1.0)

[6] LCA Report, "Life Cycle Assesment Ecocrylic sheet (2021)." Version 1, 16/6/2021



