

# Trinseo Sustainable Extruded Acrylic Sheets:

Product Environmental Summary

Trinseo has been developing material solutions enabling more sustainable applications for over a decade and is ready to accelerate its leadership position as a material solutions provider through ambitious sustainability goals

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#### THREE IMPORTANT PILLARS

Trinseo strives to become the solutions provider for sustainably advantaged plastics based on three important pillars:

- → **Sustainable Solutions:** an entire product portfolio of materials solutions focuses on energy usage and raw material efficiencies enabling sustainable change throughout the value chain.
- → Sustainability Culture: environmental and social responsibility are embedded into the company culture and the corporate governance.
- → **Future Solutions:** changing consumer landscape and trends will shape our future. Trinseo collaborates with its customers to develop future-oriented solutions aligned with their individual sustainability goals.

#### INTRODUCTION

Trinseo meets the demand for sustainably advantage materials with ALTUGLAS™ R-Life, a range of PMMA sustainable solutions including chemical, mechanical recycling as well as Bio technologies.

All of TRINSEO PMMA products that fall under the ALTUGLAS<sup>TM</sup> R-Life brand, i.e., extruded sheets, cast sheets, resins, and compounds, are similar in that they enable customers to meet their sustainability objectives. Trinseo recently developed a sustainable extruded acrylic sheet solution. This material is produced with a minimum of 75 percent of reused PMMA scraps mixed with virgin PMMA resin.

### ALTUGLAS™ R-LIFE EX SHEETS

ALTUGLAS™ R-Life extruded sheets provide comparable performance with sheets made with virgin resins:

- → Optical quality (high light-transmittance)
- $\rightarrow$  Low weight (50% lighter than glass)
- → High weathering and UV resistance (no need of coating)
- → Good tolerance thicknesses
- → Easy processability (drilling, milling, bonding, thermoformability, ...)
- $\rightarrow$  Comply with ISO norm 7823-2
- → High recycling efficiency and reusing materials leads to multiple times recyclability

ALTUGLAS™ R-Life extruded sheet provides a solution to customers who seek to accomplish their sustainability goals.

## APPLICATIONS

Trinseo's ALTUGLAS™ R-Life extruded sheets can be used for a broad range of applications including:

- → Retail/POS (visual communication)
- → Building & Construction (esthetical & protective partitions, lighting, balustrades...)
- → Transportation (glazing for marine, caravanning industries...)
- → Interior Architecture/Furniture and Design

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## **PRODUCTION PROCESS**

To produce ALTUGLAS<sup>™</sup> R-Life extruded sheets in Rho (Italy), we rely on an extrusion process with PMMA scraps. Internal PMMA scraps are fed into an extruder that heats the mix. The molten polymer then goes through a calender that gives the surface finishing and flatness of the PMMA extruded sheet.

The ALTUGLAS™ R-Life EX sheets are then masked with a PE protective film.



#### SUSTAINABLE CONTENT DECLARATION

For ALTUGLAS™ R-Life extruded sheet, Trinseo provides a sustainability content declaration of minimum 75% of internally reused PMMA scraps.

## ENVIRONMENTAL BENEFITS OF ALTUGLAS™ R-LIFE EXTRUDED SHEETS VERSUS VIRGIN PRODUCT

ALTUGLAS<sup>™</sup> R-Life product portfolio offers a measurable product carbon footprint (PCF) reduction when compared to its virgin counterpart grade.

## LIFE CYCLE ASSESSMENT (LCA) CALCULATION

#### **Declared Unit of Measure**

The LCA results presented here consider the production of 1 kg of Extruded Acrylic Sheets containing 75% of internally reused material.

#### System Boundary

LCA data for the standard fossil MMA and PMMA sheets comes from the LCA study done by Bio Intelligence Services in 2013 (now Deloitte). ALTUGLAS<sup>™</sup> R-Life Cast sheets. LCA results are consistent with the cradle-to-gate approach (raw material extraction and processing in manufacturing plant) for LCA calculation as the LCA data used is coming for existing cradle-to gate LCA studies.

#### **Data Sources Used and Assumptions**

- LCA data for the standard fossil MMA and PMMA extruded sheets from the LCA study done by Bio Intelligence Services in 2013 (now Deloitte) is still up-to-date.
- LCA data for the standard extruded sheets is taken from the 2013 LCA study.
- Scraps are internally reused so considered burden free (contribution of the extrusion process is included). For scraps, the grinding step is also included.
- 1 ton MMA gives 1 ton PMMA. No material losses are considered.

#### LCA Estimation Method

The estimated LCA results in this report are based on the following calculation approach:

- ALTUGLAS™ R-Life EX sheets formulation contains 75% of internally reused PMMA scraps.
- The environmental indicator units of measure from the ReciPE LCA methodology have been used. This method was selected because it is the most used method. It allows for easy comparison with the virgin PMMA and MMA LCA.

#### Most Relevant Environmental Indicators

The definition of each of the chosen impact categories, is described below:

- **GWP:** It is calculated as a sum of emissions of the greenhouse gases (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub> and VOCs) multiplied by their respective GWP factors. The different greenhouse gases are expressed relative to the global warming potential of CO<sub>2</sub>, which is therefore defined to be unity.
- Non-Renewable Primary Energy Use: Use of non-renewable primary energy, excluding renewable primary energy resources used as raw materials.
- Photochemical Oxidant Formation: Indicator of emissions of gases that affect the creation of photochemical ozone in the lower atmosphere (smog) catalyzed by sunlight.
- Terrestrial Acidification: Indicator of the potential acidification of soils and water due to the release of gases such as nitrogen oxides and sulphur oxides.
- Eutrophication (Freshwater + Marine): Indicator of the enrichment of the fresh water and marine ecosystem with nutritional elements, due to the emission of nitrogen containing compounds.

In the graph below, the impact on Global Warming Potential (GWP) is shown:



1 kg of PMMA Extruded Sheets

For other selected impact categories, the improvement (in %) when using the ALTUGLAS™ R-Life version versus the virgin version, is shown on the table below:

Environmental Indicator	
Global Warming Potential	53%
Non-Renewable Primary Energy Use	62%
Photochemical Oxidant Formation	62%
Terrestrial Acidification	70%
Eutrophication (Freshwater + Marine)	58%

The reduction of GWP when reusing up to 75% of internal PMMA scraps to manufacture PMMA extruded sheets is about 53%.

Use of ALTUGLAS™ R-Life extruded acrylic sheets versus the virgin product can contribute to

- Acrylic Waste reduction going to land field or incineration
- **Carbon Footprint reduction**

 $\rightarrow$ Reduction of the production of virgin acrylic monomer

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## CONTACT US

For additional information, please contact your Trinseo representative or visit us at www.trinseo.com