



Eco-profiles and Environmental Product Declarations of the European Plastics Manufacturers

# Polyoxymethylene (POM)

PlasticsEurope  
February 2014

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# Environmental Product Declaration

## Introduction

This Environmental Product Declaration (EPD) is based upon life cycle inventory (LCI) data from PlasticsEurope's Eco-profile programme. It has been prepared according to **PlasticsEurope's Eco-profiles and Environmental Declarations – LCI Methodology and PCR for Uncompounded Polymer Resins and Reactive Polymer Precursors** (Product Category Rules version 2.0, April 2011). EPDs provide environmental performance data, but no information on the economic and social aspects which would be necessary for a complete sustainability assessment. Further, they do not imply a value judgment between environmental criteria.

This EPD describes the production of Polyoxymethylene (POM) polymer from cradle to gate (from resource extraction to polymer pellet at plant).

**Please keep in mind that comparisons cannot be made on the level of the polymer material alone:** it is necessary to consider the full life cycle of an application in order to compare the performance of different materials and the effects of relevant life cycle parameters. This EPD is intended to be used by member companies, to support product-orientated environmental management; by users of plastics, as a building block of life cycle assessment (LCA) studies of individual products; and by other interested parties, as a source of life cycle information.

## Meta Data

Data Owner	PlasticsEurope, Product Group Engineering Plastics
LCA Practitioner	PricewaterhouseCoopers
Programme Owner	PlasticsEurope aisbl
Programme Manager, Reviewer	DEKRA Consulting GmbH
Number of plants included in data collection	2
Representativeness	>80%
Reference year	2010–2011
Year of data collection and calculation	2013
Expected temporal validity	2016
Cut-offs	No significant cut-offs
Data Quality	Good
Allocation method	No allocation in foreground process

## Description of the Product and the Production Process

Polyoxymethylene (POM), a semi-crystalline thermoplastic, belongs to the polyacetals family of polymers. POM exists in two different forms: homopolymer (POM-h) and copolymer (POM-c). POM has mechanical properties which are suitable for high-performance applications, such as injection-moulded parts for household appliances. This EPD is for both POM-h and POM-c, as the difference in terms of LCA is small.

## Production Process

POM is produced through the polymerisation of formaldehyde (for POM-h) or of trioxane with a smaller quantity of co-monomer (for POM-c). Formaldehyde is produced through the oxidation of methanol. The reference flow, to which all data given in this EPD refer, is 1 kg of POM in pellet form.

## Data Sources and Allocation

The main data source was a data collection from European producers of POM. Primary data on gate-to-gate POM production is derived from site-specific information for processes under operational control supplied by the participating companies of this study. Two different POM producers with plants in two European countries were participating in the primary data collection. They are expected to represent >80% of POM production in Europe (EU27) in 2010–2011. In order to enhance representativeness and to protect confidentiality of producer data, a third dataset was put together by PwC from literature sources and specialist expertise and used in the vertical average. Background data for the upstream supply chain up to the precursors were obtained from the *DEAM*, *GaBi*, *PlasticsEurope*, and *Ecoinvent* databases.

## Use Phase and End-of-Life Management

Used mainly in industrial, automotive and consumer applications, POM resin is used to produce injection-moulded mechanical and electrical parts such as gears, sliding and guide elements, screwing and assembly pieces, insulators and connectors etc.

## Environmental Performance

The tables below show the environmental performance indicators associated with the production of 1 kg of POM.

### Input Parameters

Indicator	Unit	Value
Non-renewable energy resources <sup>1)</sup>		85.1
• Fuel energy	MJ	65.7
• Feedstock energy	MJ	19.3
Renewable energy resources (biomass) <sup>1)</sup>		0.94
• Fuel energy	MJ	0.86
• Feedstock energy	MJ	0.08
Abiotic Depletion Potential		
• Elements	kg Sb eq	1.6E-06
• Fossil fuels	MJ	84.9
Renewable materials (biomass)	kg	8.6E-03
Water use	kg	544
• for process	kg	33
• for cooling	kg	512
<sup>1)</sup> Calculated as upper heating value (UHV)		

### Output Parameters

Indicator	Unit	Value
GWP	kg CO <sub>2</sub> eq	3.2
ODP	g CFC-11 eq	1.6E-04
AP	g SO <sub>2</sub> eq	5.4
POCP	g Ethene eq	0.5
EP	g PO <sub>4</sub> eq	1.2
Dust/particulate matter <sup>2)</sup>	g PM <sub>10</sub>	0.35
Total particulate matter <sup>2)</sup>	g	0.35
Waste (foreground process)		
• Non-hazardous	kg	1.05
• Hazardous	kg	2.2E-03
<sup>2)</sup> Including secondary PM <sub>10</sub>		

## Additional Environmental and Health Information

POM is inert under use phase conditions. However, during processing, when heated for extrusion or moulding, small quantities of formaldehyde may be released. Occupational health protection must be in place. The manufacturers of polyacetals are working through PlasticsEurope, the American Chemistry Council (ACC) and other industry groups to foster product safety and to actively engage with stakeholders.

## Additional Technical Information

POM combines high stiffness and strength with outstanding resilience: low friction coefficient, high abrasion and heat resistance, and excellent dimensional stability, even under the effect of mechanical forces, in contact with numerous chemicals, fuels and other media as well as at elevated temperatures. It also has good electrical insulating properties.

## Information

### Data Owner

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### Programme Manager & Reviewer

#### DEKRA Consulting GmbH

This Environmental Product Declaration has been reviewed by DEKRA Consulting GmbH. It was approved according to the Product Category Rules PCR version 2.0 (2011-04) and ISO 14025:2006.

Registration number: PlasticsEurope 2013-002, validation expires on 31 December 2016 (date of next revalidation review).

## Programme Owner

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For copies of this EPD, for the underlying LCI data (Eco-profile), and for additional information, please refer to <http://www.plasticseurope.org/>.

### References

- PlasticsEurope: Eco-profiles and environmental declarations – LCI methodology and PCR for uncompounded polymer resins and reactive polymer precursors (version 2.0, April 2011).
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