

The RecyClass PO Films Technical Committee investigated the impact of ethylene vinyl acetate copolymer (EVA) on PE film recycling. One of the objectives was to generate scientific data to align with the current recommendations made by the Association of Plastics Recyclers (APR) for the US market. This test campaign was also the opportunity to evaluate the impact of using a single screw or a twin-screw extruder when performing the RecyClass Recyclability Evaluation Protocol for PE film. After 6 months of investigations, the RecyClass PO Films Technical Committee (TC) decided to align with APR recommendations and define EVA as compatible with PE flexible packaging recycling streams, under specific conditions.

The test campaign aimed at three different objectives: 1) Investigating the impact of EVA on PE-based flexible packaging, 2) Evaluate the effect of extrusion process on RecyClass Recyclability Assessments, 3) Aligning RecyClass and APR Design for Recycling recommendations.

Samples were produced and provided by Dow. Two different films were evaluated containing an overall amount of 5 % of VA monomer and 95 % of ethylene monomer, as stated in APR current recommendations<sup>1</sup>. EVA grades, with 12 mol% and 25 mol% Vinyl Acetate (VA) content were considered to cover the main VA grades used for EVA dedicated to plastic packaging applications (cf. Annex 1). While other EVA grades are also present in the market, the PO Films TC considered that such variations of VA content would not affect the recycling process neither the quality of the generated recycle. Dow LDPE 310E grade was used as control and virgin material.

Tests performed by Norner did not show major deviations for neither pellets nor films characterisations. While some issues were faced during the extrusion process, they were attributed to the absence of a densification step in RecyClass Recyclability Evaluation Protocol, which has been corrected in the most recent version 4.0. Even after two successive extrusion processes, obtained pellets did not show any sign of degradation, in particular no intense yellowing was observed ( $b^*$  maximum = 1.8). Note however that a significant increase of gels and specks was visible on films coming from single screw extrusion (up to 20 times more than for twin screw extrusion). This confirms the hypothesis that single screw extrusion will be a worst-case scenario due to the less intense shear and mixing capacity.

---

<sup>1</sup> [APR – PE Film Guidance Table](#)

As a summary and according to the results that were obtained from the Recyclability Evaluation Protocol, the RecyClass PO Films Technical Committee defined the compatibility of the EVA with the PE film recycling stream as following.

- For PE film transparent & coloured streams:
  - **Full compatible:** EVA with VA representing up to 5 wt% of the total weight of the flexible packaging.
  - **To be evaluated:** EVA with VA representing more than 5 wt% of the total weight of the flexible packaging.

Following this work done on EVA, RecyClass also studied the impact of other ethylene-base copolymers such as Ethylene Acrylic Acid (EAA), Ethylene Methyl Acrylate (EMA), and ionomers, based on the work performed with the Association of Plastics Recyclers (APR). This work was done in order to close the gap with APR recommendations<sup>2</sup>.

#### ***About RecyClass***

RecyClass is a non-profit, cross-industry initiative advancing recyclability, bringing transparency to the origin of plastic waste and establishing a harmonized approach toward recycled plastic calculation & traceability in Europe. RecyClass develops Recyclability Evaluation Protocols and scientific testing methods for innovative plastic packaging materials which serve as the base for the Design for Recycling Guidelines and the RecyClass Online Tool. RecyClass established Recyclability Certifications for plastic packaging, Recycling Process Certification and Recycled Plastics Traceability Certification for plastic products.

[RecyClass – Plastic Future is Circular](#)

Follow the latest news on RecyClass channels: [LinkedIn](#) | [Twitter](#) | [YouTube](#)

Contact : [Jean-Emile.Potaufeux@plasticsrecyclers.eu](mailto:Jean-Emile.Potaufeux@plasticsrecyclers.eu), [www.recyclclass.eu](http://www.recyclclass.eu)

---

<sup>2</sup> [APR – PE Film Guidance Table](#)

## Annex I

Table 1: Composition of PE film containing EVA evaluated in the RecyClass EVA test campaign.

Sample	PE %	EVA %	Ethylene monomer %	VA %	EVA grade	Process
1	58	42	95	5	ELVAX 3135X (EVA- 12 % VA)	Twin-Screw extruder
2	80	20	95	5	ELVAX 3190A (EVA- 25 % VA)	Twin-Screw extruder
						Single screw extruder