RecyClass

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In 2025–2026, the RecyClass PET Thermoforms Task Force (TF) initiated a dedicated test campaign to assess the recyclability impact of sealant layers used on PET thermoforms. The objective was to generate comparative data on the removal efficiency, washing behaviour, and quality of generated rPET depending on various commercial sealing solutions currently applied to PET tray– polyolefin (PO) lid systems. Four representative sealant technologies were selected for testing, supplied by industrial partners including Dow, and applied onto PO lids subsequently sealed, by Ilpa, on monolayer PET trays. The study covered strong peel polyester, EVA, and acrylate-based sealing layers, representing major market solutions and their typical industrial configurations. The recyclability test was performed in worst-case conditions, with the PO lid 100% still attached to the PET tray, thus not considering the consumer behavior. The overall campaign shows that EVA-based sealants offer the most efficient separation during hot washing, acrylate offers lower removability but also a lower yellowing of rPET, and polyester-based solutions show the lowest separation and the most pronounced yellowing (see Annex I).

The test campaign focused on different sealing technologies, where sealants were coextruded onto PO lids and sealed onto PET trays at a target thickness ratio of 10:1 (lid : sealant layer). Four innovations were compared against a control:

1. Polyester-based (strong peel) sealant (Supplier 1)
2. EVA-based sealant (Supplier 1)
3. EVA-based sealant (Supplier 2)
4. Acrylate-based sealant (Supplier 2)

Sealing was performed at temperatures 140–170 °C, a sealing time of 0.8–1.0 s, and a pressure of 6 bar. Successful seals were subjected to a vacuum-chamber test, with seals considered acceptable when resisting 250 mbar residual pressure. Three samples per condition were recommended.

The recyclability tests focused mainly on the pre-treatment steps, including grinding, hot washing, density separation, drying. Additional heat histories were applied to the obtained PET flakes, in the form of an oven test for pellets, and the production of plaques via injection moulding, for colour measurements.

The test campaign revealed clear performance differences among the polyester-, EVA-, and acrylate-based sealing systems. EVA-based solutions offered the most efficient removal behaviour during the hot washing process, with lids detaching almost completely from the PET trays. This high separation efficiency was reflected in removal yields reaching up to 98 %. Although EVA left minor residues that produced slight yellowing and occasional coloured flakes during oven testing, the overall recyclability results remained positive.

Acrylate-based sealants demonstrated intermediate performance. Their separation efficiency during washing remained relatively low, at around 64 %, meaning a more substantial portion of the sealant layer persisted on the PET flakes. However, once reprocessed into plaques, the material maintained excellent colour stability, displaying neither yellowing nor darkening. The main drawback was a noticeable increase in haze, due to the remaining PO lids. The RecyClass PET Thermoforms TF acknowledged the need for additional results to draw the right conclusion for acrylate sealants.

In the worst-case scenario tested, the strong peel polyester allows only about 50% of the lid to be removed, therefore, leading to significant amount of still attached PO lid and polyester sealant. Removal during washing was limited, as expected due to the strong peel performance, and the material was consistently associated with strong yellowing, both immediately after processing and following oven testing. This degradation of optical quality suggests that the polyester-based sealant and/or the remaining PO-based lid interact unfavourably during the recycling process, especially when used on clear PET thermoforms. As a result, this kind of polyester-based sealant with strong peel performance pose a significant obstacle to achieving high-quality recycled PET output.

Based on the evidence generated, the RecyClass PET Thermoforms TF decided to update the Design for Recycling recommendations as follow:

For clear transparent PET Thermoforms:

- Full compatibility: EVA
- Limited compatibility: -
- Low compatibility: Copolyesters (strong peel)

For coloured transparent PET Thermoforms:

- Full compatibility: EVA
- Limited compatibility: -


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- Low compatibility: -

Several aspects arising from this test campaign deserve additional investigation to strengthen the recyclability assessment of sealants for PET thermoforms. Further work is needed to understand the behaviour of different copolyesters with weaker sealant performances. Besides, behaviour during solid-state polycondensation is to be evaluated, as strong yellowing of pellets is anticipated and may further limit their suitability in closed-loop applications for some of the tested sealants. The potential formation of non-intentionally added substances (NIAS) if sealant residues are not completely removed during washing also warrants deeper examination, given its relevance to food-contact compliance and broader material safety considerations. Beyond material interactions, the campaign highlighted the importance of considering sorting performance. Sealants, multilayer structures, and lid attachment behaviour may interfere with optical sorting systems, potentially diverting otherwise recyclable trays into undesired streams.

*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

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Annex I

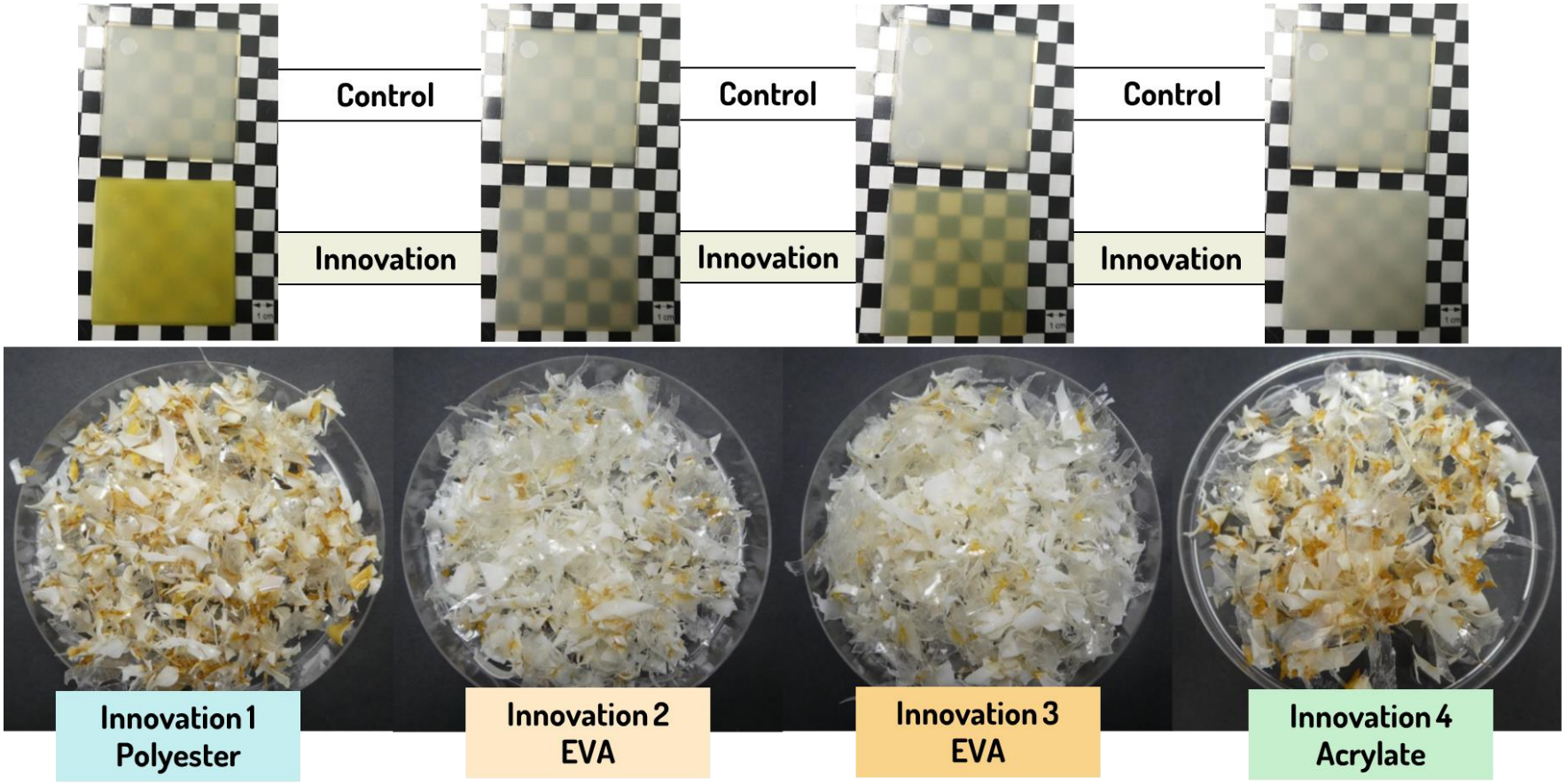


*Figure 1:* Pictures of pellets after heat exposure and produced plaques (no oven test).

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