RecyClass

Avenue de Broqueville 12
1150 Brussels, Brussels

Phone: +32 2 786 39 08
info@recyclass.eu
www.recyclass.eu

RecyClass PET Technical Committee (TC) conducted a dedicated test campaign to evaluate the impact of PET closures on the quality of rPET generated through the standard recycling process for PET bottles. The primary objective was to determine whether these closures could be considered as compatible with the PET recycling stream and whether addition of PET closures references to the Design for Recycling (DfR) Guidelines were justified. The test campaign was supported by two PET closures suppliers respectively providing injection-moulded PET caps (clear and coloured) and thermoformed PET caps containing anti-slip agents as additives. Identical bottle-grade PET (Indorama N180, Equipolymers Lighter C93) was used for control material, PET bottles and control material to ensure unbiased comparisons. Three main closure types were tested (see Annex I):

- Sample A – Injection-moulded clear PET
- Sample B – Coloured injection-moulded PET
- Sample C – Thermoformed clear PET with additives

The tests were done following a two-steps approach: 1) Study of the behaviour of the PET closure flakes during grinding and air elutriation using the sample B; 2) Complete recyclability assessment (according to RecyClass Recyclability Evaluation Protocol for PET bottles) of the clear transparent PET closures (samples A and C)

First, coloured closures were ground together with PET bottles at a 1:1 unit ratio. After grinding, flakes underwent standard air-elutriation to determine whether PET caps would be removed with the light fraction. Most flakes remained in the heavy fraction, meaning that PET closures behave similarly to bottle walls and are not lost during pre-treatment sorting steps.

For the second step, clear transparent closures were tested through the full RecyClass PET protocol using an A.0 control and A.100 blend (1:1 bottles:caps ratio). Across all stages of the recyclability evaluation, the presence of PET closures—whether injection-moulded, or thermoformed—demonstrated no negative effect on the recycling process. During pre-treatment, the yields of the innovation samples closely matched those of the control, and the percentage of light fraction remained extremely low, confirming that PET closures do not generate additional fines nor undergo unintended separation during elutriation. During extrusion, both samples A and C behaved similarly, with only a slight increase in melt pressure that did not lead to processing instability or visible defects. The solid-

state polycondensation (SSP) and intrinsic viscosity (IV) development were nearly identical between the innovations and control, with no acetaldehyde formation detected, further demonstrating good compatibility with standard PET recycling conditions. Colour and optical measurements also confirmed that the tested clear transparent PET closures do not affect the visual quality of the recycled material. No negative impact related to the presence of anti-slip agents could be identified, as L*, a*, b* and haze values remained comparable to the reference material.

Overall, the RecyClass PET TC confirmed that across all tests—including pre-treatment, extrusion, SSP, and injection moulding—the presence of PET closures did not negatively impact the recycling process, nor the IV, or colour of the recycled material. Therefore, the following Design for Recycling recommendations for PET bottles were delivered:

For clear & light-blue transparent PET bottles:

- Full compatibility: Clear transparent PET closures (with no additives or only approved additives)

For coloured transparent PET bottles:

- Full compatibility: Clear and coloured transparent PET closures (with no additives or only approved additives)

This test campaign confirms strong compatibility of PET closures with established PET bottle recycling processes, when PET closures are made of PET blow moulding grades, and using standard anti-slip agents as additives only. Nevertheless, RecyClass identifies further opportunities for investigation, in particular the impact that anti-slip agents might have at a substance level, or the risk that PET closures might represent if containing other additives or made of non-bottle PET grades. RecyClass continues to invite companies to test the recyclability of their innovative PET closures.

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, www.recyclass.eu

RecyClass

Avenue de Broqueville 12
1150 Brussels, Brussels

Phone: +32 2 786 39 08
info@recyclass.eu
www.recyclass.eu

Annex I

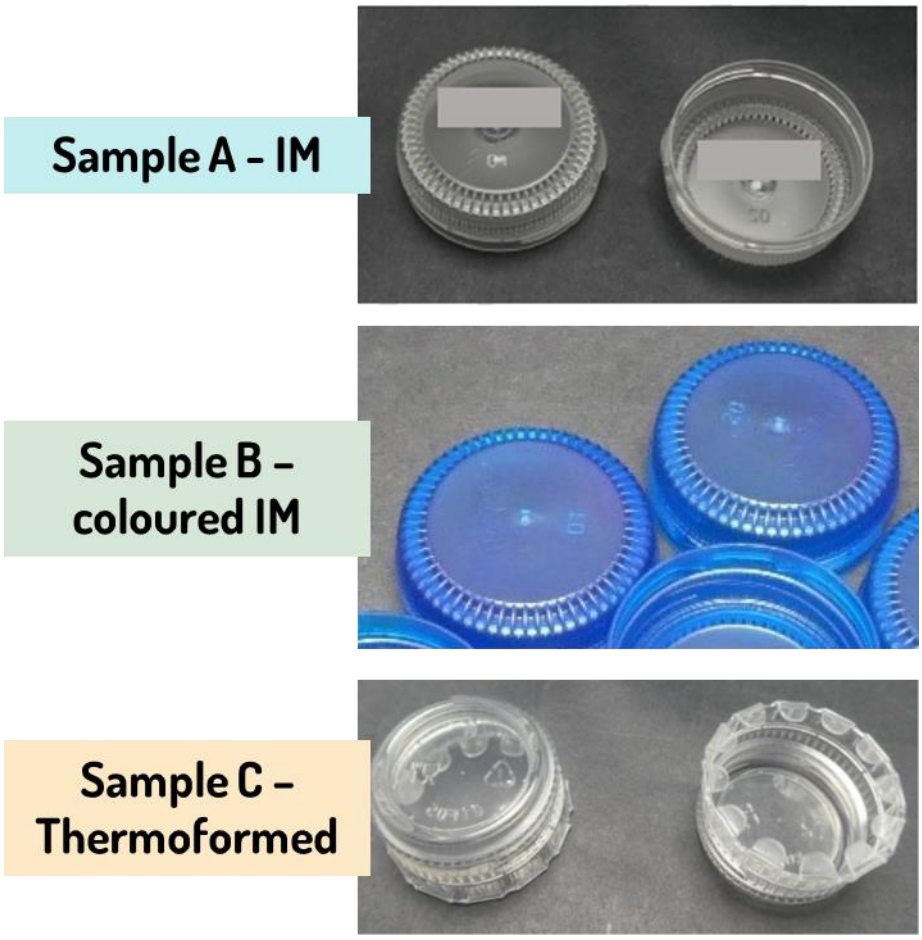

Figure 1: Pictures of samples used for the test campaign.