

The RecyClass HDPE Technical Committee investigated the impact of foaming on HDPE containers recycling. The test campaign was made on two samples representative of the market provided by Berry Global, as illustrated in Annex 1. Tests were carried out following the procedures described by the RecyClass Recyclability Evaluation Protocols for HDPE containers¹.

The samples consist of natural HDPE jar and lid with an Expanded Polyethylene (EPE) liner of 3mm, representing approximately 12wt% of the total weight of the packaging. The two different liners' technology differed by the presence of Chemical Foaming Agents (CFAs) or not in their composition. Such CFAs are typically citric acid-based chemicals used as nucleating agents for the foaming process. Such packaging and liners are often used for cosmetics and food.

The recyclability evaluation was performed at the Centre Technique Industriel de la Plasturgie et des Composites (IPC) by following the RecyClass Recyclability Evaluation Protocol for HDPE Containers. The control material used for the test corresponded to the same HDPE jar and lid without the EPE liner, meaning that the only difference with innovation packaging was the presence of the foamed PE. During the pre-treatment steps, it was observed that about 25wt% of both liners were separated during the air elutriation process. In order to evaluate a worst-case scenario, it was requested to reintroduce this light fraction to the flakes that would further be extruded. Extrusion of the flakes as well as pellet and mechanical characterizations showed no negative impact related to the presence of the PE foamed liners. However, the converting step exhibited strong issues for the samples containing EPE, in particular due to irregularities of the parisons that led to disruptions during the blow moulding process, as illustrated in the Annex 2. Bottles produced with these samples showed significant decrease in mechanical properties compared to the control bottles.

The outcome of this test campaign was that foaming is detrimental for HDPE recycling. As foamed packaging elements (such as liners and gaskets) often represent a share of the total packaging inferior to 1wt%, the HDPE Technical Committee decided to define a threshold of 1wt% for PO foamed parts to be accepted as compatible with HDPE recycling, based on previous recyclability assessments performed by RecyClass.

¹ [Recyclability Evaluation Protocol for HDPE Containers](#)

As a summary and according to the results that were obtained from the Recyclability Evaluation Protocol, the RecyClass HDPE Technical Committee defined the compatibility of the PO foamed liners, seals and valves with the HDPE rigid packaging as following:

- **Limited compatible** with HDPE if ≤ 1 wt% of the total weight of the packaging
- **Low compatible** with HDPE if > 1 wt% of the total weight of the packaging

The HDPE Technical Committee welcomes the possibility in the future to study the impact on recycling of foamed HDPE containers, which are produced following a different foaming technology.

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.

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Annex I




Control: HDPE Jar and Lid (injected parts)	Control HDPE Jar and Lid (injected parts)	Innovation 1 HDPE liner Tresylene 2530	Innovation 2 HDPE liner EPE 200-500
Innovation 1: Physical foaming without any chemical foaming agent		- Glossy appearance - Thickness 3 mm	- Matt appearance - Thickness 2,9 mm
Innovation 2: Physical foaming with the addition of chemical foaming agents			

Figure 1: Samples and foamed liners used for the test campaign

Annex II

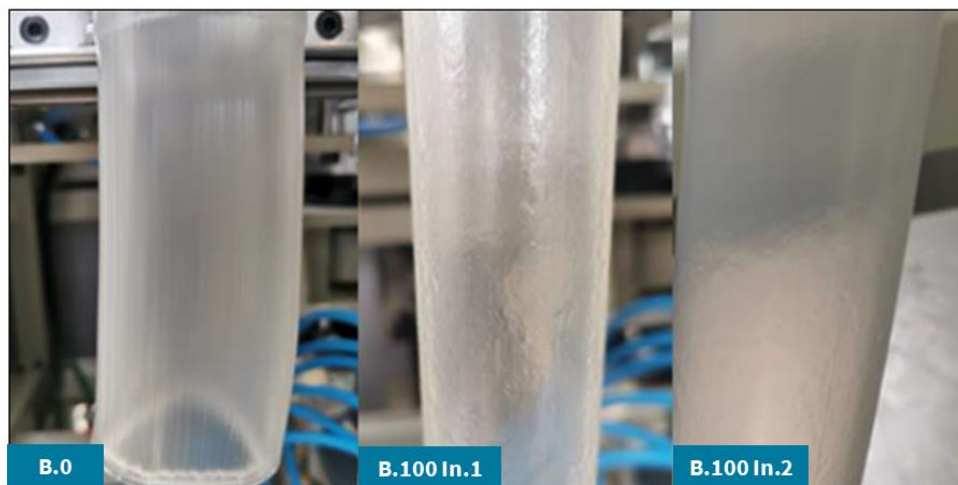


Figure 2: Parison defects during blow moulding process for samples containing foamed liners