

The RecyClass PP Technical Committee investigated the impact of PP-based In-Mould-Labels (IML) technologies on recycling of PP containers. The test campaign included four In-Mould-Labels representative of the market, as illustrated in Annex 1. Tests were carried out following the procedures described by the RecyClass Recyclability Evaluation Protocols for PP containers.

The samples consist in PP containers available on the market decorated with printed PP-based In-Mould-Label technologies, as following:

- A transparent and printed IML on a natural PP container;
- Two white and printed IMLs on white PP containers
- A white and printed IML on a coloured PP container.

Printing applied on the IMLs samples aimed to be representative of commercially available artworks and covering the main technologies provided on the European market. All samples were printed using conventional oxidative inks, except one of the white IML on a white container that was printed with solvent-based ink and lacquer. Inks counted for less than 1 wt% of the full packaging weight for all the samples, while the weight of the unprinted IML represented between 3 and 7 wt% of the total packaging weight (*cf.* Table 1).

Laboratory testings were performed by the Institut für Kunststofftechnologie und -recycling (IKTR) and Proplast following the RecyClass Recyclability Evaluation Protocol for PP Containers<sup>1</sup>. For each test, the same PP container but undecorated was used as control sample to determine the impacts on PP recyclability determined by the presence of the IML and the printing. All samples behaved well during extrusion and the obtained pellets were reprocessed using injection moulding. Few parameters were identified out of the benchmark recommendations (MFI and ash content for pellets and elongation at break for injection moulded bars). Reprocessing the natural container with the transparent printed IML led to coloured pellets and injected moulded specimens due to the presence of the inks, as this decorative technology cannot be separated during the recycling process.

To confirm the colouration of recycled material and impact of inks, an additional test on a natural container with a transparent IML containing approximately 0.3wt% of inks was performed (Figure 2).

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<sup>1</sup> [Recyclability Evaluation Protocol for PP Containers](#)

This container has been selected as a 'best-case scenario' regarding its light printing. However, testing led as well to not negligible colouration of the pellets and injected molded plates.

As key outcome of the test campaign, the type of ink used for printing IML has been pointed out as a key feature for the compatibility of this technology with PP recycling. On one hand, - unmelted particles were observed on injection moulded specimens for samples printed with a convention oxidative ink. Additional tests performed at IKTR highlighted that these inclusions were made of PP, imputing the origin to inks aggregates. On the other hand, the sample printed with solvent-based ink led to a colouration of the water during washing and floatation pre-treatment of the flakes due to bleeding behaviour of the inks.

According to the results that were obtained from the Recyclability Evaluation Protocol, the RecyClass PP Technical Committee defined the compatibility of PP-based In Mould Label technology with the PP recycling stream as following:

- **Fully compatible with coloured PP recycling** when the amount of ink is **< 1 wt%** of the full packaging weight (except dark colours and bleeding inks);
- **Limited compatible with coloured PP recycling** when the amount of ink is **≥ 1 wt%** of the full packaging weight (except bleeding inks);
- **Low compatible with natural PP recycling**

Based on these results, RecyClass acknowledges that In-Mould-Labels will impact the natural PP rigids recycling process and have no or a limited impact on the current European industrial recycling processes for coloured PP rigids, when respecting the conditions listed above.

#### **About RecyClass**

RecyClass is a comprehensive cross-industry initiative that works to advance plastic packaging recyclability and to establish a harmonized approach towards recycled content calculation and its traceability in Europe. Activities within RecyClass include the development of Recyclability Evaluation Protocols and scientific testing methods for innovative materials which serve as the base for the Design for Recycling Guidelines and the Recycling Online Tool. RecyClass offers Recyclability Certifications for plastic packaging and Recycled Content Traceability Certification for plastic products.

Contact: [Alice.Wallon@plasticsrecyclers.eu](mailto:Alice.Wallon@plasticsrecyclers.eu), [www.recyclass.eu](http://www.recyclass.eu)

## Annex I



Figure 1: In-Mould-Labels tested samples

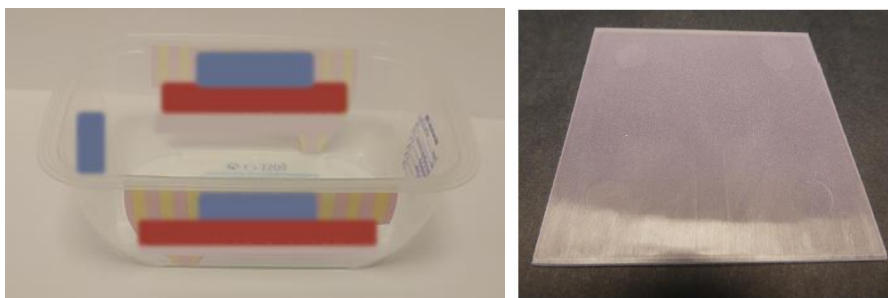


Figure 2: Additional test on transparent light printed In-Mould-Label

	Container	IML	wt% IML	Printing Inks	wt% Inks
Soup Pot	Natural	Transparent	7 %	UV White + Conventional oxidative	< 1 %
Cream Cheese	White	White	7 %	Conventional oxidative	< 1 %
Creem Cheese #2	White	White	3 %	Solvent-based	< 1 %
Candy Box	Coloured	White	6 %	Conventional oxidative	< 1 %
Transparent Tray	Natural	Transparent	7 %	UV White + Conventional oxidative	0.3 %

Table 1: Description of the tested IML packaging