RecyClass

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RECYCLASS TECHNICAL REVIEW *Brussels, 06 March 2026*

In January 2026, RecyClass Design for Recycling Guidelines for natural flexible packaging still refers to a maximum of 50% printing coverage as limited compatible with PE and PP films recycling. The RecyClass PO Films Technical Committee (TC) has here identified two key issues: 1) A natural packaging printed with close to 50% printing coverage will not allow the recycled material to be used back in a similar natural film application; 2) The printing coverage is challenging to correctly define and measure. In this context, the RecyClass PO Films Technical Committee (TC) decided to further investigate the impact of inks on the quality of natural PE films recyclate. This testing campaign was supported by Constantia Flexibles, supplier of the printed PE films. With the result of this test campaign, the RecyClass PO Films TC adapted the recommendation regarding the use of inks on natural PE and PP flexible packaging to secure the quality of natural film recycled plastic.

The objective of this test campaign was to better quantify the impact of the presence of small quantities of inks on the colour of PE pellets. A two steps approach has been followed: 1) Reprocessing multiple monochromic blends (unprinted film + single colour film), with different concentrations of printed films; 2) Repeating the same exercise by blending all films of different colours together, to replicate a more realistic composition of a waste bale. Each printed sample corresponded to a 50 µm LDPE film, printed with a monochromic PU-based ink, targeting a dry ink concentration of about 2wt% in comparison to the total weight of the film (See Annex I). One additional sample was produced, without any pigment, and was considered as a PU-varnish. Tests were conducted at Aimplas according to reprocessing conditions reported within the RecyClass Recyclability Evaluation Protocol for PE Films.

During the first step of the test campaign, printed films were ground and mixed with virgin LDPE grade. For the yellow, magenta, and cyan colours, all blends, including the ones with only 0.5 wt% of printed flakes showed a strong coloration (see Annex II). For the black colour, this effect could also be visible with 0.1 wt% of black flakes. Finally, the blends made of the varnished film (100 and 50 wt% of varnished films) led to slightly yellowish pellets due to the binder. Performing colour measurements on all samples, showed values of **Δ**E variating from 22 to 51 for yellow, cyan, magenta and black, while for white and varnish, the **Δ**E remained below 12. Note here that these results are obtained with blends that, for CMYK colours contained a maximum of 0.02 wt% of dry ink, highlighting the strong impact of the inks.

Following the production of pellets, 25 µm films were produced by mixing 50 wt% of the aforementioned coloured pellets with 50 wt% if transparent pellets. Here it was observed that the ΔE values compared to the control film was below 0.4 for all films made of the pellets containing 0.5 and 1 wt% of coloured films. This means that it was necessary to superpose few layers to see the colour of the initial printed film.

The second round of test was done by repeating the previous extrusion and films production, but using a mixed colour blend containing 20 wt% of white, cyan, yellow, magenta and black flakes. Blends made of 0.5 to 100 wt% of the mixed colour blend were produced (see Annex III). All pellets and films looked grey, with transparency significantly affected for the films containing more than 1 wt% of printed flakes.

Based on these tests, the RecyClass PO Films TC, agreed that no matter the colour of the inks or combination of colours, very small concentrations of inks will significantly affect the colour of the recyclate. Nevertheless, light colours will be preferable as they will less affect the colour of the recycled film compared to dark colours. Finally, looking at the current colour sorting technologies available for flexible packaging, the RecyClass PO Films TC understood that machine settings can be adapted to sort or not different packaging, depending on the printing coverage, colour, or artwork. Therefore, it remained very challenging to find a compromise between the objective of purity of the recycled material made of natural flexible packaging to allow new applications as natural films, and the reality of artworks and decorations existing on the flexible packaging market.

Following these discussions, the RecyClass PO Films TC agreed on amending the Design for Recycling Guidelines for natural PE and PP flexible packaging with the following recommendations:

- Fully compatible: Production or expiry date only
- Limited compatible: Only mandatory information or inks ≤ 0.25 wt% (representing the maximum concentration tested during the test campaign)
- Non-compatible: Inks > 0.25 wt%

Besides, the RecyClass PO Films TC agreed on updating the limit between natural and coloured flexible packaging to a 30 % printing coverage (instead of 50 %), to ensure that packaging assessed according to the DfR guidelines for natural PE and PP flexible packaging will remain largely unprinted.

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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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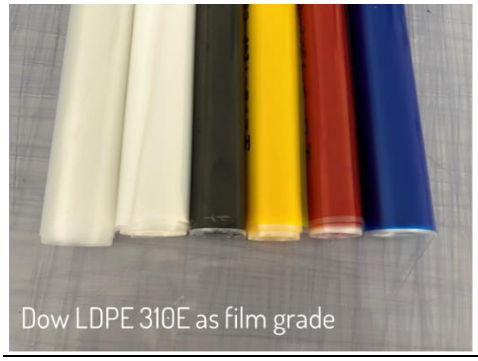
Annex I



Code	Standard Pigments	g/m2 Ink	Average gauge film / µm	Estimated inks wt%
LDPE-Blue	P.B.15:4	1,3 / 1,3	50,4	**2.70**
LDPE-Red	P.R.57	1,1 / 1,1	52,7	**2.29**
LDPE-Yellow	P.Y.13	0,9 / 0,8	51,2	**1.78**
LDPE-Black	P.Bk.7	1,2 / 1,2	52,6	**2.49**
LDPE-Varnish	-	0,8 / 0,8	52,0	**1.68**
LDPE-White	TiO2	2,3 / 2,3	51,6	**4.67**

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

Annex II

Figure 2: Pictures of the pellets produced mixing control material and printed films (Percentage refers here to the amount of printed flakes in the blend).

Annex III

Figure 3: Pictures of the pellets and films produced with the mixed colour blend (Percentage refers here to the amount of printed flakes in the blend).

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