

GENERAL NOTICE
Technical Sheet

PURPOSE

This general notice is intended to assess the impact of multilayer PET/Nylon bottles on the recycling of light PET bottles.

TESTS CONDUCTED

The behaviour of multilayer PET/Nylon bottles was analysed on the light PET stream.

Tests were carried out on bottles that are representative of the French market.

Details of the tests conducted in the various studies are given in sheet FT 36.

SUMMARY OF RECLAIMING IMPACTS

Recycling stage	Impact	Description	Consequences
AUTOMATIC  MANUAL Sorting of bottles	⚠	Multilayers cannot be detected by existing sorting technologies. Some bottles may be removed in the optional manual sorting stage	<ul style="list-style-type: none"> Higher losses (manual sorting) ➤ Increase in waste to be processed
 Grinding	∅		
 Washing	∅		
 Floating	∅	Nylon flake flows with PET flake.	
 Flake sorting <i>optional</i>	∅	Nylon cannot be detected by existing flake sorting technologies.	
Aerodynamic separation <i>optional</i>	⚠	The part of Nylon flake that is less thick than PET flake can be eliminated in this stage.	<ul style="list-style-type: none"> Higher losses ➤ Increase in waste to be processed

⚠ Caution ∅ No impact ➤ **Environmental consequences**

SUMMARY OF IMPACTS ON BOTTLE AND SHEET RECYCLING

[tested concentrations: 12.5% and 25% barrier bottles]

Recycling stage	Impact	Description	Consequences
 Granulation	∅	The presence of Nylon has no major impact on the granulation stage, although a slight yellowing of granules is already apparent.	
Solid Stating	∅	The Solid Stating conditions and the viscosity of the obtained granules are not significantly influenced by the presence of Nylon.	
Preform and plate injection		Substantial yellowing of plates is observed in samples containing Nylon (the higher the percentage of Nylon, the greater the yellowing).	Transparent sheet-type applications will be greatly limited by the yellowing phenomena.
Bottle blowing	∅ 	The presence of Nylon does not significantly influence the bottle's mechanical and size aspects. The bottles become more opaque and yellow as the proportion of Nylon increases.	Bottle-type applications will be greatly limited by the opacifying and yellowing phenomena.

SUMMARY OF IMPACTS IN FIBRE RECYCLING

[tested concentrations: 25% and 50% of barrier bottles]

The presence of Nylon did not affect the fibre extrusion and drawing stages or the characteristics of the fibres obtained in the tests.

TEST SUMMARY

The presence of multilayer PET/Nylon bottles does not cause major problems in the reclaiming stage. In the event that plants are equipped with a manual sorting station, bottles can be eliminated within the efficiency limits of the material used, leading to an increase in waste to be processed at this stage.

In the fibre recycling stage studied (continuous fibres, diameter corresponding to 5 decitex¹), the presence of residual Nylon in RPET flake or granules caused no major disruption in the process or the quality of the fibres obtained.

In the colourless transparent bottle and sheet recycling stage, the presence of residual Nylon in RPET flakes or granules leads to yellowing and opacifying of end products according to Nylon concentration.

In the event that plants are equipped with aerodynamic separation, some Nylon may be eliminated, the amount of which will depend on the efficiency of the equipment and the thickness of the layer. The reclaiming tests carried out on a representative bottle for the French market have shown that a large share (more than half) of the Nylon can be removed through aerodynamic separation.

The recyclability study (recycling as sheets and bottles) carried out following these tests showed that, at the tested concentrations and despite the significantly lower Nylon content, yellowing and opacifying are harmful to the quality of the obtained products.

GENERAL OPINION

In recycling stages including a heat phase (washing, extrusion, solid stating, injection), the presence of residual Nylon makes the stream more yellow and more opaque.

PET Nylon multilayer bottles in the light PET stream will, therefore, be eliminated insofar as possible in the manual sorting stage. This elimination, which is necessary for bottle and sheet applications (the main applications for this stream in Europe), leads to higher losses and has an adverse effect on the system's overall economics.

Given the results obtained and in order to decrease losses and optimise the system's economics, COTREP recommends studying alternative systems that take into account the compatibility of materials between each other and/or improve the separability of the intermediate barrier layer.

¹ A decitex corresponds to the weight in grams of 10,000 meters of thread
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