



## GENERAL NOTICE 69

### Impact of PP on the regeneration of flexible PE household packaging

#### SUMMARY

The aim of this general notice is to assess the impact of flexible and rigid PP elements on the regeneration of flexible PE household packaging.



##### Sorting centre

Ability of packaging waste to be channelled to the regeneration plant



##### Regeneration

Ability of packaging waste to be converted into ready-to-use flakes or granulate



##### Use of recycled material

Ability of flakes or granulate to be converted into new products

Study scope

During sorting processes, 100% separation performance cannot be achieved, and therefore a small quantity of flexible PP packaging enters the flexible PE packaging stream on leaving sorting centres. Moreover, some flexible PE packaging may include non-separable PP elements. This notice seeks to assess the impact of PP on the regeneration of flexible PE household packaging.

Its results show that a rate of 1% PP (rigid or flexible) in the flexible PE household packaging stream affects the rheological properties of recycled PE. From a rate of 2% PP (rigid or flexible) in tonnage, the physical-chemical properties of recycled PE deteriorate significantly.

It should be noted that the appearance of the films produced was not assessed in this test. A further study may be performed to supplement this notice.

**In conclusion, given the current state of the equipment and techniques used, PP elements (rigid or flexible) associated with flexible PE packaging offer very limited compatibility with flexible PE regeneration. Acceptable PP thresholds are already being reached in flexible PE household bales.**

**COTREP encourages limited use of PP in combination with flexible PE packaging to maintain the quality of recycled PE and supports efforts to seek compatible alternatives.**

## 1. CONTEXT

Small quantities of PP and PP/PE multilayer films that are supposed to be rejected at sorting centres enter the flexible PE stream sent to regeneration plants. Separation performance at sorting centres is never 100%.

Moreover, some flexible PE packaging includes non-separable PP elements such as handles on multipack film, taps, spouts, zip fasteners, etc. Since these elements attached to PE film cannot be separated from the PE film in sorting centres, they are sent to regeneration plants for flexible PE packaging and are therefore regenerated as a mixture with PE.

This notice seeks to assess the impact of PP on the regeneration of flexible PE household packaging.

## 2. IMPACT ON REGENERATION

### 2.1. Principle and analytical criteria

In its recyclability study, COTREP assessed the impact of associated PP elements (rigid and flexible) mixed in with flexible PE packaging, particularly on the quality of recycled PE (rPE) produced from flexible household packaging.

These tests were performed on a pilot scale based on protocols defined by COTREP for recycling flexible PE packaging. The protocol is representative of industrial practices applied by European regeneration plants<sup>1</sup>.

Various physical-chemical criteria were measured during the test phases and compared to those of a standard sample composed of 100% rPE.

### 2.2. Test samples

Based on a market analysis, PP samples (PP films and taps representative of elements associated with flexible PE packaging) were selected and procured from several suppliers. These PP sources were incorporated into the standard film to simulate the addition of PP elements to the stream.









A 100% rPE film was produced exclusively as the standard film for the study from granulate sourced from French selective collection (flexible PE standard).

Penetration rates were determined based on the quality of flexible PE bales. Surveys performed on items leaving sorting centres reveal a mean rate of 2%.


COTREP sought to assess the impact of associated PP elements present based on rates of 1%, 2% and 5% to reflect minimum levels, mean levels and peak concentration in bales.

### 2.3. Results

#### IMPACT OF PP ELEMENTS ON FLEXIBLE PE REGENERATION PROCESSES

| RECYCLING PROCESSES  | IMPACT  | DESCRIPTION   |
|--|---|---|
| <br><b>SHREDDING</b>                  |  | No impact on shredding  |
| <br><b>WASHING AND DRYING</b>         |  | No impact on washing and drying   |
| <br><b>FLOTATION</b>                  |  | No change to the flotation water or residual elements on flakes   |
| <br><b>EXTRUSION/<br/>GRANULATION</b> |  | The mechanical properties of granulate deteriorate if flexible or rigid PP exceeds 2%.<br>⇒ Impact of MFI at PP levels of 2% or above |

<sup>1</sup> The protocols used can be consulted on the COTREP website: <https://www.cotrep.fr/etude-technique/#protocols>

| RECYCLING PROCESSES | IMPACT  | DESCRIPTION  |
|---------------------|---|--|
| BLOW EXTRUSION      |  | The strength of films produced is diminished at PP levels of 1% or above and properties deteriorate significantly at 2% or above.<br>⇒ PP deteriorates film quality at 1% or above |



Caution



No impact

## TECHNICAL CONCLUSIONS

Through tests performed by COTREP, it was possible to assess the impact of PP on the regeneration of flexible PE household packaging.

The results show that a rate of 1% PP (rigid or flexible) in the flexible PE packaging stream affects the rheological properties of recycled PE. From a rate of 2% PP (rigid or flexible) in tonnage, the physical-chemical properties of recycled PE deteriorate significantly.

It should be noted that the appearance of the films produced was not assessed in this test. A further study may be performed to supplement this notice.

**In conclusion, given the current state of the equipment and techniques used, PP elements (rigid or flexible) associated with flexible PE packaging offer very limited compatibility with flexible PE regeneration. Acceptable PP thresholds are already being reached in flexible PE household bales.**

**COTREP encourages limited use of PP in combination with flexible PE packaging to maintain the quality of recycled PE and supports efforts to seek compatible alternatives.**