

## General Notice

### Sorting and recycling potential of PE and PP spouted pouches

#### Summary

The aim of this General Notice is to assess the sorting and recycling potential of PE and PP spouted pouches (semi-rigid semi-flexible packaging)<sup>1</sup>.



#### 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

In 2020, the spouted pouch market primarily uses structures incorporating several PET/PE resins sometimes combined with an additional aluminium barrier layer. These spouted pouches are not recyclable. New mainly PE or PP solutions are emerging and COTREP wished to analyse the sorting potential of these packaging items in view of their specific semi-rigid semi-flexible design, and subsequently analyse their potential for French rigid PE and PP regeneration operators.

**To date and in view of sorting and regeneration technologies in France, PE and PP spouted pouches that follow COTREP guidelines, particularly in terms of barrier materials, are compatible with regeneration streams for rigid PP and PE packaging and, in theory, for flexible PE packaging.** Good design practices are encouraged to improve sorting of this packaging.

COTREP may review its opinion with regard to progress made in terms of eco-design, sorting and regeneration of PE and PP packaging.

<sup>1</sup> A spouted pouch is a semi-rigid (40%-60% of packaging weight) semi-flexible (40%-60%) packaging item comprising a flexible part, a base and a cap.

## 1/ CONTEXT



In just a few years spouted pouches have become a leading packaging format for consumers. Every year, between 4,000 and 5,000 tonnes of spouted pouches are used mainly in the puree and dairy produce sector. This is the only packaging item on the market that is semi-rigid (40%-60%) and semi-flexible (40%-60%). Its hybrid composition could have an impact on its potential for processing in sorting centres.

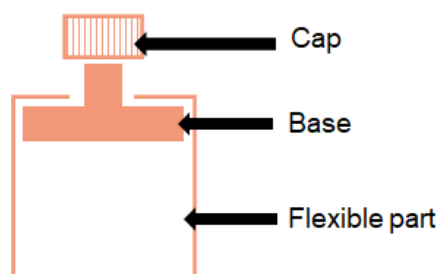
This notice concerns spouted pouches only and not doypacks, stand up spouted pouches or bag in box formats which have a larger proportion of flexible material (> 60%) and a different potential for processing in sorting centres.

The spouted pouches marketed in 2020 are mainly composed of several resins, and combine a PET layer and a PE layer, with a barrier and binders. Some spouted pouches also use an aluminium barrier or metallised lining. These spouted pouches are not recyclable to date and COTREP is not aware of industrial projects aiming to recycle this type of "composite" structure in the long term.

To provide consumers with recyclable spouted pouches, packaging manufacturers and marketers sought to develop mainly PE or PP spouted pouches.

## 2/ SPOUTED POUCHES

Spouted pouches have three components: a flexible part, a base and a cap. The weight ratio between the flexible part and the two rigid components is between 40%/60% and 60%/40%, making this packaging system a highly specific case for the market.



**Figure: Representation of a spouted pouch and its 3 components**

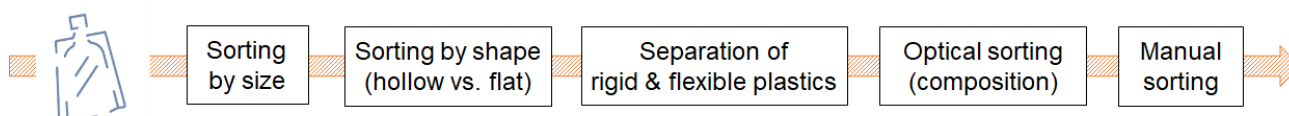
The three components (flexible part, base and cap) of PE spouted pouches tested by COTREP are mainly made of PE. Similarly, PP spouted pouches are mainly made of PP.

Spouted pouches are packaging items that use gas barriers. To find out which barriers are compatible and tolerated during regeneration, please refer to the COTREP guidelines.

### 3/ POTENTIAL IN SORTING CENTRES

Spouted pouches therefore have a half-rigid, half-flexible structure. It was decided to conduct tests in real-life conditions at sorting centres in a bid to ascertain the potential of PE and PP spouted pouches.

Tests were conducted at 3 sorting centres representative of the centres which implement the extended sorting guidelines. A representative sample of several hundreds of spouted pouches was put to the test, taking into account the diversity of packaging formats entering the sorting centre (flat, rolled up, with or without cap, etc.). The tests were supplemented by static and dynamic optical sorting tests at Tomra and Pellenc ST.



The tests produced three conclusions:

- Similar capture rate to the other packaging items for which sorting guidelines have been extended.
- Almost half of the spouted pouches captured were channelled to rigid packaging, then during optical sorting PE spouted pouches were channelled to rigid PE streams and PP spouted pouches were channelled to rigid PP streams.
- Almost half of the spouted pouches captured were channelled to flexible packaging, then during optical sorting PE spouted pouches were channelled to the PE stream and PP spouted pouches were rejected due to a lack of established stream.

Recyclability of PE spouted pouches therefore needs to be examined in view of two recycling streams, the stream processing flexible PE packaging and the stream processing rigid PE packaging.

Recyclability of PP spouted pouches needs to be examined in view of the stream that processes rigid PP packaging only.

### 4/ PP SPOUDED POUCH POTENTIAL DURING PP REGENERATION

In view of this particular problem relating to spouted pouches with a semi-flexible semi-rigid structure, COTREP decided to conduct tests in real-life industrial conditions with partner regeneration operators.

Based on the tonnage of spouted pouches currently marketed and the potential of spouted pouches in sorting centres, COTREP estimates that PP spouted pouches could represent a little over 2% of rigid PP bales on average if the entire market were to switch to this solution. It was decided to conduct tests on 5% of spouted pouches in bales to simulate variability in bale composition.

Almost 100 kg of PP spouted pouches were introduced into just under 2 tonnes of rigid PP packaging waste and tested in industrial regeneration conditions.





The presence of the spouted pouches did not affect the regeneration process: no jamming or shredding problems, etc.

The rigid part of the spouted pouch is properly captured on entry to the regeneration process and right up to the production of flakes then granulate. On the other hand, the flexible part is partly eliminated from the stream, and the tests show that between 33% and 55% of the flexible part of the spouted pouch reaches process completion.

The moisture content of flakes is not affected by the presence of the spouted pouches.

Granulate was produced and characterised. The spouted pouches cause a slight rise in the melt flow rate of recycled PP but the figure remains within the value range accepted by users.

### Details of the impact of PP spouted pouches during rigid PP regeneration

Recycling stage	Impact	Description
 <b>SHREDDING</b>	∅	The spouted pouches were shredded with rigid plastics without any impact  Loss of flexible flakes
 <b>FLOTATION</b>	∅	No separation between rigid and flexible plastic is possible in the washer
 <b>WASHING AND DRYING</b>	∅	The moisture content of flakes after drying is not affected by the presence of the spouted pouches  Loss of flexible flakes
<b>SUCTION</b> (optional)	∅	Loss of flexible flakes
 <b>EXTRUSION/ GRANULATION</b>	∅	Quality of granulate compliant



: Caution

∅: No impact

### 5/ PE SPOUDED POUCH POTENTIAL DURING RIGID PE REGENERATION

In view of this particular problem relating to spouted pouches with a semi-flexible semi-rigid structure, COTREP decided to conduct tests in real-life conditions with French partner regeneration operators.

Based on the tonnage of spouted pouches currently marketed and the potential of spouted pouches in sorting centres, COTREP estimates that in the future PE spouted pouches could represent a little over 2% of rigid PE bales on average if the entire market were to switch to this solution. It was

decided to conduct tests on 5% of spouted pouches in bales to simulate variability in bale composition.

Almost 100 kg of PE spouted pouches were introduced into 2 tonnes of rigid PE packaging waste at sorting centre output and tested in real-life industrial regeneration conditions.


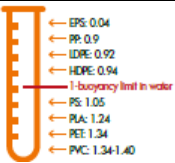


The presence of the spouted pouches did not affect the regeneration process: no jamming or shredding problems, etc.

The rigid part of the spouted pouch is properly captured on entry to the regeneration process and right up to the production of flakes then granulate. On the other hand, the flexible part is partly eliminated from the stream, and the tests show that between 44% and 61% of the flexible part of the spouted pouch reaches process completion.

The moisture content of the final flakes is not affected by the presence of the spouted pouches.

Granulate was produced and characterised. The results are comparable with the usual characteristics measured by rigid PE regeneration operators.

Details of the impact of PE spouted pouches during rigid PE regeneration

Recycling stage	Impact	Description
 <b>SHREDDING</b>	∅	<p>The spouted pouches were shredded with rigid plastics without any impact</p> <p>Loss of flexible flakes</p>
 <b>FLOTATION</b>	∅	<p>No separation between rigid and flexible plastic is possible in the washer</p>
 <b>WASHING AND DRYING</b>	∅	<p>The moisture content of flakes after drying is not affected by the presence of the spouted pouches</p> <p>Loss of flexible flakes</p>
<b>SUCTION</b> (optional)	∅	<p>Loss of flexible flakes</p>
 <b>EXTRUSION/ GRANULATION</b>	∅	<p>Quality of granulate compliant</p>



: Caution

∅: No impact

## **6/ PE SPOUTED POUCH POTENTIAL IN THE FLEXIBLE PE STREAM**

In view of the initial feedback from regeneration operators and current COTREP guidelines, the different components of PE spouted pouches should not normally affect the regeneration phase. At this stage, COTREP has decided not to conduct specific tests on these packaging items and to rely on existing knowledge.

To find out which barriers are recommended, please refer to the COTREP guidelines.

### **TECHNICAL CONCLUSIONS**

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The tests and studies conducted by COTREP on PE and PP spouted pouches confirm that these packaging items are suitable for sorting and regeneration.

**Consequently, with the current state of equipment and techniques used in France, PE and PP spouted pouches are compatible with regeneration streams for rigid PE and PP packaging and, in theory, for flexible PE packaging.** Given the existence of recycling streams for flexible and rigid PE, PE spouted pouches are more likely to be channelled to regeneration streams than PP spouted pouches.

COTREP recalls that the presence of flexible packaging in rigid PE and PP bales negatively affects recycling. Seals that are still associated with rigid end-of-life packaging, labels and spouted pouches must remain exceptional. See COTREP notices AG 60 and AG 61 for further information.

This opinion may be reviewed with regard to progress made in terms of eco-design, sorting and regeneration of PE and PP packaging.