



GENERAL NOTICE 66

Impact of sleeves on the sorting and recycling of rigid PE packaging

SUMMARY

The purpose of this general notice is to assess the sorting and recycling potential of rigid PE packaging items featuring a sleeve.

Sleeves have already been studied by COTREP and been the subject of a number of publications. In this notice, COTREP wished to further its analysis of the end-of-life of rigid PE packaging with PETG, PE, PO, PS or PVC sleeves by conducting new sorting tests and broadening its recommendations to all sleeves available on the French market.

Given the current state of equipment and techniques used in France, the tests and studies conducted by COTREP on PE packaging items show that not all sleeves (up to 60µm) react in the same way. COTREP recommends using a partial label and sleeve to maximise capture of the packaging at sorting centres and guarantee transfer to regeneration plants.

SORTING AND RECYCLING POTENTIAL OF RIGID PE PACKAGING ITEMS WITH SLEEVES (< 60 MICRONS THICK)

MATERIAL	IMPACT DURING SORTING AND REGENERATION		COTREP'S OPINION
PETG	 Sorting	A full design reduces sorting efficiency	Limited compatibility - conditional
	 Regeneration	Compatible but resulting in greater losses and waste at regeneration plants	
PS	 Sorting	A full design reduces sorting efficiency	Limited compatibility - conditional
	 Regeneration	Compatible but resulting in greater losses and waste at regeneration plants	
PVC	 Sorting	A full design reduces sorting efficiency	Non-compatible and/or disruptive
	 Regeneration	Limits potential recovery from regeneration plant rejects	
PO	 Sorting	A full design reduces sorting efficiency	Partial compatibility – tolerated
	 Regeneration	The bottle is mainly directed to the PE stream	
PE	 Sorting	No impact on sorting	Full compatibility – ideal
	 Regeneration	No impact on regeneration	

COTREP may review its opinion with regard, in particular, to progress in recognition at sorting centres, sleeve perforation and compatibility between the materials used for the sleeve and packaging.

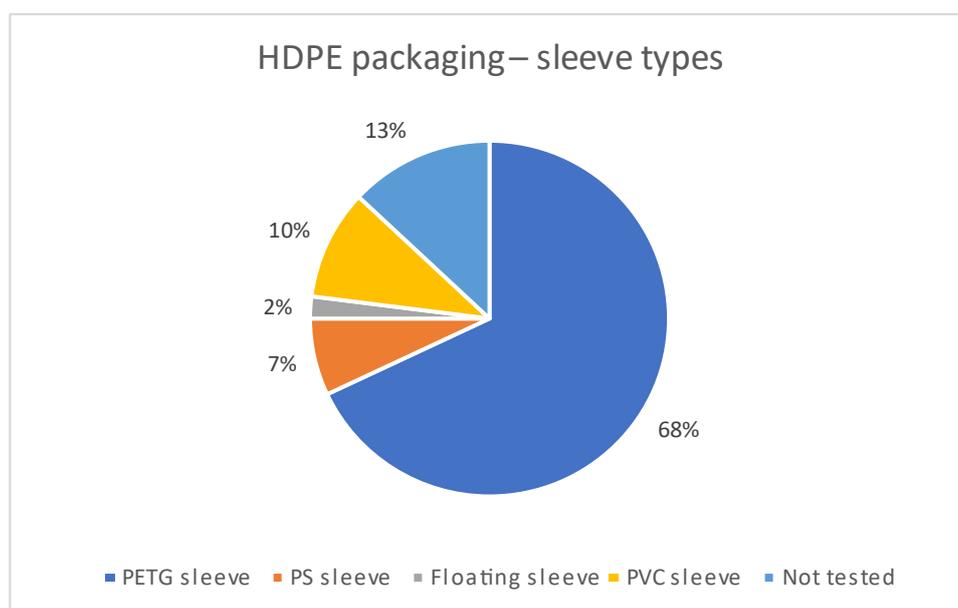
1. CONTEXT

Labels and sleeves are essential components of rigid plastic packaging items for household use. They enable manufacturers to meet their obligations regarding consumer information, giving details relating to the brand, product composition, use-by date, usage precautions where applicable and the procedure to follow for recycling the packaging after use.

In recent years, the use of sleeves has developed on the French market, in some cases to perform a particular function (conceal product decanting, add a light barrier without requiring additives to PE, etc.) and in other cases for marketing purposes.

Sleeves can be partial or cover the full packaging body. Their main difference with labels is that they do not require adhesive as they are generally heat- or steam-shrunk to the body (except for PE stretch sleeves, in which case the material's elasticity suffices to hold the sleeve in place).

In 2018, there were 6,900 tonnes of rigid PE packaging with sleeves on the French market, i.e. 7% of rigid PE packaging. PETG, PVC and PS are the main components of sleeves on the French market:



COTREP wished to deepen understanding of this packaging's sorting and recycling potential to help the companies concerned better understand the issue and identify appropriate solutions.

2. MATERIALS USED FOR SLEEVES

To date only shrink sleeves are used on rigid PE packaging on the French market. These can be made of:

- PETG,
- PS,
- PO,
- PE,
- PVC.

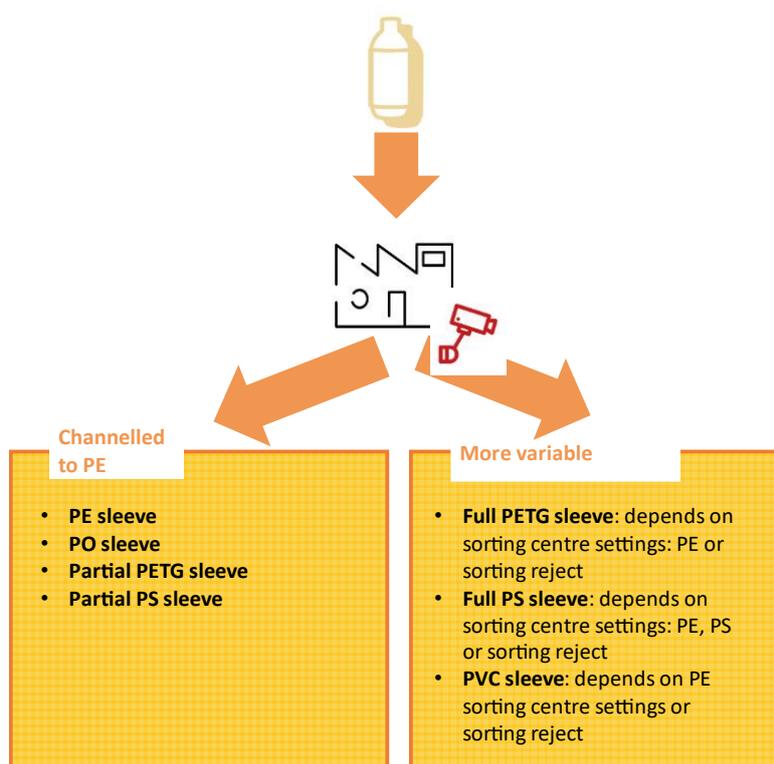
The 5 sleeve types listed above were assessed in the context of this notice.

3. POTENTIAL AT SORTING CENTRES

When passing through sorting centres, the sorting potential of rigid sleeved packaging during the optical sorting phase depends on several factors:

- **Sleeve thickness:** the thicker the sleeve, the more difficult it will be to identify the material of the packaging beneath it. The sleeves tested by COTREP have a thickness of between 40 and 60 microns (representative of the market) and these thicknesses enabled the PE to be identified beneath the sleeve. These thicknesses are not a limiting factor for sorting.
- **Coverage rate:** the size of the sleeve will affect the packaging's sorting efficiency. On packaging **with a volume of 500 ml or more, a sleeve covering 70% of the packaging body** at most is recommended to improve the capture rate. On packaging with smaller volumes, a proportion of 50% of the packaging body at most is recommended. Transparent areas can improve packaging capture, particularly when they are at the top or bottom of the sleeve.
- **Printing: a metallised sleeve** for design purposes renders the packaging undetectable by optical sorting systems, as the NIR radiation will not be able to identify it. **A large solid black fill** on the inner or outer surface can also adversely affect sorting or block radiation at the sleeve surface material.
- **Sleeve resin:** optical sorters scan the combination of packaging resin and sleeve resin to determine channelling at the sorting centre.

The diagram below shows the results of COTREP tests simulating the technologies and configurations currently used at French sorting centres.

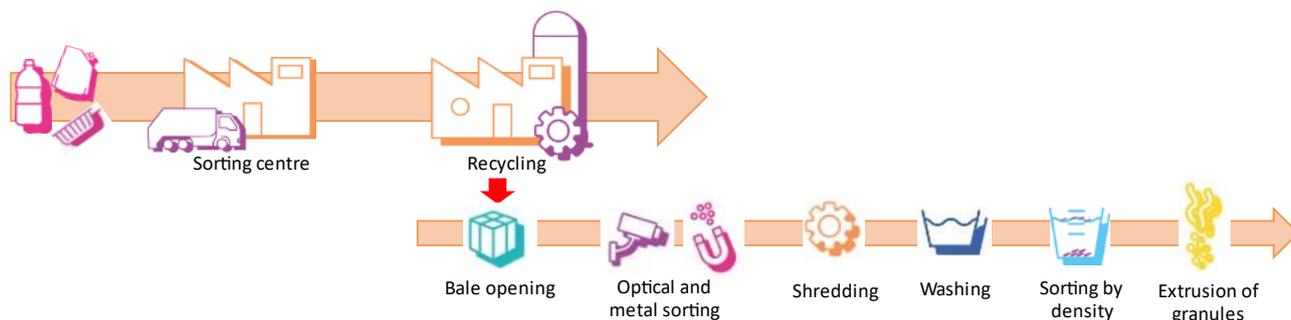


With the exception of PE and PO sleeves, the presence of a full sleeve on rigid PE packaging makes sorting more complicated and random; it therefore has a lower capture rate than packaging with a partial design. "Full" is understood to mean a sleeve that covers more than 70% of the packaging body in the case of packaging with contents of 500ml and more (50% for contents less than 500ml).

COTREP performed static and dynamic sorting tests on PE packaging with both a PETG sleeve and a PO sleeve. PE packaging with a PS sleeve only underwent static testing. COTREP is open to working with manufacturers prepared to perform dynamic sorting tests on this type of packaging and to updating its opinion as necessary.

4. POTENTIAL DURING PE REGENERATION

Five types of sleeved packaging were identified as fully or partly channelled to PE bales (or PE/PP or PE/PP/PS bales depending on configurations) at sorting centres: PE, PO, PETG, PS and PVC sleeves. These bales are then regenerated and mainly used to produce pipes according to the following procedure:



PE packaging items with a PE sleeve are channelled to the regeneration plant and the sleeve is mostly separated from the rigid flakes after sorting by density, for example during aerulic sorting after drying. The majority of sleeves are directed to energy recovery.

PE packaging items with a PO sleeve are channelled to the regeneration plant. During optical sorting, the majority of bottles are channelled to the PE stream where the sleeve is mostly separated from the rigid flakes after sorting by density, for example during aerulic sorting after drying. The majority of sleeves are directed to energy recovery.

PE packaging items with a PETG, PS or PVC sleeve partly arrive at regeneration plants; a full sleeve leads to loss of bottles at sorting centres. Once at the regeneration plant, the packaging undergoes an optical sorting phase to separate PE packaging from PP packaging and purify the materials. During this sorting phase, the presence of a sleeve can result in further bottle losses. Subsequently, the remaining packaging is recycled. Most sleeves are sent for energy recovery where PVC is considered disruptive. You are therefore strongly recommended to avoid using PVC sleeves.

PE regeneration plants are not generally equipped with de-labellers, designed to remove any labels remaining on the bottles prior to sorting, or pre-washers for the entire packaging item. De-labellers were designed for labels and are currently not able to remove sleeves efficiently.

TECHNICAL CONCLUSIONS

Given the current state of equipment and techniques used in France, the tests and studies conducted by COTREP on PE packaging items with a sleeve lead to the following conclusions:

- PE sleeves do not disrupt sorting and regeneration.
- PO sleeves do not disrupt sorting and are compatible with regeneration streams. Full sleeves reduce the capture rate of packaging items at regeneration plants in comparison with packaging with a partial design.
- PETG or PS sleeves are compatible with regeneration streams. Regardless of their coverage rate, full sleeves reduce the capture rate of packaging items at sorting centres and result in greater losses and waste at regeneration plants.
- Regardless of their coverage rate, full PVC sleeves reduce the capture rate of packaging items at sorting centres and limit potential energy recovery from regeneration plant rejects.

COTREP recommends using designs that maximise capture of the packaging at sorting centres and guarantee transfer to regeneration plants.

In the meantime, COTREP may review its opinion with regard to progress made in terms of eco-design, sorting and regeneration of PE bottles.

For further information:

- *General Notice 12 – Introduction to labels and sleeves*
- *General Notice 14 – PVC sleeve on PE*
- *General Notice 18 – PE sleeve on PE*
- *General Notice 43 – PS sleeve on PET*