Committee for Studying the Behaviour of Packaging in Sorting Centres

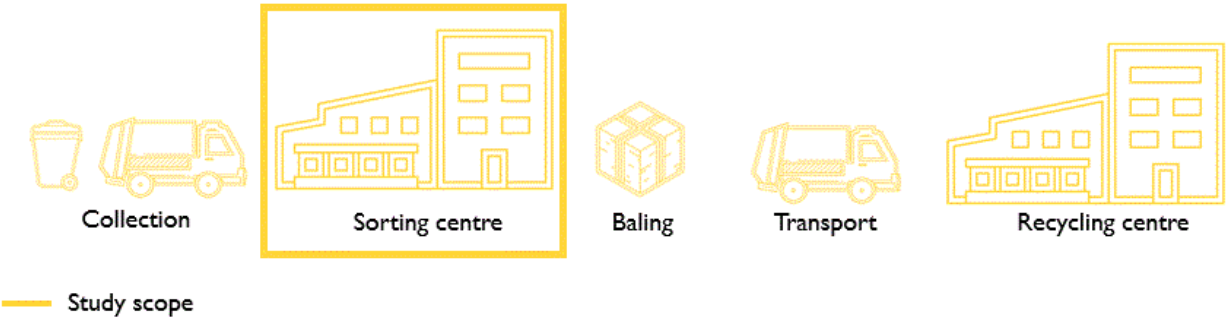
Material
Flexible plastic

GENERAL NOTICE 8

Impact of dark colours on the sorting of flexible plastic packaging

SUMMARY

This general notice aims to assess the behaviour in sorting centres of dark flexible plastic packaging.



In sorting centres, flexible plastic packaging (consisting of more than 50% flexible plastic) is intended to be directed to different recycling streams depending on its resin. Recycling streams are available for flexible PE resins. Recycling streams are under development for flexible PP and PE/PP packaging.

The dark colours of flexible plastic packaging may disrupt its ejection to its target recycling stream. COCET checked the impact of dark colours on the detection and ejection of the infrared signal emitted and received by the optical sorting machine.

The ejection of flexible plastic packaging by optical sorting is:

- **Acceptable if the packaging surface area covered by dark parts is ≤50% of the surface of the packaging**
- **Unacceptable if the packaging surface area covered by dark parts is >50% of the surface of the packaging**

To ensure that dark flexible plastic packaging is directed to the target stream, COCET recommends not exceeding a coverage rate of 60% for the dark parts.

This notice pertains solely to the behaviour of the packaging in sorting centres and provides no indication of the impact of the issue studied during the recycling of this packaging in its target stream.

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1 Context

This notice seeks to assess the impact on sorting of dark colours on flexible plastic household packaging. This notice applies to packaging that is fully or partially dark in colour, with the colouration achieved by printing or mass-colouration.

"Dark packaging" refers to dark-coloured packaging (black, dark grey, dark blue, dark green, etc.) which may or may not contain carbon black.

This feature needs an aesthetic requirement (market code).

Sectors concerned with this type of packaging include food, detergents, cosmetics & personal care products, etc.

COCET carried out optical sorting tests to assess the impact of dark colours on the sorting of flexible plastic packaging.

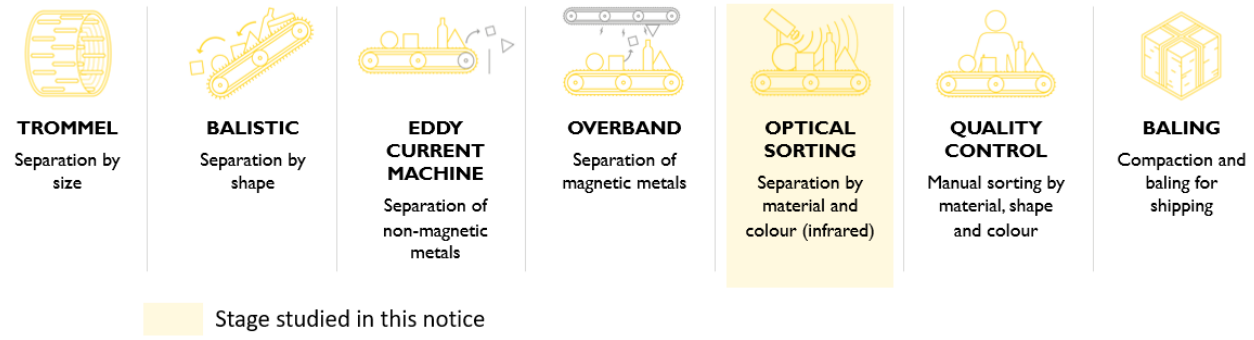
This notice does not concern:

- Flexible plastic packaging with a layer of black plastic sandwiched between two layers (of plastic and/or paper/cardboard)
- Rigid plastic packaging

2 Scope of the notice

This notice aims to assess the ejection of dark flexible plastic packaging in sorting centres. It does not assess its suitability for recycling in the target flexible plastic stream.

The identified risk of disruption for dark packaging is material separation (by optical sorting machine). The study of the behaviour of this packaging in sorting centres therefore focused on this stage.



3 Tests performed

Sorting tests were performed to understand how the presence of dark colours on flexible plastic packaging would affect its ejection during the sorting process.

The dark parts covered all or part of the flexible plastic packaging.

Optical sorting

Static and dynamic optical sorting tests were conducted at optical sorting machine manufacturers to assess the impact of these decorations on the detection and ejection of the packaging at this stage.

Several dark-colour coverage rates were tested, ranging from 20% to 100% of the packaging.

- The static tests revealed that the dark parts were not detected by optical sorting, with the exception of one sample.
    - For the samples where the dark parts were not detected, we observed that the infrared beam was incapable of returning a strong enough signal to identify the material of these parts: the colorant was undetectable.
    - For the sample where the dark parts were detected, the signal returned by the infrared bream was strong enough to identify the material: the colorant was detectable.
    - We also observed that if packaging has non-dark parts (decorations, solid colour fills, etc.), optical sorting is able to detect which material it is made of (even if the dark parts themselves are not detected).
- During dynamic tests, we observed that the higher the coverage rate of the dark parts, the less the packaging is ejected towards its target stream:
    - The sorting of packaging with dark parts covering up to 50% of the surface is acceptable.
    - Packaging with dark areas covering 70% or more is not acceptable for sorting.

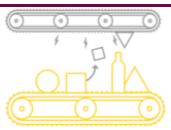
If the dark colour of flexible packaging is obtained using a detectable colorant and the packaging contains no other sorting disruptors, its sorting will be acceptable.

If the dark colour of flexible packaging is obtained using an undetectable colorant and the dark parts cover less than 50% of the packaging surface, its ejection to its target recycling stream is also acceptable. However, if the dark parts cover over 50% of the packaging surface, its ejection is unacceptable.

Assessing the behaviour of the packaging tested during optical sorting (OS)

Parameter studied	Ejection rate during OS	COCET's assessment
Coverage rate of dark parts ≤50%	Over 80%	**Acceptable**
Coverage rate of dark parts >50%	Lower than 80%	**Unacceptable**

Impact during sorting stages

Sorting stage	Impact	Description
TROMMEL	∅	
BASLISTIC	∅	
 EDDY CURRENT	∅	
 OVERBAND	∅	
OPTICAL SORTING	⚠	Optical sorting is disrupted if the colorant is undetectable and the dark parts cover more than 50% of the packaging.
 QUALITY CONTROL	∅	
BALING	∅	

✓ No impact ⚠ Caution ∅ Not tested or not concerned

CONCLUSION

Given the current state of equipment and sorting techniques available in France, the dark colour of flexible packaging may disrupt the sorting process.

- If the dark colorant is detectable, the sorting of this packaging is **acceptable**.
- If the dark colorant is undetectable and the dark part covers up to 50% of the packaging surface, sorting remains **acceptable**.
- Otherwise, the sorting of the packaging is **unacceptable**.

COCET may review this notice considering developments in sorting technologies, markets or quality requirements for recycled material.