

GENERAL NOTICE

Impact of PET aerosol dispensers on the recycling of PET bottles, pots and trays

SUMMARY

The purpose of this general notice is to assess whether PET aerosol dispensers can be sorted and recycled when mixed with PET packaging recycling streams without affecting sorting and recycling processes or the quality of recycled PET.



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

The results of tests carried out on the premises of industrial operators handling this stream show that **PET aerosol dispensers are not compatible with sorting and recycling of PET packaging:**

- In sorting centres, the test aerosols' shape and associated design elements (sleeves, labels, etc.) hampered their allocation to a predefined stream;
- On regeneration lines, the inclusion of PET aerosol dispensers in PET bales resulted both in significantly higher material losses and flakes that were not compliant with the technical specifications of customers using the R-PET;
- Some aerosols contain flammable gases, and while risk assessments have been performed on baling conditions at sorting centres, no study has yet been conducted on regeneration conditions.

Given the current state of equipment and sorting and regeneration techniques available in France, PET aerosol dispensers are not recyclable when mixed with PET packaging streams.

COTREP may review its opinion in light of any developments in the design of PET aerosol dispensers aimed at minimising components causing the issues raised during these test campaigns.

1/ CONTEXT

A PET aerosol dispenser consists of a main container made of PET, which contains a product to be sprayed and a pressurised gas. The product is sprayed using a dispensing system composed of a valve and a nozzle, comprising several parts made of different materials, including metals.

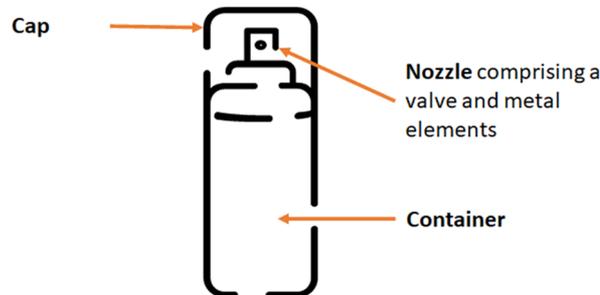


Diagram of an aerosol dispenser

The aerosol dispenser body is wrapped in a full sleeve made of copolyester (PETG or other) or PS, and this may be multicoloured.

Various pressurised gases are used in aerosol dispensers, and they may or may not be flammable. The type of gas used depends on the product and the type of spray required. 85% of the gases currently used in metal aerosol cans available on the market are flammable. According to the French Aerosols Committee (CFA), due to limited compatibility between these flammable gases and PET aerosols (pressure, content/container interactions, etc.), the market share of PET aerosols containing flammable gases is much lower than that of their metal equivalents.

Initial studies have shown that almost 5% of metal aerosols contain flammable gas residues at end-of-life. Estimates suggest that the percentage of PET aerosol dispensers containing flammable gases is lower, largely due to the fact that the packaging is transparent, making it easier for consumers to empty it properly.

At present, plastic aerosol dispenser is an innovation that represents a negligible proportion of the European market (< 1%). However, these PET aerosol dispensers are experiencing growth in some north American and European countries and are beginning to make headway in the French market because it answers various both consumer's and producer's needs. In 2019, the French Aerosols Committee considered 2 market penetration scenarios for France:

- A low-level scenario of 5% over 10 years (26.5 million packaging units)
- A high-level scenario of 10% over 5 years (53 million packaging units)

Since contact was first made with some CFA members and brands in 2018, several test campaigns have been conducted to assess the potential of PET aerosols in industrial units, namely collection trucks, sorting centres and regeneration lines.

2/ COLLECTION & SORTING TESTS

Aerosols in various conditions are encountered in sorting centres, and may be:

- in their original shape or flattened following crushing on collection;
- empty or contain various levels of residual product up to being completely full.

Tests were performed at several sorting centres. Aerosols that remained in their original shape were generally detected as PET yet ineffectively captured. Optical sorting machine efficiency was seriously compromised due to a combination of the objects' shape and weight. This resulted in aerosols not being directed to the identified stream and a significant percentage being rejected or contaminating other recycling streams.

The CFA provided COTREP with details of a study conducted by the French National Institute for Industrial Environment and Risks (INERIS) on flammability risks during baling. Tests were performed on various percentages of aerosols filled to different levels, with up to 2.5% aerosols in PET bales to simulate maximum volumes. They demonstrated that the risk of ignition during bailing at sorting centres is currently very limited. However, this study focused on only one stage in the recycling chain.

3/ REGENERATION LINE TESTING

Tests were performed at several PET regeneration sites in 2019 and early 2020.

Metal detector tests on regeneration line entry

Aerosols with metal valves are ejected by the metal detector if they have previously been flattened, while aerosols still in their original shape roll on conveyors and are ejected randomly.

Sorting equipment test at clear PET regeneration line entry

The potential of containers with different combinations of weight, shape and design elements was variable, with some directed to rejects and others to the clear PET stream.

Tests on a coloured PET regeneration line

Aerosols were added to coloured PET bales at a rate of 1.3%, which is defined as representative by the CFA based on estimated market penetration.

On the regeneration line:

- o Some PET aerosol dispensers roll on the conveyor (having either kept their original shape, not all been flattened despite baling, or even regained their original shape after compression, compromising ejection by optical sorting).
- o 2% increase in the quantity of waste produced at the regeneration plant (based on the tests performed: 1/3 during sorting at line entry, 1/3 at the metal detector, 1/3 during final sorting of flakes), which is higher than the quantity of aerosols initially introduced.
 - The inclusion of aerosols results in reduced material yield (ratio of output PET flake quantities to the quantity of PET bales at line entry), since the ejection of aerosols and contaminants leads to the loss of good PET material, which in reality is not recycled.
 - The waste produced incurs costs for elimination when PET bales entering the process are purchased.
- o The flakes produced are not compliant with customer specifications due to excessive levels of metal contaminants, POM, TPE and PETG.

The conclusions for this test conducted in the coloured PET stream are applicable to the clear PET stream whose specifications regarding contaminant levels are more restrictive. Moreover, for rPET intended for contact with food, the permitted proportion of packaging that has not been in contact with food is limited to 5%, thus also limiting quantities of PET aerosol dispensers for this stream.

4/ RESULTS

Recycling stage	Impact	Description
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<p>Sorting centres</p>		<p>Aerosols are generally detected as PET, but randomly directed due to the shape of aerosols and/or their associated design elements (sleeves, labels, etc.)</p> <p>→ Disruptions to recycling streams</p>
<p>Sorting of packaging at regeneration line entry</p>		<p>Depending on site set-up, aerosols are detected by metal detector and/or infrared sorting, but directed randomly due to their shape and/or associated design elements (sleeves, labels, etc.)</p> <p>Increased quantity of waste produced</p> <p>→ Significant reduction in efficiency</p>
<p> SHREDDING</p>		<p>The inclusion of metal may result in more rapid wear to shredder blades</p> <p>Risks have not been assessed with regard to flammable gases</p>
<p> WASHING AND DRYING</p>		<p>No impact identified</p>
<p>Flake sorting</p>		<p>Increased quantity of waste produced by metal and optical sorting of flakes</p> <p>→ Significant reduction in efficiency</p>
<p>Flake quality</p>		<p>Flakes not compliant with customer specifications due to the inclusion of metals, POM, PETg and TPE</p> <p>→ Flakes not compliant</p>

: Caution : No impact

5/ TECHNICAL CONCLUSIONS

The results show that PET aerosol dispensers are not compatible with recycling of PET packaging.

In sorting centres, PET aerosol dispensers may be detected during optical sorting, but randomly directed due to their shape. PET aerosol dispensers are directed either to:

- Rejects, in which case aerosol dispensers are not recycled.
- Or PET packaging recycling streams, in which case aerosol dispensers are included in PET bales sent to regeneration plants.
- Or to other recycling streams, in which case aerosol dispensers need to be eliminated, thus reducing the regeneration efficiency of these streams.

At PET regeneration plants, automatic sorting systems may identify PET aerosol dispensers as metal elements and reject them. If this occurs, the PET part of the aerosol dispenser will not be recycled.

If, despite everything, aerosol dispensers still enter the PET stream:

- There is a risk of ignition when shredding aerosol dispensers at regeneration line entry;
- The inclusion of aerosols results in increased quantities of waste produced (rejects) and therefore significantly lower material yield;
- The inclusion of aerosols also significantly increases levels of metals¹, PETG², POM and TPE in output flakes, rendering them non-compliant with customer specifications.

Given the current state of equipment and sorting and regeneration techniques, PET aerosol dispensers are not recyclable when mixed with PET packaging.

COTREP may review its opinion in light of any developments in the design of PET aerosol dispensers aimed at minimising components causing the issues raised during these test campaigns, notably including:

- A study of flammability in regeneration centres (shredder)
- Work on elements that disrupt or prevent recycling (metal parts, PETg, POM and TPE)
- Work on sortability, including measures relating to shape.

¹ General Notice 39: <https://www.cotrep.fr/content/uploads/sites/3/2018/11/ag39-bouteilles-et-flacons-pet-pompe-avec-elements-en-acier.pdf>

² General Notice 44: <https://www.cotrep.fr/content/uploads/sites/3/2018/11/ag44-bouteilles-et-flacons-pet-etiquette-et-manchon-petg.pdf>