



GENERAL NOTICE 81

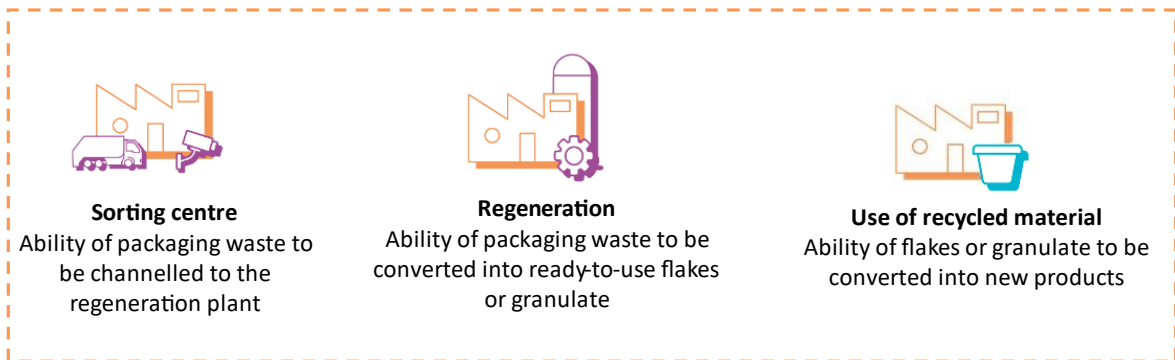
Impact of PP trays with absorbent pads on the sorting and regeneration of rigid PP household packaging

SUMMARY

The aim of this general notice is to assess the sorting and mechanical regeneration potential of rigid PP packaging with an absorbent pad.

Absorbent pads are mainly used in the bottom of food trays to absorb exudate, the juice released from meat, poultry or fish. They generally consist of two PE layers surrounding a layer of cellulose, and are stuck to the tray with a spot of adhesive.

This notice does not concern absorbent pads used for fragile fruit (similar to bubble padding), which are made with a different production technique and differ in composition.



Study scope

During the optical sorting stage, depending on its coverage rate an absorbent pad can prevent packaging from being detected correctly. Sorting tests determined that the presence of an absorbent pad covering no more than 70% of the surface of the tray bottom does not affect detection.

Pilot-scale regeneration tests were then conducted to assess the impact of this packaging on mechanical recycling and recycled material quality. Results obtained show that the presence of an absorbent pad disrupts certain stages of the rigid PP mechanical regeneration process. During the washing stage, the wash water was found to be viscous and cloudy. Additionally, the presence of absorbent pads affects extrusion/granulation above a proportion of 4%. Most of the mechanical properties of the rPP* plant pot produced are consistent with the standard; however, there may be a slight impact on certain mechanical properties such as tensile stress at break.

Given the current state of equipment and sorting and regeneration techniques available in France, the use of absorbent pads consisting mainly of cellulose and PE in a PP tray offers limited compatibility with rigid PP streams.

COTREP may review this notice in light of developments in sorting and recycling technologies, markets, or quality requirements for recycled material.

**rPP means recycled material from rigid PP packaging.*

1. CONTEXT

Absorbent pads are used to absorb exudate, the juice released from meat, poultry or fish. They generally have the following composition (standard design, non-exhaustive): PE/adhesive/cellulose/adhesive/PE. Some manufacturers also use super absorbent fibre (or SAF) pads combined with cellulose for more efficient absorption, or microporous material.

Absorbent pads are mainly assembled by gluing to the tray: adhesive is automatically applied on the thermoforming line, or else with a specific machine. Ultrasound sealing also exists but is still uncommon, and there is a risk of piercing the tray. Lastly, assembly without either adhesive or sealing is very rare as the absorbent pad could become detached during the different steps of the process (tray unstacking or in the consumer's home when the pad remains stuck to the meat).

PP trays with absorbent pads account for 4% of PP food tray tonnage, i.e. approximately 2,500 tonnes.

This notice seeks to assess the impact of using absorbent pads in PP trays on detection by optical sorting and mechanical regeneration of the rigid PP stream by injection moulding and on material quality.

The technical characteristics of the recycled material were assessed with a view to reprocessing as plant pots (injection moulding), an application representative of outlets for rPP material.

2. IMPACT ON OPTICAL SORTING

The impact on optical sorting study consisted of assessing the impact of the absorbent pad and certain parameters (colour, coverage rate) on the detection of PP trays from household packaging waste.

Static and dynamic optical sorting tests were performed on the premises of optical sorting equipment manufacturers Tomra and Pellenc ST, with several samples of packaging representative of the market of absorbent pads in PP food trays. The aim is to determine the parameters that could prevent the packaging from being correctly detected and channelled to its target recycling stream.

2.1. Test samples

Tests were performed on several types of PP trays with absorbent pads representative of structures available on the market. Four samples were tested with the following characteristics:

- Tray colour: white, crystal or natural
- Coverage rate* between 40% and 70%. COTREP did not test coverage rates above 70% as this configuration is not available on the market
- Absorption capacity: 2, 5 or 10 L/m²
- Pad colour: white
- Pad placement method: spot of adhesive
- Adhesive not detachable during washing

The test samples did not contain food residue.

2.2. Results of static optical sorting tests

The packaging was positioned beneath the optical sorting machine with near infrared (NIR) technology. The static tests were performed with dry absorbent pads, absorbent pads soaked in water (to represent an absorbent pad soaked in exudate), on the top side (absorbent pad visible), on the underside (absorbent pad beneath the tray) and with the absorbent pad folded in two (absorbent pad inside). The results were as follows:

- ⇒ In all the test configurations, the samples were detected as rigid PP packaging and the absorbent pad did not affect detection.

**The coverage rate corresponds to the ratio between the absorbent pad surface and the surface of the tray bottom.*

2.3. Results of dynamic optical sorting tests

COTREP provided pilot sorting lines with a rigid packaging stream from French sorting centres. The dynamic tests were performed on trays with dry absorbent pads only. 100 samples of PP trays with absorbent pads were injected into the packaging stream from French sorting centres. The machines were set to eject packaging to the rigid PP stream (target stream) based on the standard settings used in French sorting centres. The results were as follows:

- ⇒ The results showed that more than 90% of the test packaging was channelled to the rigid PP stream, and the absorbent pad did not affect detection.

IMPACT OF RIGID PP TRAYS WITH ABSORBENT PADS ON OPTICAL SORTING PROCESSES



No impact on optical sorting; the PP trays with an absorbent pad (max. 70% coverage rate) were correctly directed to the rigid PP stream

To ensure that packaging is directed to the appropriate recycling stream, the absorbent pad should not exceed 70% coverage. You are recommended to work with the smallest possible coverage rate to meet optical sorting capture requirements and reduce material use.

3. REGENERATION POTENTIAL OF RIGID PP

3.1. Principle and analytical criteria

In its recyclability study, COTREP assessed the impact of absorbent pads on the regeneration process and quality of rPP produced from rigid PP household packaging.

The regeneration tests were performed on a pilot scale based on the protocol defined by COTREP for recycling rigid PP packaging. This protocol is representative of industrial practices applied by regeneration plants processing streams in France¹. Use of the regenerated material was tested for injection moulding to manufacture plant pots on the site of one of COTREP's industrial partners.

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

The technical characteristics of the recycled material were assessed with a view to reprocessing as plant pots (injection moulding).

3.2. Test samples

Tests were performed on two PP tray references with absorbent pads representative of structures available on the market.

Reference	Absorbent pad material	Absorption capacity	Coverage rate	Placement type	Absorbent pad/tray weight ratio
Tray no. 1	PE/Cellulose + super absorbent fibre/PE	5 mL/m ²	36%	Spot of adhesive (not detachable during wash)	6.5%
Tray no. 2	PE/Cellulose + super absorbent fibre/PE	10 mL/m ²	38%	Spot of adhesive (not detachable during wash)	13.5%

¹ For further information, see protocol Rigid PP-1 on the COTREP website: www.cotrep.fr











The test samples did not contain food residue and the absorbent pads were dry.

The standard stream used for the study comprises 100% rPP extruded sheets produced exclusively for the study from granulate sourced from French selective collection (rigid PP standard).

Tests were performed with PP trays with absorbent pads of 4% and 10% by mass to account, respectively, for estimated marketed volumes of PP trays for the fish, poultry and meat sectors, based on the assumption that they all have absorbent pads and a peak concentration in bales.

3.3. Results

IMPACT OF ABSORBENT PADS ON RIGID PP PACKAGING REGENERATION PROCESSES

RECYCLING PROCESSES	IMPACT	DESCRIPTION
 SHREDDING		No impact on shredding
 WASHING AND SPINNING		<p>Above a proportion of 4%, the presence of absorbent pads has an impact on washing:</p> <ul style="list-style-type: none"> ⇒ Cloudy water with a viscous appearance ⇒ Dryer clogged due to the presence of fibres but no blockage of equipment
 FLOTATION AND DRYING		<p>Above a proportion of 4%, the presence of absorbent pads has an impact on flotation:</p> <ul style="list-style-type: none"> ⇒ Cloudy water with a viscous appearance <p>No impact on drying</p>
 EXTRUSION/ GRANULATION		<p>Above a proportion of 4%, the presence of absorbent pads has an impact on extrusion/granulation:</p> <ul style="list-style-type: none"> ⇒ Impact on filtration for both test batches ⇒ Extrusion process unstable for the 10% batch ⇒ MFI value out of range for the 10% batch
 INJECTION MOULDING		<p>No impact during plant pot manufacture</p> <p>Negligible impact on certain parameters (drop-weight shock, traction – tensile stress at break and traction – elongation at break)</p> <p>Pots compliant with plant pot quality standards</p>

 Caution  No impact

TECHNICAL CONCLUSIONS

Through tests performed by COTREP, it was possible to assess the impact of PP trays with absorbent pads on sorting and mechanical regeneration of rigid PP household packaging.

Sorting tests determined that the presence of an absorbent pad covering no more than 70% of the tray surface does not affect detection by optical sorting. Pilot-scale regeneration tests were then conducted to assess the impact of this packaging on mechanical recycling and recycled rigid PP material quality. Results obtained show that the presence of an absorbent pad disrupts certain stages of the rigid PP mechanical regeneration process. During the washing stage, the wash water may have a viscous, cloudy appearance. Additionally, the presence of absorbent pads affects extrusion/granulation above a proportion of 4%. Most of the mechanical properties of the rPP plant pot are consistent with the standard; however, there may be a slight impact on certain mechanical properties such as tensile stress at break.

Given the current state of equipment and sorting and regeneration techniques available in France, the use of absorbent pads consisting mainly of cellulose and PE in a PP tray offers limited compatibility with rigid PP mechanical regeneration processes.

COTREP may review this notice in light of developments in sorting and recycling technologies, markets, or quality requirements for recycled material.