

GENERAL NOTICE

Impact of multi-layer PET/copolyester pots for "hot filling" present during the recycling of clear PET bottles, pots and trays.

Summary

The purpose of this general notice is to assess whether multi-layer PET/copolyester pots used to hot fill products such as compote can be recycled when mixed with the stream for clear PET bottles, pots and trays without impacting the recycling process 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 show that multi-layer PET/copolyester pots for hot filling (at approximately 80-90°C) **are not compatible with recycling of clear PET bottles, pots and trays.** The stage in which flakes are dried prior to entering the extruder to granulate the material is seriously impacted, since the copolyester contained in the pots causes the material to melt before reaching the extruder. Standard drying conditions enabling recycling of clear PET flakes are not appropriate for PET/copolyester pots, as they cause flakes to remain stuck to the sides of the dryer.

Consequently, given the current state of equipment and techniques used in Europe, multi-layer PET/copolyester pots used for hot filling are not recyclable when mixed with the stream for clear PET bottles, pots and trays due to the presence of copolyesters that are incompatible with the standard drying conditions involved in the process.

COTREP may review this innovation if industrial practices were to change, particularly if dedicated recycling lines applying different drying conditions were developed for PET pots and trays.

1/ CONTEXT

Some food products such as compote need to be packaged at high temperatures (approximately 80-90°C). In order to meet this requirement, innovative PET pots have been developed that are specially designed to withstand such temperatures. The multi-layer structure of these pots mainly consists of clear PET, combined with thin layers of copolyester, which provide the PET with thermal protection.

Under the extended sorting guidelines, these pots are sorted and directed to the standard clear PET stream, where they are mixed with clear PET bottles, pots and trays for recycling.

The purpose of this general notice is to assess whether such PET/copolyester pots used to hot fill products such as compote can be recycled in the stream for clear PET bottles, pots and trays without impacting the recycling process or the quality of recycled PET.

Since these new pots are mainly composed of clear PET, their recyclability is examined in relation to clear PET stream output from French sorting centres.

Sorting was not assessed as part of this study. Only the part of the process in which material is regenerated for use in clear PET bottles was tested.

2/ PRINCIPLE AND ANALYSIS CRITERIA

The recyclability study conducted by a specialist, independent laboratory involved assessing the effect of multi-layer PET/copolyester pots on the quality of clear PET recycled material. These tests were performed on a pilot scale in a laboratory using the existing procedure recognised for recycling PET as bottles. The procedure is representative of industrial practices applied by European regeneration plants.

Various physical-chemical criteria were measured during flake preparation phases and compared with those of a control sample composed solely of 100% PET flakes originating from bottles sourced from French selective collection (standard clear PET from bottles).

Details regarding test conditions are available on the COTREP website.

Please note:

The study gives no indication of the suitability of the output rPET granulate for contact with food.

3/ TEST PROCEDURE

3/1 Test samples

Based on a market assessment, 3 different solutions were identified involving 3 different suppliers. Each solution was tested separately for this study.



3 different multi-layer PET/copolyester pots were tested

Most of the A/B/A-structured, thermoformed pots tested were composed of clear PET and were developed to contain products such as compote, requiring hot filling. Warping of the amorphous PET (layer B) due to high temperatures is prevented by adding a copolyester-type external resin (layer A). The packaging was tested without any food residue or secondary elements (seals, labels, print, etc.) (see images above).

Flakes of clear PET bottles sourced from French selective collection post-regeneration were used as a control for the study (standard clear PET from bottles).

PET pots were added to the control sample at rates of **7.5%** and **15%**, representative of volumes of the innovation potentially marketed, combined with a concentration factor to simulate concentration peaks in some clear PET bales.










3/2 Performance of tests

The following procedure was applied:

- 1. Shredding and washing of samples:** The PET/copolyester pots were first shredded into 12mm flakes and washed at 85°C with soda and detergent. These flakes were then dried and put through an aerulic sorting process to eliminate the possibility of any lighter and unwanted fractions remaining.
- 2. Creation of mixtures:** The test flakes were then mixed with the control sample consisting solely of standard clear PET flakes sourced from bottles. The flakes from the PET/copolyester pots were mixed at levels of **7.5%** and **15%** to simulate volumes currently marketed and future concentrations in bales.
- 3. Re-granulation of material:** The mixtures of PET/copolyester pot flakes and control PET flakes were successively dried, extruded, crystallised and underwent solid-phase polycondensation to create granulate. The same process was applied separately to the control PET flakes.
- 4. Production of sheets and bottles:** Each batch of granulate produced was then separately mixed in equal parts with virgin PET granulate. Each of the 3 granulate mixtures was injection moulded into sheets or bottle preforms. Finally, the preforms were blow moulded to produce bottles of each test mixture.

3/3 Results

Impact of "hot fill" PET/copolyester pots during recycling stages

Recycling stage	Impact	Description	
 SHREDDING	∅	No impact on shredding	
 WASHING AND DRYING	∅	Flakes from the pots turned white, indicating crystallisation of the amorphous PET component of the pots during the washing and drying stage.	
Aeraulic sorting		Significant quantities of fines recovered. Material from the pots turned brittle and crumbly after washing and drying. → Significant reduction in efficiency	
 EXTRUSION/ GRANULATION		The flakes conglomerated during the drying stage (conditions: 160°C - 3 hours): the multi-layer PET/copolyester flakes were unable to withstand the standard process and stuck to the sides of the dryer before reaching the extruder. → The extruder was not properly supplied. → Risk of damage to equipment. → Intrinsic problem with the material irrespective of the concentrations tested. ⇒ The test was stopped at this stage	 The material sticks before reaching the extruder



: Caution



: No impact

TECHNICAL CONCLUSIONS

Based on the tests performed, it has been possible to assess the impact of multi-layer PET/copolyester pots for hot filling mixed with clear PET bottles, pots and trays during recycling.

The results show that multi-layer PET/copolyester pots for hot filling are not compatible with recycling of clear PET bottles. Indeed, the stage in which flakes are dried prior to entering the extruder for material granulation is significantly impacted: due to the copolyesters present in the structure of the pots, the flakes melt quickly under standard drying conditions applied for recycling of clear PET. The flakes remain stuck to the sides of the dryer irrespective of the penetration levels tested.

Consequently, given the current state of equipment and techniques used in Europe, multi-layer PET/copolyester pots used for hot filling are not recyclable in the stream for clear PET bottles, pots and trays due to the presence of copolyester, which is incompatible with the drying conditions involved in the process.

COTREP may review this innovation if industrial practices were to change, particularly if dedicated recycling lines applying different drying conditions were developed for PET pots and trays.