



GENERAL NOTICE 86

Impact of EVOH/PE on the regeneration of rigid PS packaging

SUMMARY

The aim of this general notice is to assess the mechanical regeneration potential of household rigid PS packaging with an EVOH/PE barrier.



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

EVOH¹ is a polymer with a very low oxygen transmission rate. It is therefore often used as a barrier layer, particularly for applications such as PS pots for compote. EVOH is combined with a hydrophobic PE layer to preserve these barrier properties. To bond the PS, EVOH barrier layer and PE, a bonding layer, otherwise known as a “tie layer”, is used to guarantee compatibility.

Industrial scale regeneration tests were conducted to assess the impact of this packaging on mechanical recycling and recycled material quality. The results obtained show that the use of EVOH/PE barriers in PS pots does not affect the regeneration process or the quality of regenerated material.

Given the current state of the market and regeneration equipment and techniques available for the PS stream arriving from French sorting centres, rigid PS packaging with an EVOH/PE barrier offers partial compatibility in the rigid PS stream.

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

1. CONTEXT

EVOH barriers are commonly used in PS compote pot packaging. EVOH has a very low oxygen transmission rate, reducing product oxidation and thereby improving preservation. EVOH is sensitive to moisture, which can reduce the required oxygen barrier properties. To protect it, it is combined with a hydrophobic PE layer and always inserted in the centre of the structure between the PS and PE layers.

¹ Ethylene vinyl alcohol

A tie layer is needed to maintain adhesion between the PS, EVOH barrier and PE layers. The complete structure representative of packaging with an EVOH layer is therefore:

PS | tie layer | EVOH | tie layer | PE

This structure will be referred to as EVOH/PE in this notice. Rigid PS packaging with an EVOH/PE barrier accounts for roughly 20% of overall PS tonnage placed on the market (excluding EPS).

This notice seeks to assess the impact of EVOH/PE barriers on mechanical regeneration of the rigid PS stream and the quality of regenerated material.

2. IMPACT ON INDUSTRIAL SCALE REGENERATION

2.1. Principle and analytical criteria

In its recyclability study, COTREP assessed the impact of EVOH/PE barriers on the regeneration process and quality of rPS² produced from French rigid PS household packaging.

The regeneration tests were conducted on an industrial scale at a regeneration plant processing French rigid PS household packaging streams. Experimental conditions were defined to be representative of the industrial line and with sufficient quantities so that any impacts could be observed in comparison with a standard stream.



Figure 1: Analytical scope of the regeneration impact study

Various physical-chemical criteria were measured during the test phases and compared to those of a standard sample composed of 100% rPS produced from French household packaging.

The technical characteristics of the regenerated material were assessed on injection moulded specimens.

2.2. Test samples

Tests were performed on flakes produced by shredding PS/EVOH/PE sheets representative of structures available on the market with an EVOH/PE proportion of 11%. The test samples did not contain food residue and were unsoiled.

The standard stream is a stream of French rigid PS household packaging waste from a secondary sorting centre, already containing a proportion of pots with an EVOH/PE barrier.

Tests were performed with 10.7% and 21.4% PS/EVOH/PE flakes by mass introduced into the standard stream. These proportions correspond, respectively, to 50% and 100% of the current estimated marketed volumes of PS compote pots.

² rPS means recycled material sourced from rigid PS packaging

2.3. Results

IMPACT OF THE EVOH/PE BARRIER ON RIGID PS REGENERATION PROCESSES

REGENERATION PROCESSES	IMPACT	DESCRIPTION
 SHREDDING		No impact on shredding
 WASHING AND SPINNING		No impact during washing and spinning
 FLOTATION		No impact on flotation and drying
 EXTRUSION/ GRANULATION		No impact on extrusion/granulation
 INJECTION MOULDING OF SPECIMENS		No impact during standard specimen injection moulding



Caution



No impact

TECHNICAL CONCLUSIONS

Through tests performed by COTREP, it was possible to assess the impact of rigid PS packaging with an EVOH/PE barrier on mechanical regeneration of rigid PS household packaging.

The results of tests carried out on the premises of an industrial operator handling this stream show that **the use of an EVOH/PE barrier on PS pots given the quantities currently on the market does not affect the different stages in the process or the quality of regenerated material.**

In conclusion, given the current state of the market and regeneration equipment and techniques available for the PS stream arriving from French sorting centres, rigid PS packaging with an EVOH/PE barrier offers partial compatibility in the rigid PS stream.

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