



Tray Circularity Evaluation Platform

Quick Test QT500

Oven test for regrind PET flakes

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1. Introduction

The objective of the Tray Circularity Evaluation Platform (TCEP) is to evaluate technologies and products to allow new PET tray innovations whilst optimizing the environmental and economic consequences for the recyclability of PET.

TCEP has formulated guidelines to evaluate the influence of tray innovations - such as barrier materials, resin formulations, additives and non-PET components in or on PETtrays - on R-PET recycling processes. Barrier materials can be applied as a coating, introduced in a co-injected multilayer configuration or blended with the matrix material. Additives can be incorporated into the base material during polymerization or added during thermoforming in the form of liquid or solid master-batches. Other non-PET components can be labels, glue, sleeves, caps, printings, etc..

Laboratory analyses on the recyclability of new innovative PET trays can be relatively expensive and usually have a time delay between sampling and getting useable results of several months. Besides, assessing the test results is a difficult task that requires training and experience. This is often seen as an inconvenience.

For this reason, TCEP has developed a series of rapid and low-cost techniques for the quick assessment of PET trays. All quick tests include a complete explanation of the scope, techniques, equipment and test conditions, as well as a “summary interpretation” explaining how to use the test results. Quick tests can either be executed at the internal laboratory facility or by an independent test laboratory with minimal investment in equipment.

The results of the quick tests are purely indicative, and may not be considered as an advice, a recommendation or a formal approval by TCEP. For a complete assessment, further tests may be required to highlight all possible effects of innovative PET trays on the recyclability of collected trays into r-PET, the processing of the r-PET into products and the final product properties. Please contact TCEP for more information.

SAFETY PRECAUTIONS

This guideline is intended for use by qualified personnel who recognize safety hazards and are familiar with the safety precautions required in regard to application of this guideline. The appropriate laboratory safety procedures must be used before, during, and after testing operations.

2. Quick Test QT 500

Scope

The following test protocol is designed to provide guidance on detecting impurities, additives, coatings or glues that discolor during a heating step, which limits the use of r-PET in applications such as trays, film, sheet and fiber.

Principle

A known quantity of a test sample and a reference sample is heated at 220 °C. During this thermal treatment, degradation of certain components in the sample will cause the sample to discolor, making it possible to be visually detected in the sample.

Optional: The level of discoloration can be measured by comparing the results of the test sample with the reference sample.

Apparatus

- Oven with forced air circulation, with a maximum temperature of 250°C
- Aluminum tray with a surface of ca 600 cm², to put sample in the oven
- Technical balance, accurate to 0,1 g
- *Optional color measurement: Minolta spectrophotometer 3500, 3600, or equivalent.*

Sample

100 g of test sample in flakes (ground trays - clean and dry - no caps/labels)

100 g of an appropriate reference sample in flakes (depending on test sample type)

The bulk density of flakes is between 250 g/l and 400 g/l

Procedure

- *Optional: Measure the L-a-b value of the samples on the Minolta spectrophotometer*
- Preheat the oven at 220°C
- Weight 100 g of the sample and put evenly on the tray
- Put the tray into an oven of 220°C for 60 minutes
- Allow the sample to cool at room temperature
- Spread the cooled sample out onto a clean, white work surface
- Inspect the sample for any discoloration, colored spots, sticking, etc.
- *Optional: Measure the L-a-b value of the samples on the Minolta spectrophotometer*

Results

The samples should not show any sticking, discoloration, colored spots, or other irregularities.

Optional: Compare the L-a-b values of both samples before and after the oven test.

Test report

The test report includes the following information:

- Reference to the TCEP Quicktest QT 500
- All details necessary for complete identification of the material tested
- Description and detailed photos of the samples before and after the oven test
- *Optional: L-a-b value of the samples before and after the oven test*
- Details of any deviation from the test method, as well as any incident which may have influenced the results
- Date and place of the test.

Remark

This quick test is designed as a quality indicator to monitor a single critical parameter in PET recycling. Other specific tests may be needed to carry out a full screening for possible effects of innovative PET trays on the recyclability of collected trays into r-PET, the processing of the r-PET into products and the final product properties. Please contact TCEP for more information.

Photos



Photo 1: Flakes before and after oventest



Photo 2: Flakes before and after oventest

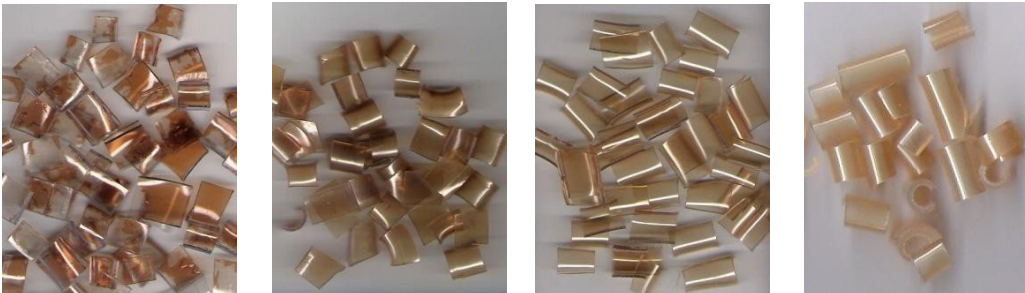


Photo 3-6: Discolouration in flakes after oventest



Photo 7: Sample inside the oven



Photo 8: Minolta spectrophotometer (optional)



Photo 9: Minolta spectrophotometer PC program (optional)



Photo 10: Minolta colour measurement technology (optional)