OPTICAL SORTING TEST PROTOCOL

Assessing dark packaging detectability in optical sorting processes

COTREP

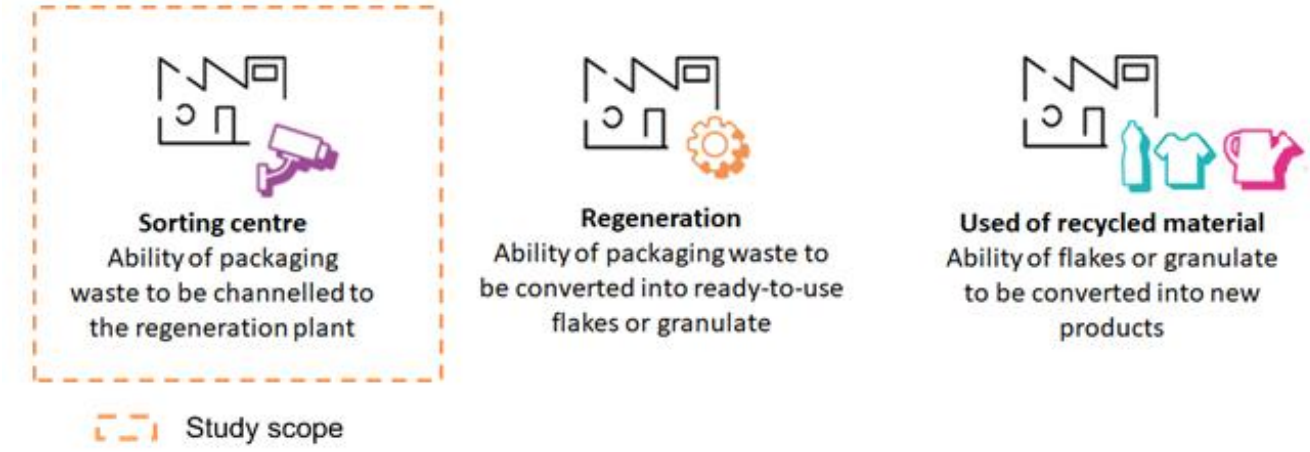
The mission of the Technical Committee for the Recycling of Plastic Packaging (COTREP) is to help designers and decision-makers develop recyclable plastic packaging while also providing scope for innovation. The committee includes various stakeholders in the plastic household packaging chain (Citeo, Elipso, SRP and Valorplast) and works on all types of plastic packaging (bottles, dispenser bottles, pots and trays, films and flexible packaging). Protocols for tests performed by COTREP are devised based on work carried out with stakeholders in household plastic packaging end-of-life.

VERSION NO.	DATE	DESCRIPTION
1	January 2019	*Initial version*
1.2	November 2021	*Update: simplification of tests and addition of a test for PET colour sorting*
1.3	March 2024	*Minor updates*
1.4	July 2024	*Contact update*

1. CONTEXT

This protocol has been drawn up by COTREP in collaboration with optical sorting machine manufacturers in light of current technical knowledge and sorting processes in France. Its purpose is to specify tests to be performed to assess the potential of dark packaging to be detected during optical sorting processes. This step forms an essential part of the overall recyclability assessment for packaging.

Results obtained from tests performed based on this protocol are insufficient for determining packaging recyclability. This protocol merely reflects the packaging detectability and sortability phase and provides no basis for judging the suitability of packaging for regeneration or the feasibility of converting such regenerated granulate into new products.



- Dark packaging:

Black carbon pigment is commonly used to provide dark colours in packaging (intense, deep colours such as black, grey, green and purple) at competitive prices. However, optical sorting technologies at sorting centres are incapable of detecting and orienting packaging containing carbon black. This is due to carbon black absorbing the infrared light emitted by optical sorting equipment and sending back no signal. Consequently, unidentified recyclable dark mono-resin packaging items are processed as sorting rejects and not sent to the appropriate recycling streams.

Alternative colorant solutions are being developed by colorant and packaging manufacturers to ensure that dark packaging is detectable in sorting centres and capable of recycling. This protocol has been specially devised to check the detectability of these alternatives and validate colorant solutions.

Any tests performed must be the most representative possible of sorting centres for household packaging waste in France. Most optical sorting machines used in the majority of sorting centres are supplied by two manufacturers – Pellenc ST and Tomra. Tests should therefore be performed on the premises of these two companies, in their test centres.

- How optical sorting machines operate:

Optical sorting technology operate by near-infrared spectroscopy (NIR–VIS). The machine scans and detects passing packaging carried by a fast conveyor belt supplying the equipment. The spectra of packages (linked to their composition and colour) are analysed in milliseconds by the spectrometer, which compares them with reference spectra in a database. Packaging composition is determined based on the detected spectra and packaging is blown towards various chutes using compressed air.

Optical sorting machines use two detection methods to separate packaging:

- Near-infrared (NIR) spectroscopy only, based on the composition of plastic resins.
- Near-infrared (NIR) spectroscopy combined with colour assessment (VIS: visual), based on plastic resin composition and also its colour. This type of detection is used for packaging that needs to be sorted by colour. This is the case for PET, which is separated into two streams: clear PET and coloured PET.

- Packaging detectability and sortability:

Detectability relates to the potential for packaging to be correctly identified based on its resin type.

Sortability relates to the potential for packaging to be correctly directed to its recycling stream.

Consequently, in light of current material standards, rigid PET packaging should be separated by "colour" into clear PET and coloured PET streams. Dark PET packaging should be sent to the coloured PET stream.

For rigid PE, PP and PS packaging, only a resin-based distinction is currently applied, with no distinction currently drawn based on "colour".

In order for packaging to be considered recyclable, it must first be accurately detected at sorting centres and sent to its recycling stream, before successfully completing the various regeneration steps.

2. AIMS

This protocol is intended for colorant manufacturers or packaging manufacturers seeking to check that colorant solutions that have been developed are detectable by optical sorting technologies used in French sorting centres. This protocol tests the detectability and sortability of the packaging, but not its recyclability.

Tests must be performed at the test centers of Pellenc ST and Tomra. They should be performed in two stages with packaging first undergoing a static test before being submitted for dynamic testing if it meets the criteria of the first test.

Static analysis: This involves determining the capability of the optical sorting machines to detect dark packaging and identify its constituent resin and "colour".

- Resin analysis: this resin will be referred to hereafter as the "target resin".
- Colour analysis: the sortability performance of PET packaging is also assessed during this phase. The aim is to ensure that dark packaging is correctly visually identified and not identified as clear PET.

Dynamic analysis: This involves assessing how effectively dark packaging waste is captured when included in a standard stream of household packaging, by comparing the results achieved with a standard sample.

3. TERMS OF REFERENCE

Companies wishing to perform detectability tests shall be referred to hereafter as "**Requesters**". Optical sorting machine manufacturers shall be referred to hereafter as "**O.S. manufacturers**".

4. PROCEDURE FOR REQUESTERS

Step 1: Contacting COTREP

The Requester should contact COTREP and describe its request using the document in APPENDIX 1. If the Requester wishes to test the detectability of several packaging types (different resins, dimensions, thicknesses, shapes, colorant solution input ratios, etc.), it should inform COTREP of this, specifying the entire packaging or colorant range it wishes to test. After reviewing the request, COTREP will respond to the Requester indicating the number of tests that need to be performed.

COTREP members' contact details are provided in the "Practical Information" section of this document.

Step 2: Contacting the O.S. manufacturers

If testing is required, COTREP will provide the Requester with the contact details of the O.S. manufacturers in order for them to discuss financial and logistical arrangements. An approximate budget to be foreseen for performing tests is provided in the "Practical Information" section of this document.

Step 3: Preparing samples

After a test date has been confirmed, the Requester must submit test samples to the O.S. manufacturers:

- Sample type:

- Only formed packaging can be tested to ensure that the results are representative.
- Any type of plastic packaging can be tested (rigid packaging[1] such as bottles, dispenser bottles, trays, pots, etc. **excluding** flexible packaging and film). Bottle caps and covers cannot be tested.
- Packaging may be new or used but must be emptied of its contents.
- Since the tests focus on the detectability of the colorant solution, **tested samples should be separated from associated elements** (labels, lids, bottle tops, covers, absorbent pads, etc.). Subsequent addition of other elements to packaging may affect the detectability and sortability of the end packaging.
- If a **packaging is sometimes manufactured from coloured production scrap** (which may itself contain carbon black) we strongly recommend testing this composition. This is because even small quantities of carbon black contained in production scrap may impact the detectability of such packaging during optical sorting.

- Number of packaging items to be submitted for testing for each type of test packaging:

This varies depending on the resin type used in the packaging composition.

[1] Rigid packaging is defined as offering a certain degree of deformation resistance and stability when stacked on shelves. The main element of rigid packaging is generally over 300 micrometres thick. The definition of rigid packaging given here relates to its anticipated ballistic behaviour during sorting and recycling processes.

- For PE, PP or PS resins:

	VALIDATION OF A PACKAGING ITEM OR OF A PACKAGING RANGE[2]	VALIDATION OF A COLORANT SOLUTION
STATIC TEST	- 5 identical dark packaging items of a specific thickness and concentration (for a range, minimal thickness)	- 5 identical dark packaging items of the minimum thickness and maximum concentration in the range
DYNAMIC TEST	- 100 identical dark packaging items of a specific thickness and concentration (for a range, minimal thickness) - 100 standard packaging items: similar (same thickness) but clear or uncoloured	- 100 identical dark packaging items of the minimum thickness and maximum concentration in the range - 100 standard packaging items: similar (same thickness) but clear or uncoloured

For example, to test the sortability of a PP thermoformed tray, each O.S. manufacturer requires:

- *105 dark PP thermoformed trays (alternative colorant solution).*
- *105 transparent, white or light-coloured thermoformed trays free of carbon black.*

- For PET resins:

	VALIDATION OF A PACKAGING ITEM OR OF A PACKAGING RANGE[2]	VALIDATION OF A COLORANT SOLUTION
STATIC TEST	- 5 identical dark packaging items of a specific thickness and concentration (for a range, minimal thickness)	Identical dark packaging items of the minimum thickness for the range: - 5 packaging items of the maximum concentration - 5 packaging items of the minimum concentration

DYNAMIC TEST	- 100 identical dark packaging items of a specific thickness and concentration (for a range, minimal thickness)
	- 100 standard packaging items: similar (same thickness) but coloured with a light colour or uncoloured
		- Identical dark packaging items of the minimum thickness for the range:
		  - 100 packaging items of the maximum concentration
		  - 100 packaging items of the minimum concentration
		- 100 standard packaging items: similar (same thickness) but coloured with a light colour or uncoloured

"Minimum concentration" denotes the lowest recommended concentration (based on the guidelines of the colourist or converter) of colorant for integration in a dark PET packaging item or packaging range.

For example, to test the sortability of a colorant solution for PET thermoformed trays, each O.S. manufacturer requires:

- *105 dark PET thermoformed trays (alternative colorant solution) of the minimum thickness and maximum colorant concentration*

[2] A packaging range is defined as packages having the same shape, the same resin, the same colorant solution and at the same concentration but with different sizes. A range can also include the same thermoformed sheet for different formats of pots and trays.

- *105 dark PET thermoformed trays (alternative colorant solution) of the minimum thickness and minimum colorant concentration*
- *105 transparent PET thermoformed trays of the minimum thickness containing no carbon black.*

- Labelling samples:

In general, all samples provided should be fully labelled (and should, as a minimum requirement, be sent in a clearly identified bag/cardboard box for each item sent).

For tests performed on PET packaging, Requesters should label each sample individually, ensuring that they use small paper labels to avoid any disruption to sorting that may be caused by such labels. **The label should cover no more than 10% of packaging surface area. This step is essential for distinguishing between minimum and maximum concentrations for PET samples.**

Step 4: Sending samples

After samples have been labelled (PET samples only), they should be sent separately to both O.S manufacturers. APPENDIX 2 should be completed and attached to each parcel, and also emailed to the O.S. manufacturers prior to samples being sent. We recommend sending samples at least **10 days** prior to testing.

5. PREPARATION OF TESTS BY THE O.S. MANUFACTURERS

- Equipment:

The equipments used in the test centres should be systematically the same used from one test to another. Machine settings should be the most representative possible of those currently used in sorting centres in France and have been determined in consultation with COTREP. Any change in parameters by the O.S. manufacturers will be notified in advance and validated with COTREP.

IMPORTANT:

- The aim is to perform tests that are the most **representative possible of procedures in modern sorting centres** in normal operating conditions.
- The machine settings should be **fixed and identical** for each test for a same reference stream. They may be readjusted when changing the reference stream.

- Preparing samples:

For the purpose of the two tests, packaging provided by Requesters can be manually crushed by the O.S. manufacturers so that it is the most representative of the state of waste following collection processes.

A stream of packaging waste[3] sampled from selective collection is required for dynamic testing of all resins. This stream will be referred to hereafter as the "**SC stream**".

A second stream of PET packaging waste[4] is also required for dynamic testing of PET packaging. This stream will be referred to hereafter as the "**PET stream**".

Both streams will be provided by COTREP from sorting centres and may be reused for several dynamic test campaigns.

If required by the O.S. manufacturers, COTREP will provide new SC streams and PET streams on request. Please note that a period of 30 days should be allowed between such requests and receipt of the SC and PET

[3] The stream should be sampled at the ballistic outlet for hollow containers with a maximum of 2% residual film. Ferrous materials should be removed by the O.S. manufacturers. The stream should therefore consist of LPB (liquid packaging board), aluminium, rigid plastic, and potential rejects.
[4] The stream should be sampled after initial optical sorting separating the PET stream from the hollow container stream. Ferrous materials should be removed by the O.S. manufacturers. The stream should therefore consist of rigid plastic and potential rejects.

streams. The first time, all steel and black packaging in the stream should be removed by the O.S. manufacturers.

- Preparing for sorting:

On receipt of a new SC or PET stream, the O.S. manufacturers should record sorting operations for each foreseen configuration.

For the SC stream, one sorting operation should be recorded for each foreseen target resin, i.e. one sorting operation for PET, one for HDPE, one for PP and one for PS.

For the PET stream, a sorting operation should be recorded for the foreseen target resin, i.e. for coloured PET (including all PET colourings and excluding clear and blue transparent PET).

- Standard stream: Only the SC or PET stream should be used in this test, with no standard packaging or test sample.
- Sorting: Packaging composed of the target resin should be positively sorted. Other packaging should be negatively sorted as rejects. In the case of the PET stream, a "colour" sorting test should be performed in combination with resin detection for the coloured PET sorting operation (NIR + VIS).
- Measurement: The two output streams (blown stream and non-blown stream) should be split into two categories for measurement:
  - Weight of packaging composed of the target resin
  - Weight of other resins/packaging items
- Analysis: The results of these measurements should be used to determine benchmark separation performance:
  - Capture rate for packaging composed of the target resin: CR_1

$$CR_1[\%] = \frac{\text{weight of blown target packaging}}{\text{weight of blown target packaging} + \text{weight of non} - \text{blown target packaging}} * 100$$

  - Purity of the blown stream: P_1

$$P_1[\%] = \frac{\text{weight of blown target resin packaging}}{\text{weight of blown packaging}} * 100$$

- Verification: Capture rate and purity values for each of the sorting operations should be forwarded to COTREP for verification. It is recommended that these exceed 90%. If this is not the case, the O.S. manufacturer may adjust the machine settings in consultation with COTREP and restart the standard test.

Once the sorting operations are validated, the capture rate and purity of the blown stream should only be remeasured when the SC stream is changed.

6. TESTS TO BE PERFORMED

Step 1: Static test

- Test procedure:

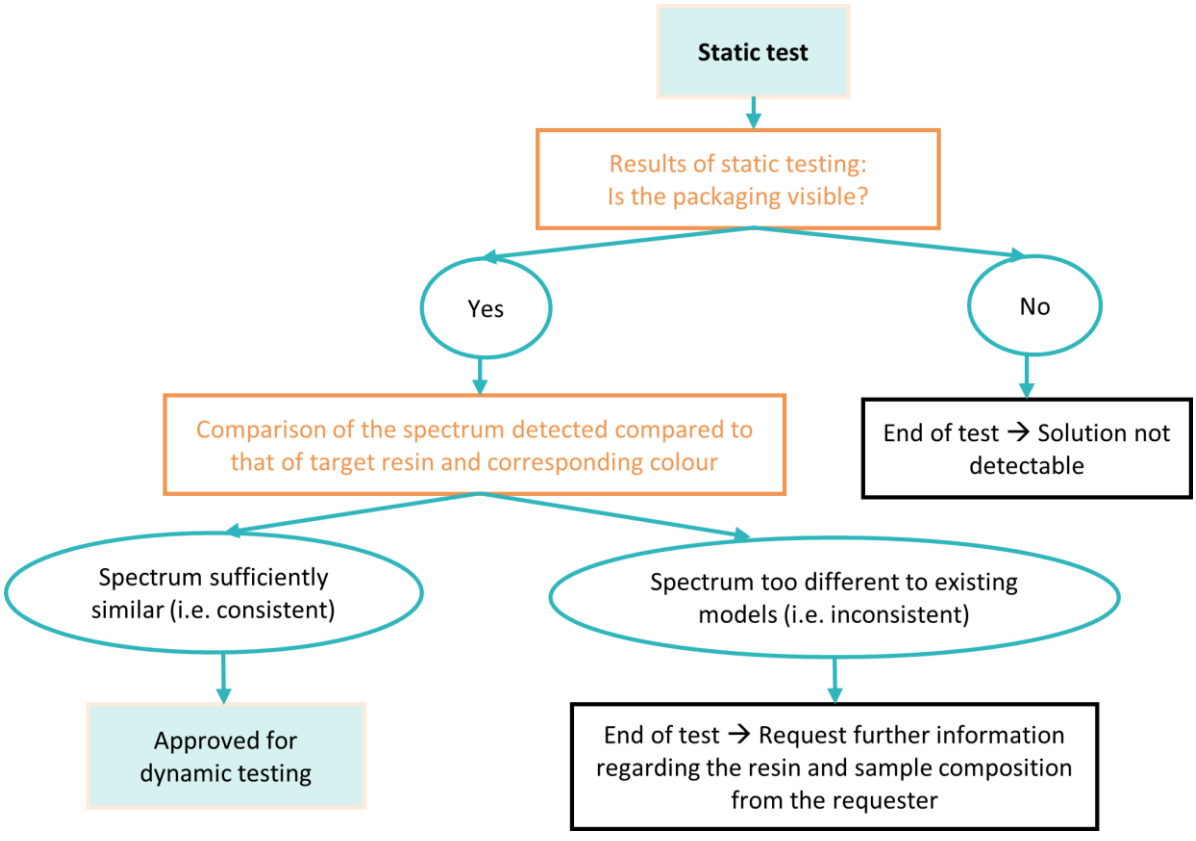
Samples should be positioned below the optical sensor to determine whether the optical sorting machine is able to detect the dark packaging items and identify their constituent resins, i.e. the target resins (specified by the Requester in APPENDIX 1).

Where appropriate, static tests should be performed with samples in different positions (side A up, side B up, packaging on its side, etc.).

For PET, once accurate detection of the resin is ascertained, the sortability of packaging items should also be tested in this phase. At this stage, it is necessary to ensure that dark packaging items are correctly visually identified and not identified as clear PET. To achieve this, steps should be taken to determine whether the optical sorting machine is capable of detecting dark packaging items as coloured PET.

- Success criterion:

For the static test, the standard packaging and dark packaging should be visible and the detected spectrum should be sufficiently similar to that of the target resin.



Results analysis:

Results should be recorded in the test report:

- If the results meet the test criteria, a dynamic test should be performed.
- If the results do not meet the test criteria, a dynamic test is not necessary. Changes must be made to the alternative dark solution.

Step 2: Dynamic test

The purpose of the dynamic test is to assess the detectability and sortability of colorant solutions in similar conditions to those in sorting centres. Tested samples are mixed in with a stream of packaging waste (reference stream). The entire stream on the fast conveyor passes beneath the spectrometer. Packaging is blown and guided towards different outlet chutes depending on its composition and the spectrum detected.

- Test conditions:

Important:

- The settings applied should be fixed and identical for all tests performed for a same reference stream. They may be readjusted when changing the reference stream.
- They should be the most representative possible of genuine current conditions in sorting centres. It is imperative that they are not optimised during testing.

Machine settings (flow rate, belt width, sensor type, nozzle type, nozzle spacing, resolution, belt speed, ejection pressure) should be the most representative of those currently used at sorting centres and have been defined in consultation with COTREP. The following streams should be sorted: PE, PP, PS, PET and coloured PET.

The capture rate for the tested packaging items should be measured for each dynamic test.

- Test procedure:

This varies depending on the resin type used in the packaging composition.

For PE, PP and PS packaging:

Dynamic tests should be performed as follows:

Resin detection test (NIR) with standard packaging items and tested dark packaging items, in the SC stream:

- Preparing the stream: The 100 standard packaging items and 100 dark packaging items of maximum concentration should be used in this test. Once compacted, they should be mixed in evenly with the SC stream prior to testing.
- Sorting: Once the equipment is set (see previous section on *Preparation of tests by the O.S. manufacturers*), packaging made of the target resin should be positively sorted. Other packaging should be negatively sorted as rejects.
- Measurement: Both output streams (blown stream and non-blown stream) should be measured: A count should be performed of the number of standard packaging items and dark packaging items present in the blown stream (target resin), and of those present in the non-blown stream.
  - Number of standard samples identified in the blown stream: $no\ std.samp.correct\ stream$
  - Number of standard samples identified in the non-blown stream: $no.std\ samp.incorrect\ stream$
  - Number of dark test samples identified in the blown stream: $no.dark\ samp.correct\ stream$
  - Number of dark test samples identified in the non-blown stream: $no.dark\ samp.incorrect\ stream$
- Analysis: The results of these measurements should be used to define the standard capture rates and the capture rate for dark packaging items:
  - Standard packaging capture rate

$$CR_{std}[\%] = \frac{\text{no. std. samp. correct stream}}{\text{no. std. samp. correct stream} + \text{no. std. samp. incorrect stream}} * 100$$

  - Dark packaging capture rate

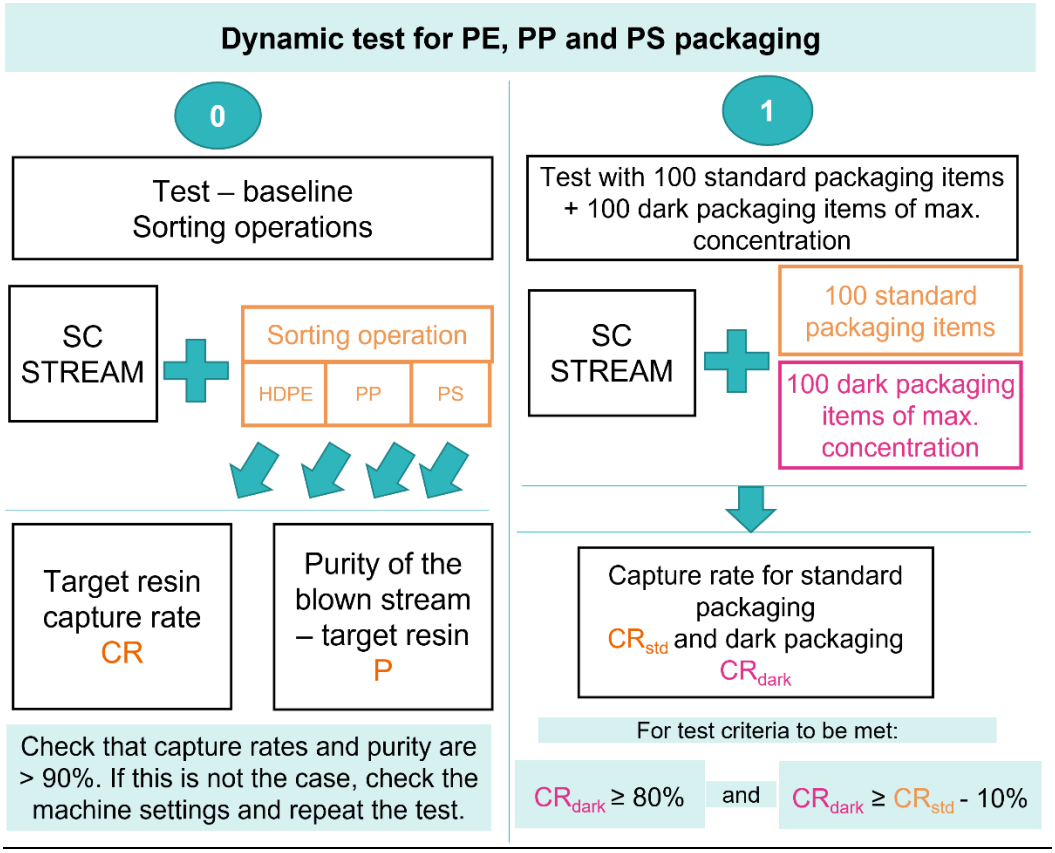
$$CR_{dark}[\%] = \frac{\text{no. dark samp. correct stream}}{\text{no. dark samp. correct stream} + \text{no. dark samp. incorrect stream}} * 100$$

- Success criteria: For test criteria to be met, the capture rate for tested dark packaging must satisfy both of the following conditions:
  - $\boldsymbol{CR_{dark} \geq 80\%}$
  - $\boldsymbol{CR_{dark} \geq CR_{std} - 10\%}$

- Removal of packaging: Remove the 100 standard packaging items and 100 dark packaging items from the stream.

The test report should be completed by the O.S. manufacturers to enable COTREP to analyse the results.

Diagram summarising dynamic testing of PE, PP and PS packaging:



For PET packaging:

Dynamic tests should be performed in two steps:

1) **Resin detection test (NIR) with standard packaging items and tested dark packaging items, in the SC stream:**

- Preparing the stream: The 100 standard packaging items and 100 dark packaging items of maximum concentration should be used in this test. Once compacted, they should be mixed in evenly with the SC stream prior to testing.
- Sorting: Once the equipment is set (see previous section on *Preparation of tests by the O.S. manufacturers*), packaging made of the PET target resin should be positively sorted. Other packaging should be negatively sorted as rejects.
- Measurement: Both output streams (blown stream and non-blown stream) should be measured: A count should be performed of the number of standard packaging items and dark packaging items present in the blown stream (target resin), and of those present in the non-blown stream.
  - Number of standard samples identified in the blown stream: $no.std.samp.correct\ stream$
  - Number of standard samples identified in the non-blown stream: $no.std.samp.incorrect\ stream$
  - Number of dark test samples identified in the blown stream: $no.dark\ samp.correct\ stream$
  - Number of dark test samples identified in the non-blown stream: $no.dark\ samp.incorrect\ stream$
- Analysis: The results of these measurements should be used to define the capture rates for standard packaging items and the capture rate for dark packaging items:

- Standard packaging capture rate

$$CR_{std}[\%] = \frac{\text{no. std. samp. correct stream}}{\text{no. std. samp. correct stream} + \text{ no. std. samp. incorrect stream}} * 100$$

- Dark packaging capture rate

$$CR_{dark}[\%] = \frac{\text{no. dark samp. correct stream}}{\text{no. dark samp. correct stream} + \text{ no. dark samp. incorrect stream}} * 100$$

- Success criteria: For test criteria to be met, the capture rate for tested dark packaging must satisfy both of the following conditions:
  - $\boldsymbol{CR_{dark} \geq 80\%}$
  - $\boldsymbol{CR_{dark} \geq CR_{std} - 10\%}$
- Removal of packaging: Remove the 100 standard packaging items and 100 dark packaging items from the stream.

2) "Colour" detection test (NIR + VIS) with tested dark packaging items, in the PET stream:

- Preparing the stream: The 100 tested dark packaging items of minimum concentration and the 100 tested dark packaging items of maximum concentration should be used in this test. Once compacted, they should be mixed in evenly with the PET stream prior to testing.
- Sorting: Packaging composed of the target resin **coloured PET** should be positively sorted. Other packaging should be negatively sorted as rejects.
- Measurement: The two output streams (blown stream and non-blown stream) should be measured: A count should be performed of the number of dark packaging items of minimum and maximum concentration present in the blown stream (target resin), and of those present in the non-blown stream.
  - Number of dark samples of minimum concentration identified in the blown stream: $no.min.samp.correct\ stream$
  - Number of dark samples of minimum concentration identified in the non-blown stream: $no.min.samp.incorrect\ stream$
  - Number of dark samples of maximum concentration identified in the blown stream: $no.max.samp.correct\ stream$
  - Number of dark samples of maximum concentration identified in the non-blown stream: $no.max.samp.incorrect\ stream$
- Analysis: The results of this measurement should be used to determine the capture rate for the tested dark packaging:
  - Capture rate for dark packaging of minimum concentration

$$CR_{dark\ min}[\%] = \frac{\text{no. min. samp. correct stream}}{\text{no. min. samp. correct stream} + \text{ no. min. samp. incorrect stream}} * 100$$

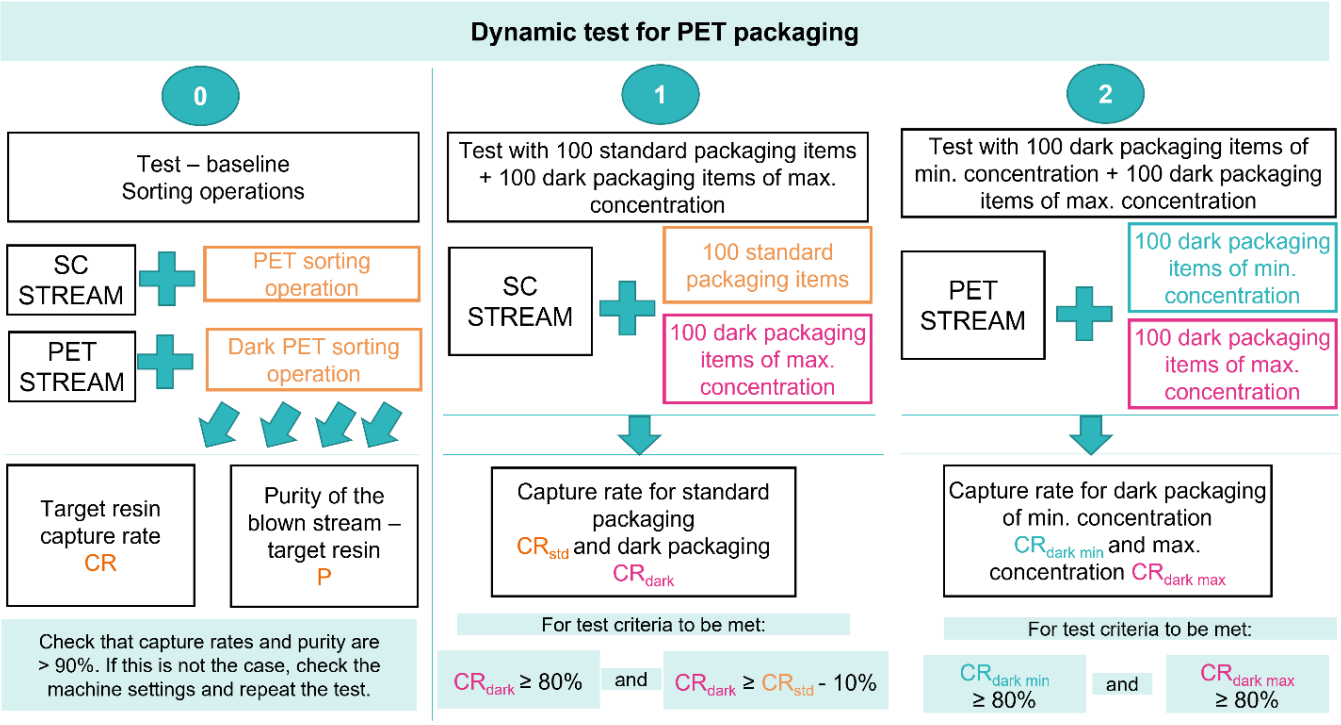
  - Capture rate for dark packaging of maximum concentration

$$CR_{dark\ max}[\%] = \frac{\text{no. max. samp. correct stream}}{\text{no. max. samp. correct stream} + \text{ no. max. samp. incorrect stream}} * 100$$

- Success criteria: For test criteria to be met, the capture rate for tested dark packaging must satisfy both of the following conditions:
  - $\boldsymbol{CR_{dark\ min} \geq 80\%}$
  - $\boldsymbol{CR_{dark\ max} \geq 80\%}$
- Removal of packaging: Remove the 200 dark packaging items from the stream.

The test report should be completed by the O.S. manufacturers to enable COTREP to analyse the results.

Diagram summarising dynamic testing of PET packaging:



Reminder: COTREP can only issue a positive opinion on the detectability of packaging if static and dynamic tests have been performed at **both** test centres of O.S. manufacturers and the test criteria have been met.

Please note: COTREP reserves the right to simplify the protocol in consultation with the Requester.

7. TEST REPORT

Each O.S. manufacturer must draw up a test report including the following details:

- A description of samples received and tested including photographs. If several batches of samples have been tested, descriptions and results for each batch of samples should be presented separately in the report.
- Details of the equipment used.
- A summary of the test parameters applied.
- The number of samples and procedures for each test.
- The report should **include the following statements**:
    - "Tests have been conducted in accordance with the COTREP test protocol - Assessment of dark packaging detectability in optical sorting processes – Version 2 – November 2021".
    - "This report does not, as such, constitute a COTREP opinion. In order for COTREP to issue an opinion on the detectability of an alternative dark solution, this test report must be submitted to COTREP."
- O.S. manufacturers undertake to adhere to the entire protocol **and indicate any deviations from it in the test report.**

Reminders:

- The methodology used for testing all samples submitted for analysis should be strictly identical.
- Results presented in reports should relate **solely** to tests conducted at test centres with **machine settings that are the most representative of those used in modern sorting centres in France** in normal operating conditions.
- **No reference should be made in reports to results obtained with optimised settings without COTREP consultation.**

In order for a positive opinion to be issued on the sortability of an alternative dark solution, both test reports must show that the protocol has been followed, demonstrate that test criteria have been met, and be submitted to COTREP.

8. CONFIDENTIALITY

If required by Requesters, a confidentiality agreement covering any details of requests and the content of reports (particularly results and observations) may be signed between the O.S. manufacturers, COTREP and Requesters.

9. PRACTICAL INFORMATION

Contacts

To carry out tests on dark packaging, contact Romane Osadnick: romane.osadnick@citeo.com.

The terms of the test as well as the contacts of the O.S. Manufacturers will then be shared with the Requesters.

Cost of testing – to be borne by Requesters

Requesters shall bear the costs of testing and discuss these directly with the O.S. manufacturers.

As a guideline, each test on the premises of an O.S. manufacturer should cost between €250 and €2,000 exclusive of VAT. Precise costings should be determined by each O.S. manufacturer based on the number of sample batches tested and the number of static and/or dynamic tests conducted.

Requesters should also budget for:

- The cost of creating and labelling samples (to be performed by Requesters)
- The cost of sending samples to the O.S. manufacturers
- Any costs for returning samples after testing.

APPENDIX 1: COTREP sorting test request form

REQUESTER:

COMPANY:

FIRST NAME/LAST NAME:

POSITION:

EMAIL:

TELEPHONE:

IMAGE OF THE PACKAGING

DESCRIPTION OF THE TEST PACKAGING

PACKAGING TYPE*:

TRADE NAME/REFERENCE NUMBER:

COLOUR:

THICKNESS (THE SMALLEST THICKNESS IN THE CASE OF A RANGE):

PACKAGING DIMENSIONS:

MAJORITY RESIN (IF MULTILAYER OR BARRIERS PRESENT, PROVIDE A DESCRIPTION):

COLORANT SOLUTION:

SUPPLIER/TRADING NAME:

INPUT RATE:**

BASE COLOUR OF THE COLORANT SOLUTION (FOR PET PACKAGING ITEMS):

DOES THE PACKAGING CONTAIN ANY MINERAL CHARGE (TIO2, ETC.)?

VOLUME MARKETED:

REQUESTER'S UNDERTAKINGS

☐ **I HEREBY CONFIRM THAT:**

- I wish to conduct tests in accordance with the standard protocol set out by COTREP.
- I confirm that tests will be conducted on the premises of the two O.S. manufacturers (Pellenc ST and Tomra).
- I agree that results will be sent to COTREP for its analysis and opinion.
- I agree to bear the entire cost of testing, which I will arrange directly with the O.S. manufacturers.
- I certify that the tested colorant solution:
    - Meets the essential requirements of the Packaging and Packaging Waste Directive (94/62/EC).
    - Does not alter the density of the packaging: the density of packaging mainly consisting of PP or PE must be < 1 and > 1 for packaging mainly consisting of PET or PS.

COTREP CAN ONLY ISSUE AN OPINION ONCE IT HAS RECEIVED THIS DOCUMENT AND THE TEST REPORTS FROM THE TWO O.S. MANUFACTURERS.

Company stamp:	Date:	Last name, first name and signature

* Examples: bottle, dispenser bottle, pot, tray, tube, etc. The shape of the packaging item may affect dynamic testing. A photograph of the packaging item is required to plan for any such potential impact.

** Indicate the concentration of the colorant solution:

- The specific concentration for validating a packaging item.
- The minimum and maximum concentration for validating a packaging range or colorant solution for PET.
- The maximum concentration for validating a packaging range or colorant solution for PE, PP and PS.

APPENDIX 2: Document to be completed and attached to each package of samples

Purpose of testing: Standard sorting protocol for dark packaging

Requester:

Company:
First name/Last name

O.S. manufacturer contact:

Test date:

Reference number of the sample and target resin:

What should be done with samples after testing?

☐ Please do not return samples.

☐ Please return samples after testing. The return address is:

- Name:
- Street:
- Post code/city:
- Country