

1. INTRODUCTION

In the frame of the Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste, all packaging put on the market must be accompanied with a Certificate of Conformity. This Certificate is under the responsibility on the industrialist who puts the packaging on the market. To obtain this document, the packaging (according to the European Directive 2013/2/EU of 7 February 2013) must comply with the Essential Requirements defined by the Directive that take into account the manufacture of the packaging but also its end of life. To satisfy the essential requirements of the Directive, the latter has proposed several standards (EN 13427 – July 2004) to apply to check the conformity of the packaging:

- Requirements specific to manufacturing and composition – prevention by source reduction (EN 13428)
- Requirements for packaging recoverable by material recycling (EN 13430)
- Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value (EN 13431)
- Requirements for packaging recoverable through composting and biodegradation (EN 13432)

The European Directive 2018/851/EC (amending the Directive 2008/98/EC) has described the waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy:

- Prevention (eco-designing);
- Preparing for re-use;
- Recycling (including composting);
- Other recovery, e.g. energy recovery;
- Disposal.

To study the recyclability of a product, it is of essential importance to consider two criteria:

- 1 To ensure that the design of the finished packaging has a certain percentage of the packaging material can be claimed to be recyclable. To be a secondary material for the paper industry, the packaging must be made with a minimum of 50 % of paper and board material.
- 2 The control selection of raw materials used in production operations to ensure that the recycling processes are not negatively affected. In other words, packaging components must be compatible with known, relevant and industrially available recycling technologies. This part is checked by laboratory trials.

2. DESCRIPTION OF THE PRODUCT

Sample identification #1: **Glassine 60 g/m²**

The tested product is a finished product delivered in reel.

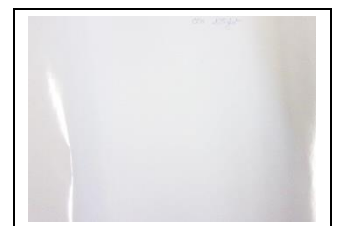
Composition: not known



Sample identification #2: **CCK 125 g/m²**

The tested product is a finished product delivered in reel.

Composition: not known



The 2 products are made predominantly from paper and board material.

3. RECYCLABILITY ASSESSMENT (LAB SCALE)

3.1. Composition

The first criterion of recyclability has been met for the 2 products: more than 50% of it is made of paper and board material (by weight). The products can be evaluated for their recyclability in the paper industry according to this criterion.

3.2. Recycling behaviour

Raw material

The samples were hand torn into pieces of approximately 3 x 3 cm in order to fit the dimensions to the laboratory pulper. They are tested separately.

Pulping (standard ISO 5263-1*)

The pulping conditions chosen at laboratory scale are representative of the industrial conditions for the recycling of packaging materials, according to the 2018/852/EU European Directive.

They are called neutral conditions:

- pulping duration: 15 minutes
- consistency: 3 % (2 litres, 60 g oven dry)
- pulping temperature: 40°C*
- no addition of chemical agents.

The objective of the pulping step is to release individual fibres in order to obtain a pumpable fibrous suspension. These experimental pulping conditions are representative of those encountered in the industry.



* exemption: 40°C to simulate the process water temperature in industrial recycling lines

Visual observation of the fibrous suspension after pulping

After 15 min. disintegration, the pulp suspension is observed visually to check two points:

- the individualisation of fibres indicating good disintegration and therefore sufficient pulping time. In the event of insufficient disintegration, the pulping time can be extended to 15 minutes or even 30 minutes maximum. After 45 minutes, the product is considered non-recyclable.
- the colour of the water in order to check for any bleeding of inks and/ or dyes.

Screening or unwanted material removal (standard TAPPI ANSI T275 sp-18)

After pulping, the pulp suspension is screened on 3 Somerville devices placed in series in the following order: 5 mm holed plate, 15/100 slotted plate and 10/100 mm* slotted plate. The screening duration is 20 min. with a flow rate of 8.6 L/min. Only the first Somerville device is fed with water.

*Note: the 10/100 mm slotted plate retains the possible remaining unwanted materials not previously removed indicating a possible insufficient quality of the pulp suspension. It is used as a monitoring device to evaluate the removal efficiency of previous screening steps.



Heavyweight cleaning step (optional)

At the outlet of the screening steps, it is possible that unwanted particles (glues, metallic particles, pieces of plastic film...) are still present in the pulp suspension. A heavyweight cleaning (HW) step (widely used in industrial recycling lines) can be effective in removing the unwanted residual particles.

The cleaning step is carried out under industrial conditions with limited flow reject rates in order to limit fibre losses. Indeed, heavyweight cleaners can be very effective but with a limited selectivity: the rejects are composed with the unwanted materials but also with certain cellulosic fibres.



Visual aspect handsheets (standard NF EN ISO 5269-2)

After pulping (if possible), screening and cleaning (if performed) steps, laboratory sheets (called handsheets) are manufactured according to the Rapid-Köthen method*.

* NF EN ISO 5269-2. *Pulps - Preparation of laboratory sheets for physical testing - Part 2)*

The handsheets are joined to the report.



3.3. Experimental results

3.3.1. Pulping

The pulping step was carried out without any difficulties. After 15 minutes, the samples (glassine or CCK) are relatively well disintegrated in the conditions chosen for the test. A visual examination of the suspension showed that some elements are not completely disintegrated and some coating particles are present in the pulp suspension.

The pulping water was not coloured.

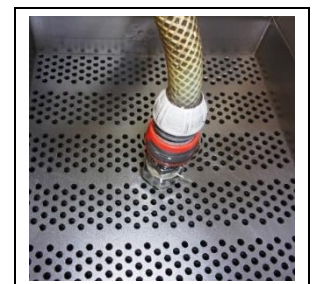
3.3.2. Somerville classifications (in cascade)

Sample #1. Glassine 60 g/m²

Step 1: 5 mm holed plate

The amount of rejects is: 0%

There is no reject at this screening step.



Step 2: 15/100 mm slotted plate

The 15/100 mm screening step is performed on the accepted pulp of the coarse screening classification.

The amount of rejects is: 0.6%

Rejects are composed of small coating particles. they turn yellow after the passage in the oven at 105°C for 8 hours.



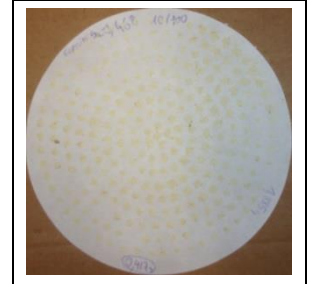
Step 3: 10/100 mm slotted plate

The 3rd screening step is used to verify the effectiveness of the 2nd screening step. It checks whether the 15/100 mm screening step is effective in removing all unwanted materials.

The amount of rejects is: 0.7%. The classification was carried out on the accepted pulp from the 15/100 mm screening step.

Rejects are composed of small coating particles. There are no fibres in the rejects.

If the screening step had been performed in one step using the 10/100 mm plate, the rejects rate would have been 1.3%.

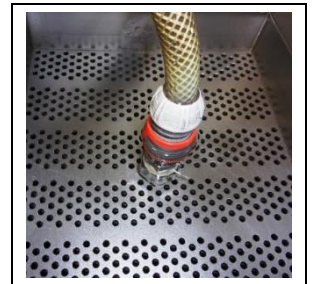


Sample #2. CCK 125 g/m²

Step 1: 5 mm holed plate

The amount of rejects is: 0%

There is no reject at this screening step.

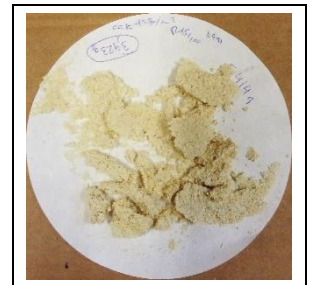


Step 2: 15/100 mm slotted plate

The 15/100 mm screening step is performed on the accepted pulp of the coarse screening classification.

The amount of rejects is: 6.1%

Rejects are composed of many coating particles. They turn yellow after the passage in the oven at 105°C for 8 hours.



Step 3: 10/100 mm slotted plate

The 3rd screening step is used to verify the effectiveness of the 2nd screening step. It checks whether the 15/100 mm screening step is effective in removing all unwanted materials.

The amount of rejects is: 1.0%. The classification was carried out on the accepted pulp from the 15/100 mm screening step.

Rejects are composed of small coating particles. There are no fibres in the rejects.

If the screening step had been performed in one step using the 10/100 mm plate, the rejects rate would have been 7.1%.



3.3.3. Heavyweight cleaning step

After the screening steps, the pulp suspensions (for glassine and CCK) were clean enough to be acceptable. It was not necessary to carry out the heavyweight cleaning step.

3.3.4. Visual aspect handsheets

Sample #1. Glassine 60 g/m²

After the pulping step

After pulping, it has been possible to manufacture handsheet. Fibres are well distributed in the sheet but we can observe many small particles in transmitted light (coating particles). These particles are not tacky. The handsheet can be easily separated from the paper cover sheet and the carrier board.

A handsheet "Glassine 60 g/m² pulpeur (recyclability test)" is joined to the report.



After the 10/100 screening step

After screening, the largest coating particles have been removed but there are still some small particles present in the handsheet. The visual aspect can be considered as acceptable. There is no tackiness effect.

A handsheet "Glassine 60 g/m² Acc Class (recyclability test)" is joined to the report.



Sample #2. CCK 125 g/m²

After the pulping step

After pulping, it has been possible to manufacture handsheet. Fibres are well distributed in the sheet but we can observe many small particles in transmitted light (coating particles). These particles are not tacky. The handsheet can be easily separated from the paper cover sheet and the carrier board.

A handsheet "CCK 125 g/m² Pulpeur (recyclability test)" is joined to the report.



After the 10/100 screening step

After screening, the largest coating particles have been removed but there are still some small particles present in the handsheet. The visual aspect can be considered as acceptable. There is no tackiness effect.

A handsheet "CCK 125 g/m² Acc Class (recyclability test)" is joined to the report.



3.4. Recyclability test: conclusion

3.4.1. Sample #1. Glassine 60 g/m²

The product Glassine 60 g/m² delivered in reel was easily disintegrated in the conditions chosen for the recycling of packaging. At the screening step (coarse 5 mm and fine 15/100 mm), the amount of rejects is low (0.6%). Rejects are composed of small coating particles. The fibre yield is high. The final pulp has a good visual aspect in reflected light. Small particles can be observed in transmitted light.

The composition of the product complies with the first criterion (minimum 50% paper and cardboard by weight) and is compatible with the conventional recycling chain:

The recyclability* has been proved without reserves according to the standard EN13430 “Requirements for packaging recoverable by material recycling” for the product Glassine 60 g/m².**



3.4.2. Sample #2. CCK 125 g/m²

The product CCK 125 g/m² delivered in reel was easily disintegrated in the conditions chosen for the recycling of packaging. At the screening step (coarse 5 mm and fine 15/100 mm), the amount of rejects is 6.1%. Rejects are composed of coating particles. The fibre yield is high. The final pulp has a good visual aspect in reflected light. Small particles can be observed in transmitted light.

The composition of the product complies with the first criterion (minimum 50% paper and cardboard by weight) and is compatible with the conventional recycling chain:

The recyclability* has been proved without reserves according to the standard EN13430 “Requirements for packaging recoverable by material recycling” for the product CCK 125 g/m².**



3.4.3. Essential remarks

Any change in the sample components or any additional converting operation will render the conclusion of this report invalid.

* the recyclability certificate of conformity is the responsibility of the company which places the packaging on the market. CTP do not issue such a certificate.

** small coating particles are not really a problem for visual quality: white particles among white fibres are not easily visible.

4. RECYCLING BEHAVIOUR (PILOT PLANT SCALE)

4.1. Experimental conditions

4.1.1. Raw materials

The tested release papers are made of white fibres and the coating is white. The presence of coating particles in the pulp suspension (bleached fibres) is not detrimental because it is not easy to distinguish them.

In the recycling of packaging, the main colour is brown/ grey. The presence of white particles (of various size) in the final pulp suspension (of brown colour) could be more detrimental.

For this reason, a recycling test was carried out on a pilot plant scale. Instead of carrying out the test with 100% of the product(s) to be tested, we mixed the product with a perfectly recyclable cardboard in a proportion of 80% cardboard/20% release paper.

The presence of white particles will be probably more visible among brown fibres.

Preparation of the raw materials:

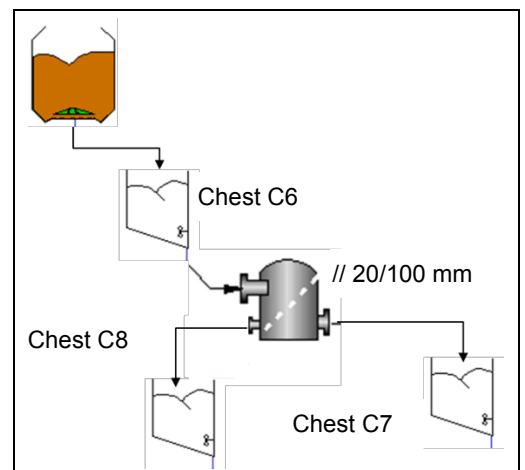
The quantity of product in the pulper was 28 kg i.e. a mixture of 22.4 kg of cardboard and 5.6 kg of release paper.

The cardboard and the release paper were cut to A3 size before being pulped.

4.1.2. Recycling line

To perform the test at pilot plant scale, we simulate a conventional recycling line:

- Pulping: 5%, 40°C, 20 min. (28 kg – 560 litres)
- Coarse screening step and high-density cleaning: not shown in the figure (and due to the cleanliness of the raw materials (only release paper and cardboard), they were unnecessary).
- Screening step with a 20/100 mm slotted basket
 - o Chest C6: inlet pulp
 - o Chest C7: accepted pulp
 - o Chest C8: rejects



The screening step was carried out in order to minimise the amount of rejects and to simulate 3 to 4 screening stages.

The pilot plant trials were performed in the following conditions:

	Inlet cc% (C6)	Accepts cc% (C7)	Rejects cc% (C8)
Glassine	2.3	2.1	2.8
CCK	2.3	2.2	2.7

4.1.3. Controls and characterisations

Handsheets were manufactured:




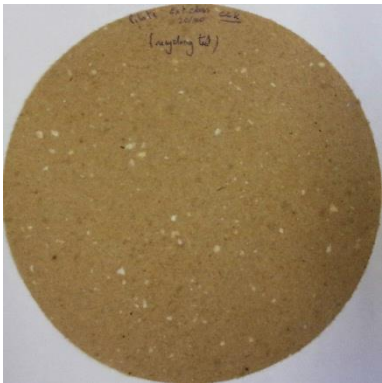
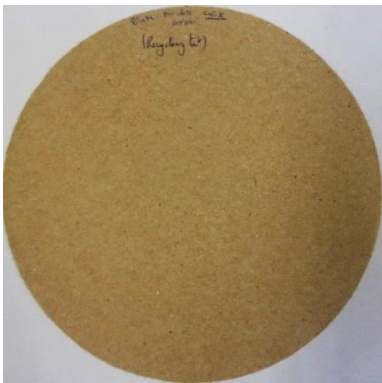

- at the inlet of the screening step (corresponding to the pulp after pulping) in chest C6

- at the accepts -chest C7)
- at the rejects (chest C8)

Somerville classifications (in cascade using the 15/100- and 10/100-mm slotted plates) were performed on the three different samples: inlet pulp, accepted pulp and rejected pulp.

4.2. Experimental results

4.2.1. Handsheets

80% cardboard/ 20% glassine			
	Pilote entrée CH glassine (recycling test)	Pilote acc CH glassine (recycling test)	Pilote refus CH glassine (recycling test)
	Inlet pulp (chest C6)	Accepted pulp (chest C7)	Rejected pulp (chest C8)
80% cardboard/ 20% CCK			
	Pilote ent class 20/100 CCK (recycling test)	Pilote Acc class 20/100 CCK (recycling test)	Pilote refus class 20/100 CCK (recycling test)

Sample #1. Glassine 60 g/m²

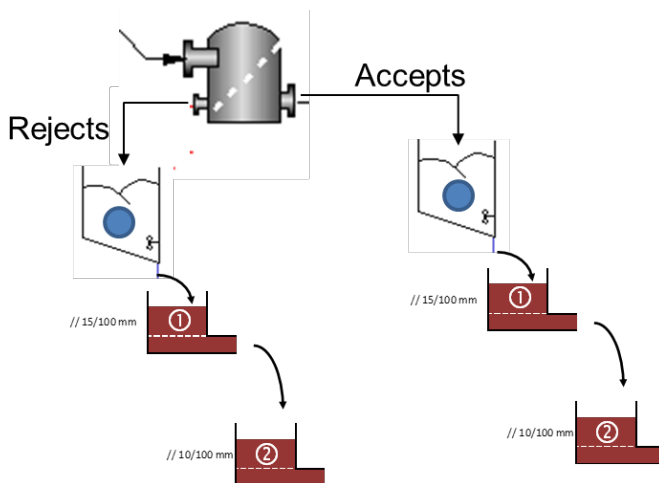
- The handsheet at the inlet of the screening step (20/100 mm) contains many big white particles. The visual aspect poses some visual quality issues. The screening step is necessary. The handsheet (Pilote entrée CH glassine (recycling test)) is joined to the report
- After the screening step for the accepted pulp, the visual aspect of the handsheet is very good. White particles have been removed, fibres are well distributed in the paper sheet. The handsheet (Pilote acc CH glassine (recycling test)) is joined to the report.
- After the screening step for the rejected pulp, we can observe white particles in of the handsheet. The handsheet (Pilote refus CH glassine (recycling test)) is joined to the report.





Sample #2. CCK 125 g/m²

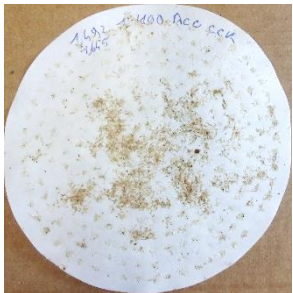
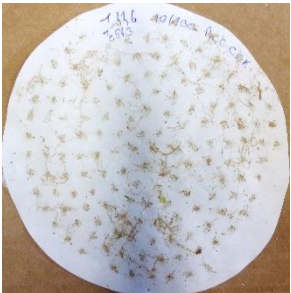


- The handsheet at the inlet of the screening step (20/100 mm) contains many big white particles. The visual aspect poses some visual quality issues. The screening step is necessary. The handsheet (Pilote ent class 20/100 CCK (recycling test)) is joined to the report
- After the screening step for the accepted pulp, the visual aspect of the handsheet is very good. White particles have been removed, fibres are well distributed in the paper sheet. The handsheet (Pilote ent class 20/100 CCK (recycling test)) is joined to the report.
- After the screening step for the rejected pulp, we can observe white particles in of the handsheet. The handsheet (Pilote refus CH glassine (recycling test)) is joined to the report.

4.2.2. Somerville classification (control)

After the screening step (CH 20/100 mm) performed at pilot plant scale, the accepted pulp and the rejects were classified on the 2 Somerville devices (15/100 mm and 10/100 mm) placed in cascade in order to determine the amount of residual unwanted materials (see below). Pictures of the rejects at the Somerville screening steps are given hereafter with the amount of rejects.



80% cardboard/ 20% glassine				
	0.1% at 15/100 mm	0.2% at 10/100 mm	1.7% at 15/100 mm	0.2% at 10/100 mm
Accepted pulp of the 20/100 mm screening step		Rejects of the 20/100 mm screening step		

80% cardboard/ 20% CCK				
	0.6% at 15/100 mm		0.4% at 10/100 mm	
	Accepted pulp of the 20/100 mm screening step		Rejects of the 20/100 mm screening step	

Accepted pulp of the CH screen (pilot plant)

For the 2 mixtures (80% cardboard/ 20% release paper (glassine or CCK)), there are practically no white particles in the rejects meaning that the 2 final pulps are clean and the visual aspects are very good.

4.3. Recycling test: conclusion

The 2 release papers (glassine 60 g/m² and CCK 125 g/m²) are not detrimental to recycling when introduced in mixture with recyclable paper in a ratio of 80% cardboard/ 20% release paper. The final pulps have a very good visual aspect.

5. GENERAL CONCLUSION

The 2 release papers (glassine 60 /m² and CCK 125 g/m²) were tested for recyclability and recycling. The recyclability test was performed on 100% of the products whereas the recycling test was performed with the release papers in mixture with a recyclable cardboard (80% cardboard/ 20% release paper) in order to simulate the industrial reality.

Both release papers are considered as recyclable according to the EN13430 standard and are not detrimental to recycling when recycled in mixture with cardboards.

oooOOOooo