

Lucca, 28/07/2023
REFERENCE N. 23LD03822

Technical report
Recyclability Laboratory Test Method CEPI Version 2 (2022)

To the kind attention of PAPETERIES DU LEMAN
1080 RUE DES VIGNES ROUGES
74500, - PUBLIER (France)

Product: BAKING PAPER NAMED PRIMABAKE

Sampling Source: By customer

Send by: Customers Plant

Date Received: 19/07/2023

End of analysis: 24/07/2023

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1. DESCRIPTION OF THE SAMPLE

Description of sample: The analyzed sample is paper and is presented as illustrated in Fig. 1.

Sample identification: BAKING PAPER NAMED PRIMABAKE

Test starting date: 24/07/2023

Notes: Analysis carried out pre-consumer

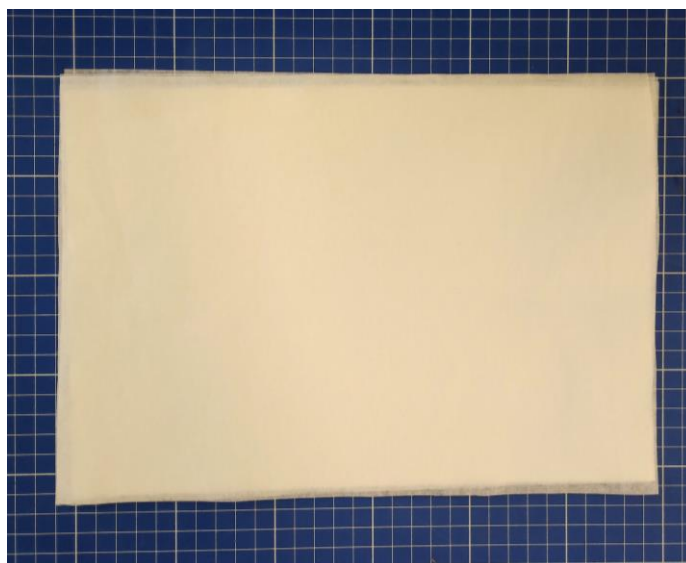


Figure 1. Sample as received

2. ANALYSIS OF RECYCLABILITY

Evaluation carried out in accordance with CEPI Recyclability Test Method Version 2 (2022).

A sample of material or product is tested in accordance with the Test Method, which simulates the recycling process widely found in facilities (typically Paper Mills) for the processing of Paper for Recycling (PFR).

This standard is used to evaluate the performance of the material or product under standardized processing conditions to provide a measure of the ease with which any particular product may be recycled.

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2.1 Equipment used:

- Gibertini EU-C 7500DR analytical balance;
- Standard pulper for FRANK-PTI type S95568001;
- Somerville FRANK-PTI fractionator type S40170 0001 equipped with plate with holes: \varnothing 5 mm, \varnothing 0.15 mm;
- PTS DOMAS image analysis system consisting of a scanner with a minimum optical resolution of 2000 dpi and software for analyzing the area and distribution of macrostickies;
- Rapid Köthen sheet former RK-2A 070883.

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3. RESULTS

On the sample under examination, the following parameters in Table 1 and 2 were determined:

Table 1 Parameters used for recyclability Total Score calculation (4EG valuation, see Annex)

Evaluation system for recyclability	Units	Results	Minimum value	Maximum value
Coarse Reject (CR)	%	< 0,1	< 0,1	< 0,1
Fine Reject (FR)	%	11,0	10,7	11,3
Sheet formation – II Adhesion (SA)		Absent		
Sheet formation – II Optical inhomogeneity (VI)		1		
Total Score	%	68		

Table 2. Parameters not used for recyclability Total Score calculation

Evaluation system for recyclability	Units	Results	Minimum value	Maximum value
Evaporation residue	%	1,14	1,13	1,15
Sheet formation – I Adhesion		Absent		
Sheet formation – I Optical inhomogeneity		1		
Macrostickies $\phi < 2000 \mu\text{m}$	mm ² /kg	< 500	< 500	< 500

The sample, according to the protocol of 4EG, is (see Annex):

“Suitable for Standard Mill recycling = 68/100

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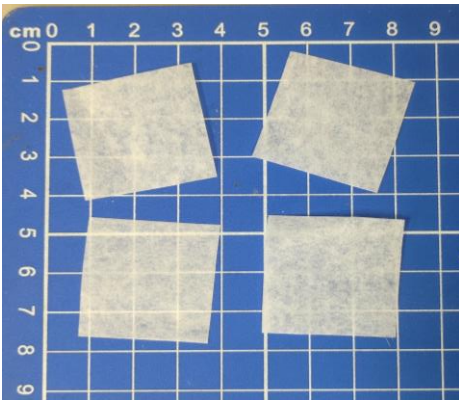
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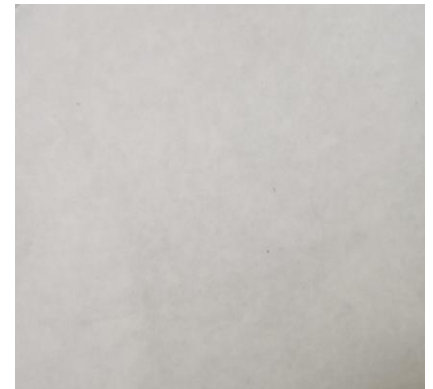
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Sample cut



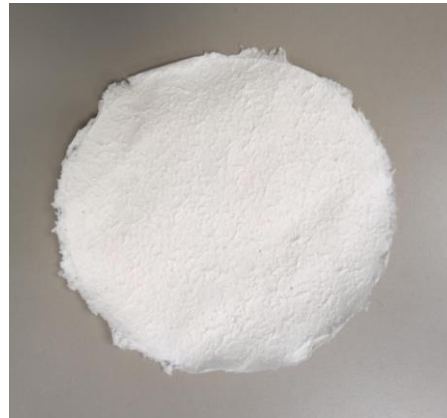
I Sheet



I Sheet detail



Fine Reject



Fine Reject dry



Fine Reject dry detail



Macrostickies



Macrostickies dry



Macrostickies detail

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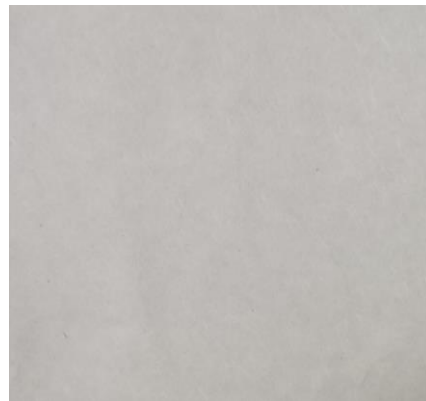
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II Sheet



II Sheet detail

Technical Manager

Rapporto di Prova Firmato Digitalmente
Digitally Signed Test Report

Dott.ssa Tiziana Messina

Ordine Reg. Chimici e Fisici della Toscana – N° 2335 Sez. A Chimico

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Annex, Recyclability evaluation protocol by 4EG

In order to calculate the recyclability score, several output values of the lab test are considered. Table 3 shows the output values currently being considered.

Table 3. Parameters used for recyclability score calculation

Acronym	Full name	Meaning
CR	Coarse Reject	Mass weight percent of components of packaging material retained on a coarse screen after repulping
FR	Fine Reject	Mass weight percent of components of packaging material retained on a fine screen after repulping and coarse screening
VI	Visual Impurities	An evaluation of the optical purity of the paper. This parameter is evaluated on a hand sheet from the accept fine screening
SA	Sheet Adhesion	An evaluation of the tackiness of a handsheet from the accept of fine screening

Yield score

The total reject (TR) is calculated according to the method in equation below:

$$TR = CR + FR * \alpha, \alpha = 0,9$$

$$Y = 100\% - TR$$

The total reject measures how much material will be lost during screening is and approximates the total mass of the packaging product, as a percentage, that will not be recycled. All terms used in equation can be found in Table 4 except for α which is a correction factor used to mitigate the impact of errors commonly observed when assessing fine rejects at the lab scale. The value of α is set to 0.9 based on expert consensus.

Table 4. Overview of the yield scoring calculation within each interval/range and total reject (the score at the edge of each interval is indicated)

Yield (%)	Total Reject (%)	Yield score calculation	Yield Score
≥95	<5	Score = 100 – TR * 2	100...90
95...85	5...15	Score = 90 – (TR – 5) * 4,5	90...45
85...80	15...20	Score = 45 – (TR – 15) * 9	45...0
<80	>20	Score = 45 – (TR – 15) * 9	0...-100

To this Yield score value is added two other scores given by the visual impurities (Table 5) and the adhesiveness (Table 6) obtained from the laboratory handsheet to obtain the Total Score calculation.

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Table 5. Conversion table for visual impurity level to visual impurity score

Visual impurity level	Visual impurity score
1	0
2	-5
3	-15
4	-30

Table 6. Conversion table for sheet adhesion level to sheet adhesion score

Sheet adhesion level	Sheet Adhesion score
1	0
2	0
3	Knockout

For the detail about of the recyclability score refer to this link:

<https://4evergreenforum.eu/wp-content/uploads/Fibre-based-packaging-recyclability-evaluation-protocol-4EG-Beta-Release.pdf>

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