Grenoble, November 2020

Study Report n° 19.0083/3b

Objet: Assessment of Printed Product recyclability – Deinkability score based on INGEDE method 11

UV inks Sicura L-NRGY/LED Rock (Siegwerk)

SAMPLES

Designation:
- Simplex prints

Observations:
- Designation of tested product comes from the information given by Siegwerk France SA. They do not engage CTP responsibility
- Product not used for the test are stored in CTP for 3 months as well as samples generated during the trials

ORDER

V/ Ref: Quotation DV.FAB. 19.0083

Customer: Jérôme FUMEX

Company: SIEGWERK FRANCE SA.

TESTS

Recycling/deinking Team

Responsible for the tests: Benjamin Fabry

Visa

Main operator: Jean De Gracia

Calendar: Trials performed in November 2019

This report concerns only the tested products

The copy of this report is authorized in the uncut version only.

This report is made of 18 pages (including cover)

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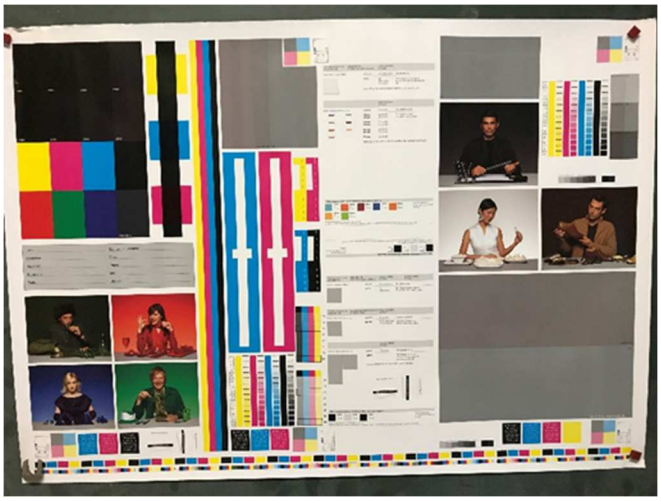
SUMARY / CONCLUSIONS



Prints with UV inks are known to induce difficulties for deinking, mainly due to the generation of a high amount of dirt specks that are not sufficiently removed during flotation, leading to unacceptable cleanliness of the deinked pulp

Sicura L-NRGY/LED Rock UV inks series (see complete references inside the report) proposed by **Siegwerk** has been printed with **Heidelberg XL 106-6L offset sheetfed press** on coated paper from **BSV (135 g/m²)** on simplex mode (see picture of the tested printed product). This printed material has been submitted to deinkability test according following INGEDE method 11 and the EPRC deinkability score is determined based on the results obtained. Such printed material

- reaches the targeted objective for luminance Y, color shade a*, and Ink removal index and filtrate darkening ΔY criteria
- reaches the threshold value for dirt speck contamination A_{50} and A_{25} criteria (not the targeted objective)

By application of the EPRC scorecard principle, as none of the criteria failed, an EPRC deinkability score can be evaluated: the tested product is considered with a **good deinkability** with a total score of **94 pts.** This statement can be extended to similar ink coverage on the same paper having higher basis weight than the one that has been tested.

Criteria	Y	a*	A_{50}	A_{250}	IE	ΔY	Total score
Tested product	35	20	15	12	7	10	94

Score obtained.

Note that this evaluation is only valid for the declared product (paper, ink, printing press). Change in one of the tested association can lead to different results and scoring.

1. Context and objectives

The presence of ink particles coming from printed papers is considered as detrimental particles in Paper for Recycling that must be removed to produce new white papers for the graphic chain (newspapers, magazines, printing/writing, etc). Ink removal step is mainly achieved during flotation in deinking mills. Flotation is based on the particle size and the hydrophobic character of the particles to be removed. In order to evaluate the deinkability of a product, a laboratory method has been developed: method INGEDE 11 quantifies the deinkability results through optical properties obtained after defined laboratory deinking as well as process parameters such as ink removal and coloration of the process water.

In order to be awarded for EU Ecolabel for printed paper or Blue Angel for example, the product put on the market must answer to a number of criteria including recyclability issue that includes proven deinkability for the printed products. For this purpose, “Deinking Scorecard” can be used. The deinking scorecard was adopted by the European Recovered Paper Council (ERPC) to promote eco-design of printed products; which will ensure their recyclability and also promote sustainable processes. In France, in the framework of declaration of prints put on the market, a given number of troublemaker elements on deinking/recycling have been identified and can be submitted to penalty. Among these troublemaker elements, UV inks and UV varnishes are brought to the fore. In order to be exempted of penalty during declaration to CITEO, it is necessary to justify the deinkability of the product put on the market (ERPC deinkability score higher than 70 points). Until now, most of the printed products with UV inks failed ERPC deinkability score due to too high dirt speck content after lab deinking sequence.

It must be brought to the fore that ERPC deinkability score is valid only for a given association of paper, inks and printing press. On the other hand, it is admitted that if a printed product passes the ERPC for a given basis weight of a paper, all the paper from the same reference with higher basis weight are also considered with positive results and deinkability test are not requested for them.

The objective of the present report is to assess the deinkability score for **UV Inks Sicura L-NRGY/LED Rock** proposed by **Siegwerk**.

2. Characteristics of printed product

The tested prints correspond to form test prints on sheet-fed Heidelberg XL 106-6-L press on BVS paper (135 g/m²).

The UV inks correspond to Sicura L-NRGY/LED Rock series proposed by Siegwerk see details for more complete information; see Annex - Information given (p.14).

The received simplex printed samples are illustrated in Figure 1.

Figure 1: Printed samples (simplex).

3. Trial description and EPRC Deinking score principle

3.1. Laboratory deinking test: INGEDE method 11

The complete description of INGEDE method 11 (January 2018 version) is described in the following link: http://pub.ingede.com/en-GB/methods/

The print samples are firstly artificially aged in an oven during 72 hours at 60°C and then manually shredded into pieces of about 2x2 cm² and acclimated.

In a first step, dry papers are reslushed at 16% mass consistency with the conventional chemistry recommended by INGEDE method 11 (0.6% NaOH, 1.8% silicate, 0.7% H_2O_2 and 0.8% oleic acid) in order to determine if the pH range of INGEDE method 11 are respected or not, and to eventually adjust eventually the chemical dosage to achieve the pH targets. Based on preliminary results, the pH range is too high and the dosages of caustic soda and silicate are reduced to respectively 0.4 and 1.2%.

The re-slushed pulp is then diluted to 5% consistency and stored at 45°C during 60 minutes. The pulp is then diluted a second time at 8 g/l for flotation in a Voith Delta 25L cell during 12 min with air supply at 7L/min. The foam generated is collected and used to determine the flotation yield.

During all these steps, the water hardness is adjusted to 128 mg Ca^{2+}/l.

Pictures of the different steps are illustrated in the following figures (note that pictures do not correspond to the tested prints but are present to illustrate the different steps).

Figure 2 : Illustration of the different steps.

Pulp samples are collected and used to manufacture pads, handsheets, collect water from thickening, etc. All the preparations of samples are made in agreement with the various INGEDE methods to be applied.

3.2. Principle of ERPC deinkability score

"Assessment of Printed Product Recyclability – Deinking Score" [1] proposed by the European Recovered Paper Council can be applied to determine their recyclability. The latter document provides an assessment of the deinkability of a printed product by evaluating results of a laboratory deinking test procedure for all kinds of printed graphics on white paper. The deinkability of a printed product, as a whole, can be assessed by only looking at its Deinkability Score (max score of 100). For individual products, this is done by using the rating of the results given in this specification or by comparing the Deinkability Scores of several printed products. Scoring are determined according to the INGEDE method n°11p [2] that defines the procedure and equipment to be used to run a deinkability test. Deinkability is assessed by 3 quality parameters (luminance, color shade and dirt specks (in two different categories) and 2 process parameters (ink elimination and filtrate darkening).

For each of these parameters, thresholds and target values are defined. The target values are depending on the category of the printed product. If the results meet the target value or are better, it scores the maximum points allocated to this parameter. If it is not the case, the score has to be calculated: for each individual parameter, the ratio of units better than the threshold value, divided by the range between threshold and target values, multiplied by the maximum score for this parameter gives the Deinkability Score for this parameter. If one result does not reach the threshold value, a negative score is attributed and the corresponding print product will be classified as not suitable for deinking. Note that a score below zero in one or more parameters leads to an overall assessment "not suitable for deinking".

The list of output parameters and used abbreviations are the following:

- Y: luminance of deinked pulp measured by the reflectance at 557 nm expressed in percent
- a*: color shade (green or red) in CIE L*a*b* system
- A_{50} : dirt particle area for particles larger than 50 µm (circle equivalent diameter) expressed in mm^2/m^2
- A_{250}: dirt particle area for particles larger than 250 µm (circle equivalent diameter) expressed in mm^2/m^2
- IE: Ink elimination expressed in %
- ΔY: filtrate darkening expressed in points

[1] "Assessment of printed product recyclability: deinkability score Issue 2 – January 2017" by European Recovered Paper Council – document available at http://paperforrecycling.eu/publications/
[2] INGEDE Method n°11p " Assessment of Print Product Recyclability: Deinkability test", available at http://pub.ingede.com/en-GB/methods/

The weighting of each parameters (and therefore the maximum score), threshold values and target values are given in the following table (for the tested product, target values to be applied correspond to the "Magazine coated" case). If the test failed at least one criterion (and whatever the score obtained for the other criteria), the print is considered as not suitable for deinking. On the other, as soon as a print passes all the threshold values for all the parameters, a deinkability score can be attributed: it corresponds to the sum of the score of each parameter and allows to classify them in terms of deinkability (Table 2).

Parameter	Y	a*	A_{50}	A_{250}	IE	ΔY
Maximum score	35	20	15	10	10	10
Threshold values						
Lower Threshold	47	-3.0			40	
Higher Threshold		2.0	2 000	600		18
Target values according to the product category						
Newspaper	>60	>-2.0 to <+1	<600	<180	> 70	< 6
Magazines, uncoated	>65				> 70	
Magazines, coated	>75				> 75	
Stationary (Y of base paper <75)	>70				> 70	

Table 1: Maximum score, threshold values and target values for each parameter for "Newspapers", "Magazine" and "Low Ink coverage products (Brightness of base paper <75)".

As soon as a Deinking Score is established, printing products recyclability should be assessed according to the following table. The deinking score is then valid only for an association of paper/ink/printing process. Any change of this association can lead to different behaviour.

Score	Evaluation of deinkability
71 to 100 points	Good
51 to 70 points	Fair
0 to 50 points	Tolerable
Negative (failed to meet at least one thrsehold)	Not suitable for deinking (May be recyclable without deinking)

Table 2: Rating of the deinkability score.

4. Results

All the data are reported in Annex -Data obtained when running the test (p. 16).

4.1. Flotation yield

Even if not directly taken into account in EPRC deinkability score, flotation yield is an important parameter for deinkers as it will have direct impact on environmental footprint and deinking cost production (yield is associated with solid losses that are generated during flotation). The total yield is generally higher than 70 and 80% for respectively coated and uncoated papers. As can be observed from Figure 3, the total yield measured is relative low compared to conventional behaviour for coated paper and represents ~70% (for a fibre yield of 91%).

As mentioned in INGEDE method 11, if the fibre yield is below 65%, the test must be repeated with a shorter flotation time to reach 65%. For the print product tested, the fibre yield is higher than 65%, meaning repetition of the test with shorter flotation time is not necessary.

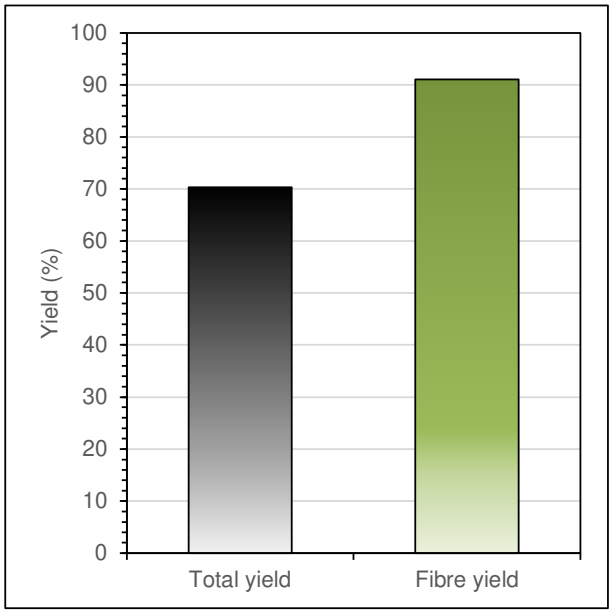


Figure 3: Flotation yields.

4.2. Presence/removal of pigmented black inks

The ERIC measurements (Effective Residual Ink Content) allow to follow black inks not visible by naked eyes but that impact strongly brightness and luminosity of the pulp. This measurement is based on reflectance measurement at 950 nm (wavelength where only pigmented black inks will have an impact):

- Measured on whole pulp after pulping, ERIC gives indication on the initial amount of ink and/or the fragmentation of them: the higher the ERIC value, the greater the amount of ink present and/or the higher the ink fragmentation level.
- Measured on hyperwashed pulp (lab procedure allowing to remove all the particles smaller than 65µm and referenced fibre fraction), ERIC values give information on the amount of ink still attached to the fibres. It also gives us the potential of deinkability if all the free inks are removed.
- Measured on whole pulp after flotation, ERIC values give information on the amount of ink removed by flotation (flotation process does not induce ink fragmentation) and therefore the total ink removal index and the detached ink removal index (also called free ink removal).

Based on the ERIC measurements, it is possible to determine different indexes:

- Ink detachment index: $Id=(1-ERIC_{hyperwashed}/ERIC_{pulper\ outlet})x100$
- Total ink removal index: $IEERIC=(1-ERIC_{floated\ pulp}/ERIC_{pulpeur\ outlet})x100$
- Free ink removal index:

$$IEfree=[1-(ERIC_{floated\ pulp}-ERIC_{hyperwashed})/(ERIC_{pulpeur\ outlet}-ERIC_{hyperwashed}]x100$$

When determining the deinkability score, the preconized Ink Elimination calculation is based on the reflectance measurement at 700 nm (IE700). In comparison to the previous method based on ERIC

(Reflectance at 950 nm), IE700 takes into account a part of the dyes, the nature of the fibres, the presence of mineral filler. Most of the time, IEERIC and IE700 indexes give similar values.

After the pulping stage, the tested product leads to very low ERIC value on the fibres (~15 ppm) that corresponds to an ink detachment index of 88% (meaning that 12% of ink is still attached to the fibres, but the quantity is low).

During pulping (undeinked pulp), ERIC value represents a low value in comparison to the high ink coverage of the tested product (ERIC~130 ppm) and decreases to 30 ppm after flotation stage (deinked pulp). It represents a total ink removal about 79% that corresponds to higher value than the targeted value of EPRC criteria (75%) and free ink removal represents 89%.

The results are illustrated in Figure 4 and Figure 5.

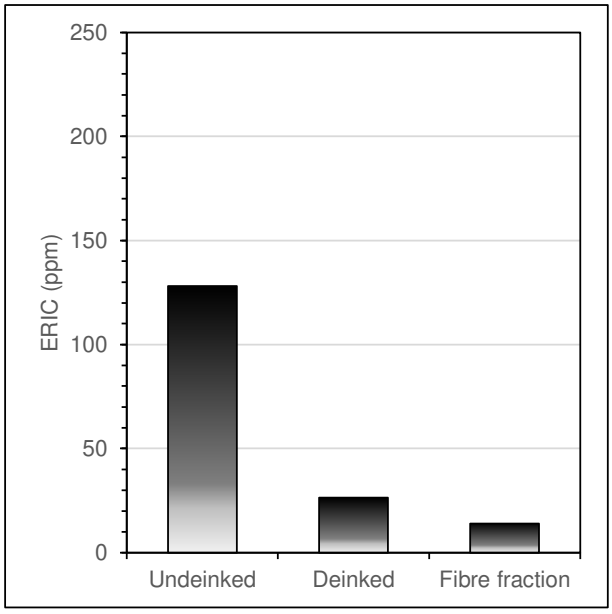


Figure 4 : ERIC measurements after pulping, flotation and on fibre fraction.

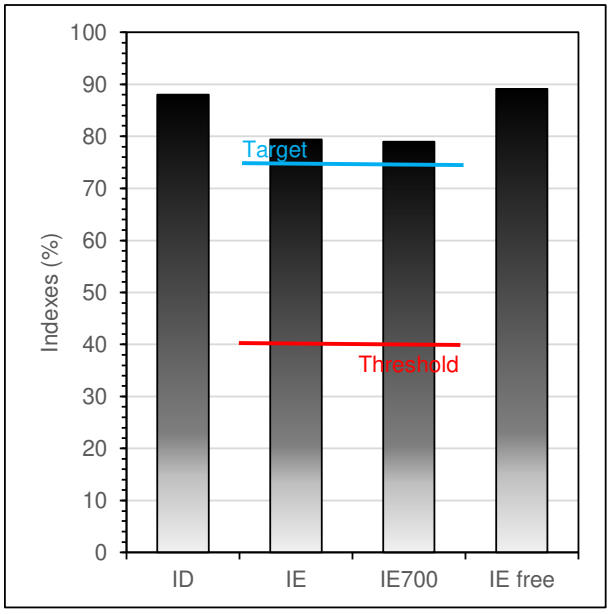


Figure 5 : Ink detachment and ink removal indexes.

4.3. Brightness (R_{457nm}) and luminance R_{557nm} measured without UV

Even if brightness is not taken into account in EPRC deinkability score, it is one of the key parameter for paper production and use for the printer. Brightness is measured at 457 nm wavelength and in the framework of this study with C2° light source (UV excluded).

After pulping, brightness represents already 75% (Figure 6). After flotation, where ink particles are removed, brightness gain is logically observed (+ 9 pts). The direct link between ink content and brightness is clearly illustrated in Figure 7: the lower the ERIC value (the lower the ink content), the higher the brightness. After flotation, brightness represents then 84% whereas the fibre fraction (that gives an idea of the real potential if all the free inks are removed from the process) represents 87%.

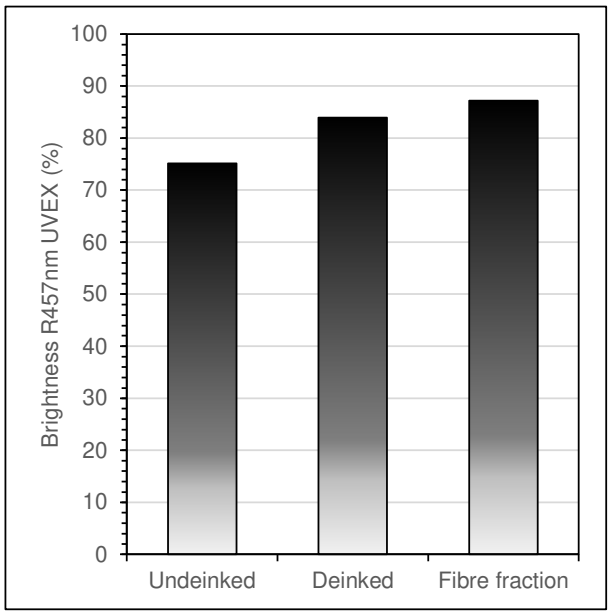


Figure 6 : Brightness measurements after pulping, flotation and on fibre fraction.

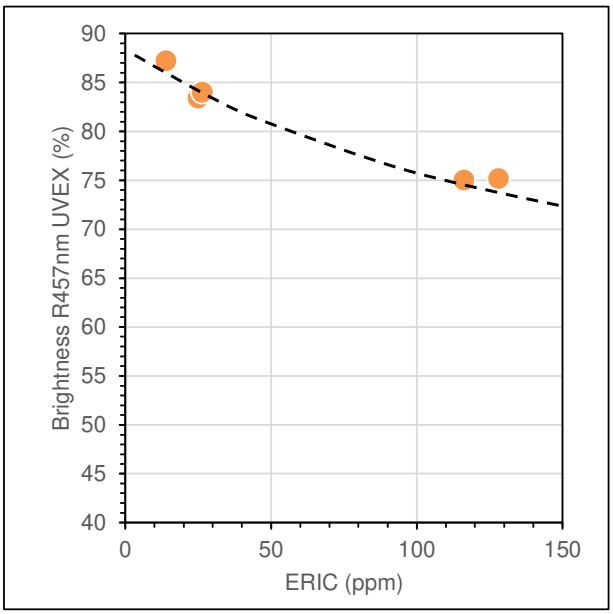


Figure 7 : Brightness versus ERIC measurements.

Luminance Y (based on reflectance measured at 557 nm wavelength, contrary to brightness based on reflectance at 457 nm), follows the same trend than brightness (trends observed in Figure 6 and Figure 8 are identical).

After pulping, luminance Y represents already 75% (targeted value already reached) and after flotation, where ink particles are removed, luminance gain is logically observed (+ 11 pts). After flotation, luminance represents then 86% that allows to reach the EPRC target value for this criterion. Note that if all the small elements present (including the free ink particles) are removed from the process, the potential of such packaging material is 91% (Fibre fraction in the figure).

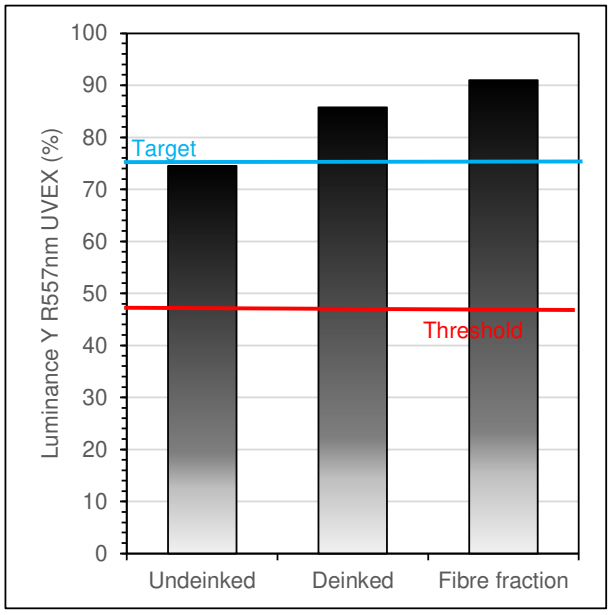


Figure 8 : Y after pulping, flotation and on fibre fraction.

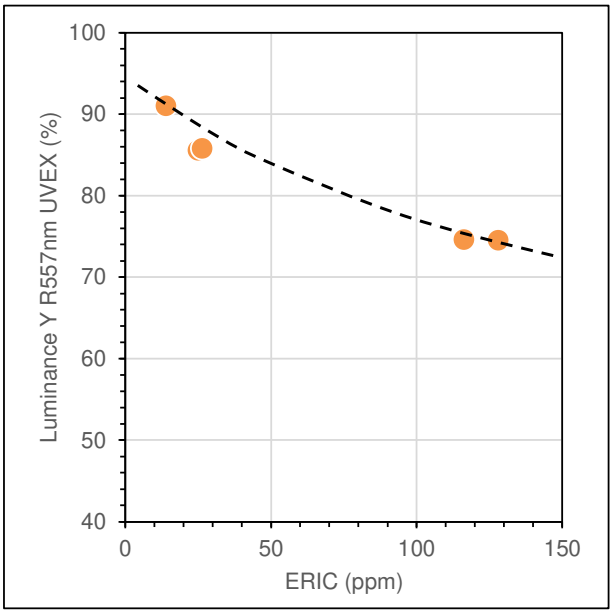


Figure 9 : Y versus ERIC measurements.

4.4. Residual Colour shade

Residual color shade of the pulp is measured through L*a*b* CIE system:

- L*=0 corresponds to black and L*=100 corresponds to perfect white. The intermediates values correspond then to different grey level.
- a* is characteristic of red shade (if positive value) or green shade (if negative value)
- b* is characteristic of yellow shade (if positive value) or blue shade (if negative value).

The a* and b* values obtained are illustrated respectively in Figure 10 and Figure 11.

The pulp obtained after pulping stage is characterized by neutrality in regards to red/green shade (a*~0). During flotation, the green shade slightly increases (-0.1)but still within the targeted EPRC window.

Even if only a* is taken into account in the determination of EPRC deinkability score, b* value can give also information on the nature of the fibres, the presence of dyes, the presence of blue or yellow inks. After pulping, the product tested leads to b* slightly negative (blue shade). Flotation leads to an increase in b* and the fibre fraction is characterized with more pronounced yellow shade (characteristic of cellulose fibres).

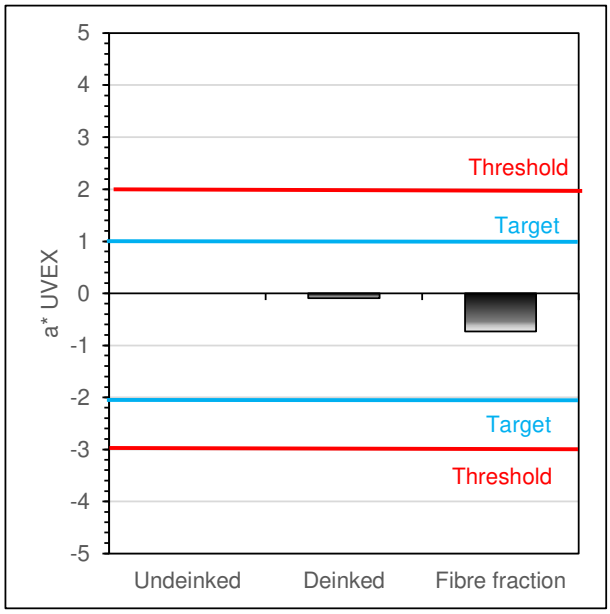


Figure 10 : Green/red shade.

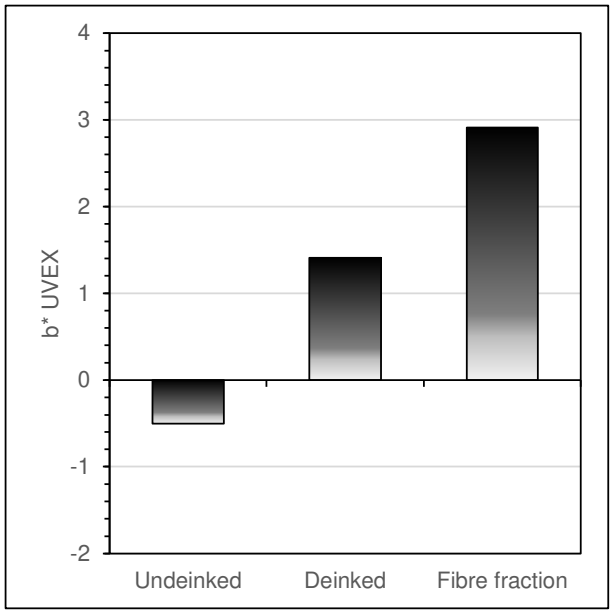


Figure 11 : Blue/yellow shade.

4.5. Filtrate darkening

Process water coloration (also called filtrate darkening ΔY) is measured by filtration on Millipore of 100 ml of filtrate obtained during thickening of 4 g o.d.pulp after flotation that is diluted in 1 litre of water through a filter pad. For the tested product, filtrate darkening ΔY is very low (0.2 pts), meaning that the targeted value is largely achieved.

4.6. Dirt specks

Dirt speck particles correspond to large particle of ink having an equivalent diameter greater than 50 µm (and visible by naked eyes, and with sufficient contrast).

The total dirt speck contamination A_{50} (i.e. all the particles having an equivalent diameter larger than 50 µm) is expressed in mm²/m² of handsheets. Initial A_{50} for the tested product is very high (61 040 mm²/m²). Flotation allows to remove 98% of them, leading to a final contamination of 880 mm²/m², meaning that the threshold value is reached (2000 mm²/m²) but not the targeted value (600 mm²/m²).

For the largest particles having a diameter larger than 250 µm, the large dirt speck content A_{250} after pulping is largely higher than the threshold value of EPRC regarding this criterion (A_{250} represents 18 960 mm²/m² in comparison to a threshold of 600 mm²/m²). Flotation stage allows to reduce the final A_{250} contamination to 310 mm²/m² (removal efficiency of 98%), i.e within the EPRC windows range between threshold and targeted values.

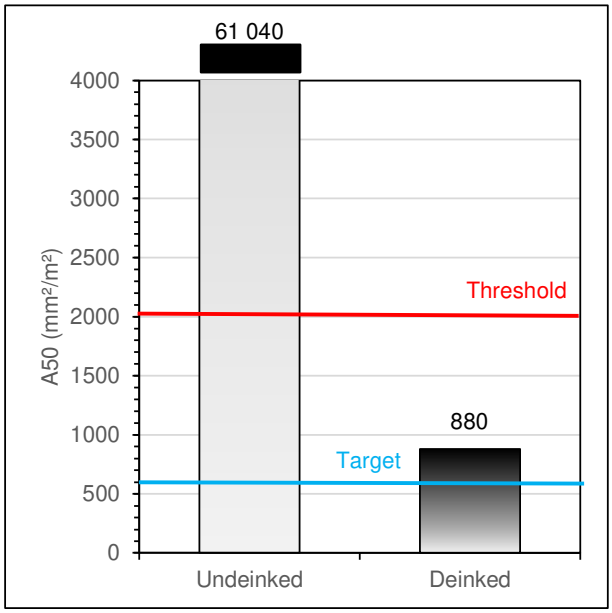


Figure 12 : A_{50} dirt speck contamination.

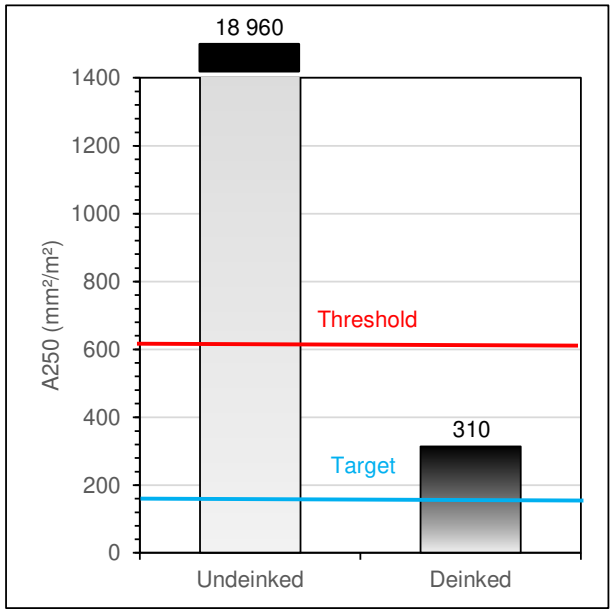


Figure 13 : A_{250} dirt speck contamination.

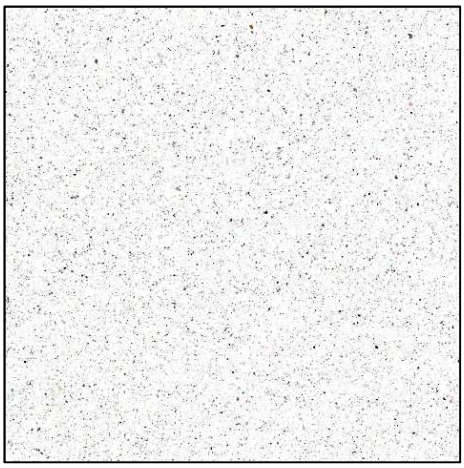


Figure 14 : Picture of handsheet from undeinked pulp (picture size: 5x5 cm).

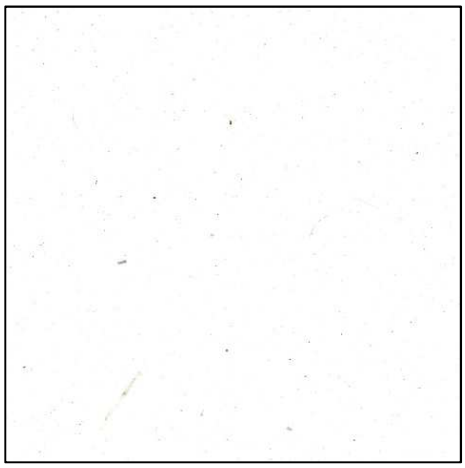


Figure 15 : Picture of handsheet from deinked pulp (picture size: 5x5 cm).

4.7. ERPC deinkability score

The following tables summarize the useful results to calculate the EPRC deinkability score:

- In green (👍👍), it corresponds to measurement where the tested product reached the targeted value, meaning that it will obtain the maximum score for this parameter
- In black (👍), it corresponds to measurement within the targeted and threshold values.
- In red (👎), it corresponds to measurement where the tested product does not reach the threshold value. If only one of the parameter failed, by application of the EPRC deinkability score principle, the product is considered as not suitable for deinking, whatever the score obtained for the other criteria.

Parameter	Y [pts]	a* [-]	A_{50} [mm²/m²]	A_{250} [mm²/m²]	IE [%]	ΔY [pts]
Threshold, target and measured values						
Lower threshold	47	-3.0			40	
Higher threshold		2.0	2 000	600		18
Target value	>75	>-2.0 to <+1	<600	<180	>75	<6
Tested product	👍👍	👍👍	👍	👍	👍👍	👍👍

Table 3: Criteria respect for each parameters.

Parameter	Y [pts]	a* [-]	A_{50} [mm²/m²]	A_{250} [mm²/m²]	IE [%]	ΔY [pts]
Threshold, target and measured values						
Lower threshold	47	-3.0			40	
Higher threshold		2.0	2 000	600		18
Target value	>75	>-2.0 to <+1	<600	<180	>75	<6
Tested product	**86**	**-0.1**	**880**	**315**	**79**	**0**
Deinkability score (details)						
Maximum score	35	20	15	10	10	10
Tested product	**35**	**20**	12	**7**	**10**	**10**

Table 4: Details of the EPRC score.

As can be seen from the previous tables, the tested product

- reaches the targeted objective for luminance Y, color shade a*, and Ink removal index and filtrate darkening ΔY criteria
- reaches the threshold value for dirt speck contamination A_{50} and A_{25} criteria (not the targeted objective)

By application of the EPRC scorecard principle, as none of the criteria failed, a EPRC deinkability score can be evaluated: the tested product is considered with a **good deinkability** with a total score of **94 pts.**

5. Annex

5.1. Information given for the tested product

INGEDE

Assessment of deinkability
Data sheet

Please specify if choosing "other" (use the field remarks)
Grey fields are filled in by INGEDE Office

Number of questionnaire	
Receipt date	
INGEDE TestID	
Applicant	
Company	Siegwerk
Street	13 route de Taninges
Postal code	74100
City	Annemasse
Country	FR
Contact name	Fumex Jérôme
Phone	450877400
Mobile	686452487
Fax	
e-Mail	jerome.fumex@siegwerk.com
General Information	
Product Name	**forme test Heidelberg**
Publisher	Siegwerk
Issue	mai-18
Printing Plant	
Print run	1000 sheets
Publishing frequency	Anual
Weight in g	
Pages	

Product Part	**Please select**
No. of Pages	
Paper	
Furnish	Woodfree
Finishing	HWC
Use	Offset (uncoated/coated)
Manufacturer	BVS
Brand name	
Basis weight in g/m²	135.0
Brightness R_{457}	
Printing Technology	
Printing process	Offset Sheetfed
Printing fed	Sheet-fed
Printing machine manufacturer	Heidelberg
Printing machine designation	XL106-6-L
Printing process speed	15000
Ink	
Cyan	
Position of printing unit	2
Trade name	Sicura L-NRGY / LED Rock - Process Cyan L-NRGY/LED
Manufacturer	SIEGWERK
Manufacturer article number	70-120094-1
Main Carrier	Other
Magenta	
Position of printing unit	3
Trade name	Sicura L-NRGY / LED Rock - Process Magenta L-NRGY/LED
Manufacturer	SIEGWERK
Manufacturer article number	70-802475-7
Main Carrier	Please select
Yellow	
Position of printing unit	4
Trade name	Sicura L-NRGY / LED Rock - Process Yellow L-NRGY/LED
Manufacturer	SIEGWERK
Manufacturer article number	70-301169-2
Main Carrier	Please select
Black	
Position of printing unit	1
Trade name	Sicura L-NRGY / LED Rock - Process Magenta L-NRGY/LED
Manufacturer	SIEGWERK
Manufacturer article number	70-900925-8
Main Carrier	Please select
Image setting	
Colour management	On
Fountain solution	
Manufacturer	Saphira 221 AF
Concentration in %	3.0
Drying	
Technology	UV curing
Temperature in °C	
Post-treatment	
Varnish	No treatment
Other	
Remarks	

5.2. Data obtained when running the test

CTP Reference				Sicura
Chimie	% NaOH			0.4
	% Silicate			1.2
	Technicien			DGJ
pH	After Pulping (15% Concentration)			10.0
	At Begin of Storage (5% Concentration)			9.7
	At End of Storage (5% Concentration)			9.5
	Begin of Flotation (Flotation Concentration)			8.3
After Pulping	Pads CTP (UP-CTP)	Ash (525°C)		48.9
		Brightness R457		75.0
		Y		74.6
		L*		89.2
		a*		0.1
		b*		-0.3
		R700nm		75.6
		ERIC		116
	Pad INGEDE (UP-ING)	Brightness R457		75.2
		Y		74.5
		L*		89.2
		a*		0.0
		b*		-0.5
		R700nm		75.2
		ERIC		128
	Handsheet UP	ln nb (nb/m²)	[50-100]	45287.1
			[100-150]	1167329
			[150-200]	564824
			[200-250]	343928.8
			[250-500]	291981.3
			[500-…]	4399.2
			Somme	2417749.4
		ln surface (mm²/m²)	[50-100]	280.9
			[100-150]	14768.3
			[150-200]	13694.2
			[200-250]	13335.2
			[250-500]	18418
			[500-…]	540.7
			Somme	61037.3
		Mean equivalent diameter (µm)		179

CTP Reference				Sicura
AFTER FLOTATION	Foam	Total colume of foam (L)		1.644
		Concentration (g/l)		32.49276156
		Total yield (%)		83.4
		Fibre Yield (%)		85.6
	Pad CTP (DP-CTP)	Concentration (g/l)		5.3
		Ash (525°C)		33.8
		Brightness R457		83.4
		Y		85.6
		L*		94.1
		a*		-0.2
		b*		1.8
		R700nm		87.7
		ERIC		25
	galette HL (DP-CTP)	Concentration (g/l)		3.1
		Brightness R457		87.2
		Y		91.0
		L*		96.4
		a*		-0.7
		b*		2.9
		R700nm		92.7
		ERIC		14
	Pad INGEDE (DP-ING)	Brightness R457		84.0
		Y		85.8
		L*		94.2
		a*		-0.1
		b*		1.4
		R700nm		87.7
		ERIC		26
	Millipore	Brightness R457		93.7
		Y		95.3
		L*		98.2
		a*		-0.3
		b*		1.2
		R700nm		96.2
		ERIC		3
	HandsheetsDP	en nb (nb/m²)	[50-100]	698.9
			[100-150]	27368.2
			[150-200]	5283.1
			[200-250]	2672.4
			[250-500]	2569.6
			[500-…]	513.9
			Somme	39106.1
		en surface (mm²/m²)	[50-100]	4.4
			[100-150]	330.4
			[150-200]	127.4
			[200-250]	103.4
			[250-500]	190.5
			[500-…]	123.6
			Somme	879.7
		Mean equivalent diameter (µm)		169

CTP Reference		Sicura
	ID	88.0
	IE	79.4
	IE700	79.0
	IE free	89.1
	Total yield	70.3
	Fibre yield	91.1
	Delta Y	0.2
A50	UP	61037.3
	DP	879.7
A250	UP	18958.7
	DP	314.1
A50 removal		98.6
A250 removal		98.3

Calculation according to ERPC

Benchmarking Category		Magazine Coated
Y	DS	**35**
a*	DS	**20**
$A_{>50}$	DS	**12**
$A_{>250}$	DS	**7**
IE	DS	**10**
ΔY	DS	**10**
Total Scoring	Total	**94.0**
	Assessm.	**good deinkability**