

## Recyclability of Packaging Products and Proposal for a Scorecard Assessment

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1. Introduction
2. Test Method EPL 1 for Packaging Products
3. Proposal for Scorecard Assessment
4. Summary

## Introduction I

- From its origin, paper grades are typically recyclable
- This becomes obvious by the fact that every paper mill uses its broke as raw material again or sells it to other paper mills for further reuse
- But on its way from paper to paper products recyclability can be significantly impaired
- Deinking mills require deinkable graphic paper products to manufacture high quality DIP
- Undeinkable graphic paper products can still be recycled in paper mills using mixed or packaging grades of paper for recycling
- For graphic paper products an approved test method and an assessment on deinkability is available by INGEDE and ERPC



Source: VDP



## Introduction II

- For packaging products, a similar approved test procedure and assessment is missing until now
- In EcoPaperLoop a test method (EPL 1) was developed and database established with 168 test results
- Deinkability or recyclability always has to be assessed by using the specific paper product alone – not as constituent part of paper for recycling
- Therefore, the test method EPL 1 and the proposed scorecard are not suitable for the assessment of paper for recycling



Ergebnisse für die Verbesserung von Central Europe  
Paper Based Products Recycling Loop

Recyclability Test for Packaging Products	Lead
	Since July 2014

**1 Introduction**  
In order to minimise the problems occurring during recovered paper processing, it is essential that packaging products are manufactured according to good manufacturing practice. In fact, the packaging products have to be manufactured for the most part from fibre and must be easy to deink. This increases fibre yield and reduces energy demand as well as the amount of rejects to be disposed. Also, adhesive applications used for packaging products have to be able to resist the chemical shear forces during stock preparation processes, and to fragment mostly into particles of adequate size which can be removed during the process.

INGEDE Method 11	Assessment of Print Product Recyclability – Deinkability Test –	INGEDE
July 2014 13 Pages		

**Introduction**  
The good recyclability of printed products is a crucial feature for the sustainability of the graphic paper use. In order to be able to recycle, it is important to improve recyclability. One of the measures is to provide keys for the assessment of the recyclability in the test reports:

- Deinkability
  - Sustainability of adhesive applications
- Therefore a set of methods has been developed to evaluate the common operating conditions of relevant systems such as an industrial deinking plant under standard conditions or a laboratory scale. This also includes the related evaluation of printed products based on deinking plant operating parameters (inked paper) for recycling plants, and after printing and writing paper products (inked paper) for recycling plants. The results are documented in the test reports. The test reports are available as a digital content of the test reports. The test reports are available as a digital content of the test reports. The test reports are available as a digital content of the test reports.

**1 Scope**  
This INGEDE Method describes a procedure to evaluate the deinkability of printed paper products.



Source: VDP

## Introduction III

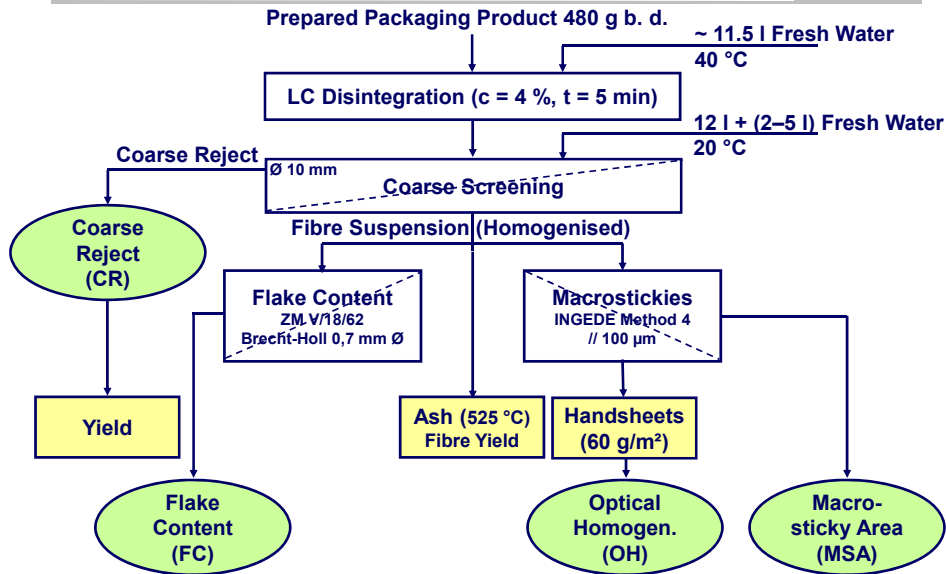


- Despite the fact that paper products are typically recyclable, EN 643 already describes and limits as part of unwanted materials “paper and board detrimental to production” as:
  - papers and boards which have been recovered or treated in such a way that they are, for a basic or standard level of equipment, unsuitable as raw material for the manufacture of new paper and board products, or
  - are actually damaging, or
  - whose presence makes the whole consignment of paper unusable
- The total amount of unwanted materials is limited in EN 643 between 0,5% and 3,0%, depending on the grade of paper for recycling



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# Recyclability Test for Packaging Products (EPL Method 1)



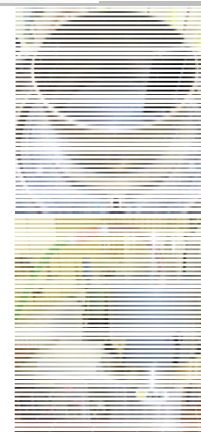
## Major Equipment



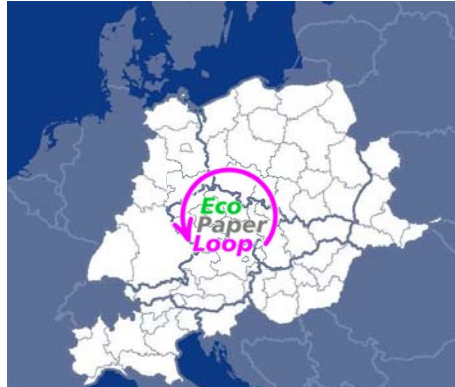
LC Disintegration



Coarse Screening



Flake Content & Sticky Evaluation



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## Recyclability Score Card Proposal Purpose and Scope of Application



- Improvement of material recycling of packaging products within the paper industry
  - Applicable to all paper and board products which might be constituent part of EN 643
  - Test method and assessment is for individual packaging products only
  - Not applicable for paper products which are usually intended for deinking purposes
  - A positive test result according to this method does not mean that the packaging product can be part of recycling paper grades for deinking
- Recyclability Score from +100 to -90 points

## Recyclability Scorecard Proposal Principle I



- **Recyclability test:**
  - **EcoPaperLoop Method 1 or**
  - **ZELLCHEMING Technical Leaflet RECO 1 2/2014**
- **8 Product Categories (Corrugated Boxes, Folding Cartons, Carrier Bags, ...)**
- **4 Tested Parameters**

▪ <b>Coarse Reject (CR)</b>	<b>Process Parameters</b>
▪ <b>Flake Content (FC)</b>	<b>Process Parameters</b>
▪ <b>Macrosticky Area (MSA)</b>	<b>Quality Parameters</b>
▪ <b>Optical Homogeneity (OH)</b>	<b>Quality Parameters</b>

## Recyclability Scorecard Proposal Principle II



- **Quality parameters (MSA, OH) refer to the quality of the achieved recycled pulp, process parameters (CR, FC) affecting the process efficiency**
- **The 4 parameters are weighted differently, but process and quality parameters are assessed equally with 50 points in maximum**

Parameter	Coarse Reject (CR)	Flake Content (FC)	Macrosticky Area (MSA)	Optical Homogen. (OH)	Total
Maximum Score	35	15	40	10	100
	<b>Process Parameters</b>		<b>Quality Parameters</b>		

## Recyclability Scorecard Proposal Principle III



- For each parameter tested (except optical homogeneity) threshold values are defined independent from the product category
- Exceeding a threshold ends in a negative Recyclability Score
- A warning range is established for CR and MSA independent from the product category
- If at least one parameter is in the warning range and the others are below the thresholds values, the Recyclability Score becomes zero, and an indication for improvements is given
- Target values for the parameters FC, MSA and OH are equal independent from the product category
- For CR a differentiation is made between composite packaging products and pure paper products

## Recyclability Scorecard Proposal Optical Homogeneity I



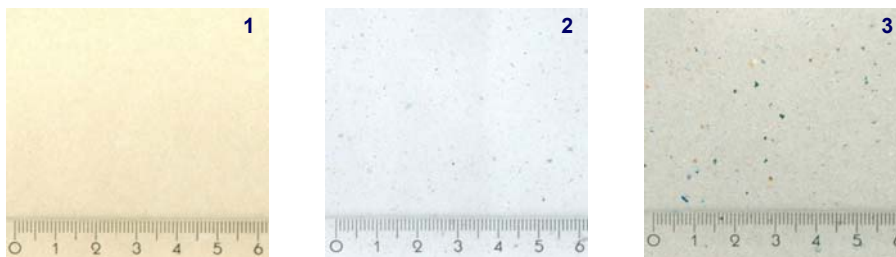
- Only inhomogeneities from non-paper product materials should be taken into account (not from coloured fibres)
- No quantitative measurement is actually available
- Results are categorised by visual impression of the prepared handsheets from the accept of sticky screening
- Optical homogeneity is no criterion for failing the recyclability test

## Recyclability Scorecard Proposal Optical Homogeneity II



The following categories exist:

1. Very good (no visible inhomogeneity): Score 10 points
2. Good (some visible inhomogeneity): Score 5 points
3. Tolerable (plenty visible inhomogeneity): Score 0 points



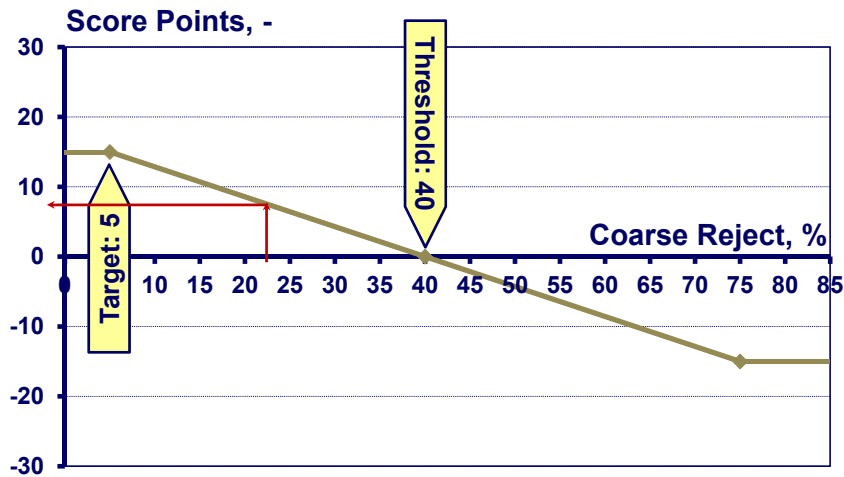
## Recyclability Scorecard Proposal TH-, TA-Values, WR



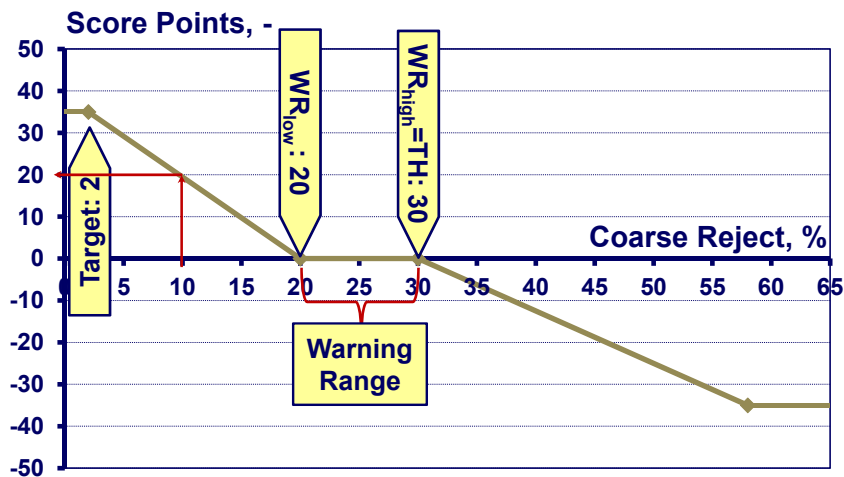
<b>Threshold Values (TH)</b>	<b>CR</b> %	<b>FC</b> %	<b>MSA</b> < 2.000 µm mm <sup>2</sup> /kg	<b>OH</b> ---
<b>All Product Categories</b>	<b>30</b>	<b>40</b>	<b>30.000</b>	<b>n/a</b>
<b>Warning Range (WR)</b>	<b>CR</b> WR <sub>low</sub> %	<b>CR</b> WR <sub>high</sub> = TH %	<b>MSA</b> < 2.000 µm WR <sub>low</sub> mm <sup>2</sup> /kg	<b>MSA</b> < 2.000 µm WR <sub>high</sub> = TH mm <sup>2</sup> /kg
<b>All Product Categories</b>	<b>20</b>	<b>30</b>	<b>20.000</b>	<b>30.000</b>
<b>Target Values (TA)</b>	<b>CR</b> %	<b>FC</b> %	<b>MSA</b> < 2.000 µm mm <sup>2</sup> /kg	<b>OH</b> ---
<b>Pure Paper Categories</b>	<b>≤ 2</b>	<b>≤ 5</b>	<b>≤ 1.000</b>	<b>Very good</b>
<b>Composite Paper Categories</b>	<b>≤ 10</b>	<b>≤ 5</b>	<b>≤ 1.000</b>	<b>Very good</b>



## Calculation of Score Points (Example: FC, Threshold 40 %)



## Calculation of Score Points (Example: CR, Threshold 30 %)



## Recyclability Scorecard Proposal Calculation



Calculation of the score per parameter:

- Comparable to Deinkability Score of ERPC
  - Examples are shown in the draft document
  - Maximum score per parameter for all figures below target value
  - Total maximum score is 100 points
  - Numbers are calculated according to the achieved results
  - For one result in the warning range total score is zero if other parameters below the thresholds
  - A score below 0 (negative) for CR and/or FC lead to the overall assessment “not suitable for use in standard recycling processes but can possibly be used in specialised processes”
  - A score below 0 (negative) for MSA lead to the overall assessment “not suitable for use in any recycling processes”

## Recyclability Scorecard Proposal of Rating



Packaging Recyclability Score	Evaluation of Recyclability
71 to 100 Points	Good recyclability
1 to 70 Points	Fair recyclability
CR in the Warning Range	Tolerable recyclability, but needs design improvements and/or process adaptations
MSA in the Warning Range	Tolerable recyclability, but needs improved adhesive applications
CR and/or FC above Threshold	Not suitable for use in standard recycling processes, but can possibly be used in specialized processes
MSA above Threshold	Not suitable for use in any recycling processes

## Recyclability Scores (02.02.2015)



	Tested No.	Failed Tests		Due to:		
		No.	%	CR	FC	MSA
Corrugated Boxes	43	2	5	2	0	0
Folding Cartons	29	1	3	0	0	1
Carrier Bags	18	5	28	3	1	4
Moulded Products	17	2	12	0	2	0
Sacks (pure paper)	17	4	24	4	1	0
Sacks (composites)	19	11	58	11	1	1
Liquid Packages	18	18	100	18	0	0
Others	7	3	43	1	0	2
<b>Total</b>	<b>168</b>	<b>46</b>	<b>27</b>	<b>39</b>	<b>5</b>	<b>8</b>



02.02.2015

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## Summary



- The recyclability test method for packaging products is published
- A recyclability assessment has been proposed for packaging products
- The Recyclability Score proposed differentiates between good and fair recyclable packaging products, those which have a tolerable recyclability get hints for further improvements, for some products specialized recycling processes are approved and finally only products with too high MSA are evaluated as “not suitable for use in any recycling process”
- The proposed Scorecard is still under discussion within the paper value chain via CEPI and ERPC
- Most important feedback regards the need to develop a specific test method for the recyclability of composite packaging products

## Thank You!



**For further information please contact the  
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