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green**

Macrostickies Evaluation Monitoring Annex

Workstream 1 – Recyclability Evaluation Protocol

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1. INTRODUCTION

This document sets out the scope, intent, and use conditions of the 4evergreen monitoring phase related to macrostickies evaluation scoring. It is designed as an informative and voluntary reference for laboratories, industry stakeholders, and the broader 4evergreen community.

This phase serves as a learning and data-gathering step prior to any future methodology updates or alignments.

2. SCOPE, POSITIONING AND BOUNDARIES

Objectives

- Collect structured, comparable data on macrostickies using the current publicly available recyclability laboratory test methods (CEPI Part I Version 3, 4evergreen Part II Version 1 and 4evergreen Part III Version 1)
- Support collective learning on robustness, applicability ranges, and limitations of the methodology.
- Inform future 4evergreen work without prejudging outcomes and/or test method review using collected feedback.

Voluntary and informative nature

Participation is voluntary but highly encouraged. Outputs are provided for information only and do not constitute certification, validation, or compliance claims.

Clear separation from recyclability evaluation and regulation

The monitoring phase is explicitly not a recyclability pass/fail evaluation and is not intended for regulatory use. Any such interpretations fall outside the scope of this initiative.

Expected value and next steps

Insights generated may feed into future methodological improvements, guidance documents or discussions, subject to 4evergreen governance.

3. WHAT IS RELEASED AND IN WHICH FORMAT

Within the framework of the monitoring phase, 4evergreen releases the following elements:

> An **updated version of the Recyclability Scorecard Excel**, including the introduction of the macrostickies parameter. The macrostickies parameter is reported separately and does not impact the total technical recyclability score outcome. It is intended solely to provide additional transparency and support data collection during the monitoring phase.

> This **Macrostickies Evaluation Monitoring Annex**, which provides:

- > Guidance on the intended use and interpretation of the macrostickies parameter,
- > Clarification on scope, limitations, and positioning of the monitoring phase,
- > Instructions for laboratories and stakeholders on data donation and feedback,
- > A detailed description of the macrostickies evaluation scoring: calculations and formulas for Part I, II and III.

4. MACROSTICKIES EVALUATION SCORE

The macrostickies evaluation scoring only considers and evaluates the impact of the smaller sized macrostickies, which have a demonstrated negative impact on industrial paper recycling.

Therefore, the removal efficiency of industrial screening is considered for different size classes of macrostickies (Table 1).

Size Class of Macrostickies (equivalent circle Diameter)	Remaining macrostickies
<600 µm	100%
600 µm–1000 µm	80%
1000 µm–2000 µm	20%
>2000 µm	0%

Table 1: Macrostickies remaining in the screened pulp

The formula that is used to calculate the adjusted macrostickies area after industrial screening is:

$$A_{MS} = A_{600} + A_{1000} \times 0,8 + A_{2000} \times 0,2$$

Where:

A_{MS} is the adjusted macrostickies area (mm²/kg packaging)

A_{600} is the macrostickies area with an equivalent circle diameter smaller than 600 µm (mm²/kg packaging)

A_{1000} is the macrostickies area with an equivalent circle diameter of 600-1000 µm (mm²/kg packaging)

A_{2000} is the macrostickies area with an equivalent diameter of 1000-2000 µm (mm²/kg packaging)

0,8 corresponds to a screening efficiency of 20%

0,2 corresponds to a screening efficiency of 80%

All recycling processes are striving for a clean process and output, therefore the adjusted macrostickies area (A_{MS}) must be kept to a minimum. This has clear financial, technical and environmental benefit reflected in the score levels allocated. The calculations for the macrostickies scores are shown in the following section.

Macrostickies Evaluation Score for Part I – Paper mill with conventional recycling process

The Macrostickies Score (MS Score) is calculated using the following formula:

$$MS\ Score = \begin{cases} 0 & A_{MS} \leq 10000\ mm^2/kg \\ -40 \times \frac{\log(A_{MS}) - \log(10000\ \frac{mm^2}{kg})}{\log(50000\ \frac{mm^2}{kg}) - \log(10000\ \frac{mm^2}{kg})} & \text{for } 10000\ mm^2/kg \leq A_{MS} \leq 50000\ mm^2/kg \\ -40 & A_{MS} \geq 50000\ mm^2/kg \end{cases}$$

Where

A_{MS} is the adjusted macrostickies area (mm²/kg packaging)

10000 mm²/kg is the target value (lower values have no score deduction)

50000 mm²/kg is the maximum threshold

If the A_{MS} value is higher than 50000 mm²/kg, it is likely that the product tested will be classified as limited or non-recyclable in future.

Macrostickies Evaluation Score for Part II – Paper mill with flotation-deinking recycling process

MS Score

$$MS \text{ Score} = 15 - 15 \times \frac{\log(A_{MS}) - \log\left(2000 \frac{mm^2}{kg}\right)}{\log\left(25000 \frac{mm^2}{kg}\right) - \log\left(250000 \frac{mm^2}{kg}\right)}$$

$A_{MS} \leq 2000 \text{ mm}^2/kg$
 $10000 \frac{mm^2}{kg} \leq A_{MS} \leq 50000 \frac{mm^2}{kg}$
 $A_{MS} \geq 250000 \text{ mm}^2/kg$

Where:

A_{MS} is the adjusted macrostickies area (mm^2/kg packaging)
 2000 mm^2/kg is the target value (lower values got a score of 15)
 25000 mm^2/kg is the maximum threshold (higher values will receive a negative score)
 250000 mm^2/kg is the scoring limit (score is capped at -15, higher values will get no higher score deduction)

If the MS score is below 0, it is likely that the product tested will be classified as limited or non-recyclable in future.

Macrostickies Evaluation Score for Part III – Paper mill with specialised recycling process (LPC)

MS Score

$$MS \text{ Score} = -20 \times \frac{\log(A_{MS}) - \log\left(10000 \frac{mm^2}{kg}\right)}{\log\left(50000 \frac{mm^2}{kg}\right) - \log\left(10000 \frac{mm^2}{kg}\right)}$$

$A_{MS} \leq 10000 \text{ mm}^2/kg$
 $10000 \text{ mm}^2/kg \leq A_{MS} \leq 50000 \text{ mm}^2/kg$
 $A_{MS} \geq 50000 \text{ mm}^2/kg$

Where:

A_{MS} is the adjusted macrostickies area (mm^2/kg packaging)
 10000 mm^2/kg is the target value (lower values gave no score deduction)
 50000 mm^2/kg is the threshold

If the A_{MS} value is higher than 50000 mm^2/kg , it is likely that the product tested will be classified as limited or non-recyclable in future.

5. USE OF THE MACROSTICKIES SCORE – DISCLAIMER

The macrostickies evaluation scoring results generated within the monitoring phase is provided for informational and learning purposes only. As such:

- It shall not be used to support claims on recyclability performance, product compliance, or market suitability.
- It does not constitute a pass/fail criterion, nor does it replace or modify the established recyclability evaluation outcome.
- It must not be interpreted as a certification, endorsement, or validation by 4evergreen or any affiliated body.
- Any external communication of results should clearly indicate that the data originates from a voluntary monitoring phase and is subject to ongoing evaluation and potential methodological evolution.

Users remain fully responsible for how results are interpreted and communicated. Any use beyond the intended informational scope lies outside the responsibility of 4evergreen.

6. FEEDBACK AND DATA COLLECTION – CALL TO ACTION

Contribution to collective learning

Participants are invited to actively contribute feedback and data to strengthen the overall robustness of the work.

Expected feedback

Participants are invited to actively contribute feedback and data to strengthen the overall robustness of the work.

- Practical experience with test execution and evaluation scoring implementation
- Observed variability, sensitivities, or repeatability issues.
- Identification of edge cases or atypical material behaviours.

Data Donation

Voluntary sharing of test results is highly encouraged to support the analysis of applicability ranges and methodological limits. All data (and sample) donations with 4evergreen are managed through the Sample Hub, which ensures that contributions are handled in a fully anonymised manner. Company identities are not disclosed, and all exchanges are treated as strictly confidential.

Contribution to future developments

Inputs will inform future 4evergreen workstream updates, subject to governance and consensus within the dedicated workstream.

Contact points

Organisations wishing to share insights and data may contact the central 4evergreen mailbox at 4evergreen@cepi.org. Requests will then be channelled, as appropriate, to the Sample Hub and/or the relevant Project Coordinator to ensure proper handling in line with 4evergreen governance.

ABOUT 4EVERGREEN

4evergreen is a cross-industry alliance perfecting the circularity of paper-based packaging to contribute to a climate-neutral and sustainable society. Our goal is to raise the overall recycling rate of paper-based packaging to 90% by 2030. We bring a particular focus on packaging with a lower circularity performance today, namely the types used for household, out-of-home and on-the-go consumption.

The alliance brings together industry representatives from across the paper-based packaging value-chain, from pulp, paper and board manufacturers and recyclers to packaging producers and converters, including brand owners, retailers and waste management companies. It also comprises non-fibre material suppliers (e.g., adhesives, inks, coatings), technology providers (e.g., machinery, collection, and recycling solutions), and leading research institutes.



For general enquiries please contact 4evergreen@cepi.org