RecyClass

RECYCLASS RECYCLABILITY METHODOLOGY

VERSION 2.4

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RecyClass

Making Plastics
Packaging Circular

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RecyClass

INTRODUCTION

Traditionally, plastic packaging has been designed with functionality and marketing display in mind, while its end-of-life management has been disregarded. Today, moving forward in the transition towards circular economy, design for recycling stands as an essential measure to accomplish circular life for plastics and contributes towards diverting plastics away from landfills and incineration plants, ultimately contributing to achieve higher recycling targets while saving natural resources. The overarching goal of RecyClass is to enable high-quality recycling of plastic packaging.

RecyClass is an initiative aiming to create a value chain community around plastic packaging recyclability to find the correct way to approach and evaluate design for recycling of plastic packaging products, with the goal of improving their recyclability.

The RecyClass Platform aims at filling the existing gap between different industry actors and works towards combining the technical knowledge of polymer suppliers, converters, brand owners, waste managers and recyclers. The RecyClass Platform gathers members across the whole plastics value chain with recyclability in the core of their strategy to work on the development of testing Protocols[1], as well as on Design for Recycling Guidelines[2].

In order to create a level playing field around recycling claims, RecyClass defines two different Recyclability Assessments:

▶ DESIGN-FOR-RECYCLING ASSESSMENT

The package is designed to be recyclable, following the RecyClass Design for Recycling Guidelines. This Assessment evaluates and ranks the recyclability of a plastic packaging, determining to which extent it is suitable for a specific recycling stream based on the most commonly used sorting and recycling technologies available in Europe. This assessment does not consider collection, sorting and recycling specificities in a given country. The Assessment is based on RecyClass Design for Recycling Guidelines and its associated self-assessment Online Tool[3], which allows a pre-assessment of the technical recyclability of a plastic packaging on the EU market.

▶ RECYCLABILITY RATE ASSESSMENT

The package is designed to be recycled, following the RecyClass Design for Recycling Guidelines, and is effectively recycled in the specific geographical area for which the assessment is conducted. In this assessment, the existence of selective collection schemes, as well as the existence of sorting and recycling infrastructures are being checked.

Both Assessments are the basis for the RecyClass Certification scheme which evaluates a package via a technical assessment (Design-for-Recycling Certification); and a quantitative assessment (Recyclability Rate Certification). The methodology behind these assessment processes is laid down in this document.

1. RecyClass Recyclability Evaluation Protocols
2. Design for Recycling guidelines are available at: https://recyclass.eu/recyclass/design-for-recycling-guidelines/
3. RecyClass Online Tool is available at: https://recyclass.eu/recyclability/online-tool/

RECYCLABILITY DEFINITION AND EVALUATION

Chapter

02

RECYCLABILITY DEFINITION AND EVALUATION

In order to lay the foundations of the methodology, RecyClass defined first the meaning of "recyclability" and "recyclable packaging", illustrated by a class ranking from "A" to "F" resembling the energy efficiency grading. Classes A, B and C are granted to packaging generating high quality recyclate, meaning incorporable back in its original application or usable for other circular applications, and therefore these packaging can claim their recyclability. On the other hand, packaging design classified with classes D, E and F cannot reach the requirements of circularity and will lower the quality of the recycling stream. Section 2.2. defines each recyclability class and the concept of circularity.

The RecyClass Online Tool is a user-friendly online self-assessment which provides an analysis of the technical recyclability of a plastic packaging according to the most commonly used recycling technology available in Europe.

The recyclability evaluation results in a class ranking from A to F. The results are detailed in a certification report, which provides specific indications on how the packaging design affects its compatibility with recycling in Europe.

The results achieved with the RecyClass Online Tool only give an indication to the user and cannot be considered as an official RecyClass Certification. The self-assessment provides a preliminary indication about packaging eligibility for certification and possible additional tests needed prior to the assessment, as well as general indications for Certification Bodies before the assessment to issue a Certificate for Recyclability (e.g. indications on polymer stream of the audited packaging). More information on the use of claims may be found in the document "Use of Claims"[4] available on the website.

2.1 RECYCLABILITY DEFINITION

A global definition of "recyclability" of plastics packaging and products is an integral step to harmonize the worldwide plastics recycling industry. This definition was developed by The Association of Plastics Recyclers (APR) and Plastics Recyclers Europe (PRE) in 2018.

Plastics must meet four conditions for a product to be considered recyclable:

1. The product must be made with a plastic that is collected for recycling, has market value and/or is supported by a legislatively mandated program.
2. The product must be sorted and aggregated into defined streams for recycling processes.
3. The product can be processed and reclaimed/recycled with commercial recycling processes.
4. The recycled plastic becomes a raw material that is used in the production of new products.

This definition does not intend to restrict innovation. For innovative materials to be recyclable, it shall be demonstrated that they are collected and sorted in sufficient quantities and are compatible with existing industrial recycling processes or have sufficient material quantities to justify operating new recycling processes.

Nonetheless, fulfilling these four categories is a prerequisite to evaluate the plastic product recyclability and does not automatically designate a product recyclable. Recycled material is available in many different quality grades which depend among others on the quality of the input material to the process. Recyclability will however depend on the specific design of each packaging that will have to be evaluated by the RecyClass Online Tool and certified via the Recyclability Certification Schemes.

4. Recyclability & Recycled Content Use of Claims Guidance is available at: https://recyclass.eu/get-certified/use-of-claims/

2.2 RECYCLABILITY CLASSES

The class ranking ranges from "A" to "F", where an "A" implies that a package is designed to be fully recyclable[5], while a "F" indicates that a package is unrecyclable, and its only available option is energy recovery.

The recyclability classes are described as follows:

CLASS A

The packaging does not pose any recyclability issues and the recycled plastics can potentially feed a closed-loop scheme to be used in the same quality application.

CLASS B

The packaging has some minor recyclability issues that slightly affect the quality of the recycled plastic generated. However, majority of recycled plastics from this packaging can still potentially feed a closed loop.

CLASS C

The packaging presents some recyclability issues that affect the quality of the recycled plastics or lead to material losses during recycling. In the first case the recycled plastic could be used in a cascade open-loop scheme, whereas in the latter case the plastic could potentially feed a closed loop scheme.

CLASS D

The packaging has significant design issues that highly affect its recyclability or imply large material losses. In both cases the recycled plastic can only be fed into low-value applications (i.e. the packaging will be downcycled).

CLASS E

The packaging has major design issues that jeopardize its recyclability or imply severe material losses. The packaging is not considered recyclable and can only be used in incineration with energy recovery.

CLASS F

The package is not recyclable at all, either because of fundamental design issues or a lack of specific infrastructure for collection, sorting and recycling in EU27+3.

5. Types of packaging considered recyclable in Europe have to fit with the definition of recyclability available at the following link: https://recyclass.eu/recyclability/definition/

The class grading indicates a decrease of recyclability which can be caused by many different factors of a packaging design. As defined above, packaging with class “A” can be recycled in closed-loop systems, for instance “beverage bottle to beverage bottle” or “food to non-food packaging”.

However, this class would not apply to packaging destined for open loop recycling– see figure 1. High-quality applications are strongly supported by the Circular Plastic Economy, as they:

- Minimize the loss of materials,
- Minimize plastic degradation, allowing for more recycling cycles,
- Preserve the plastic economic value.

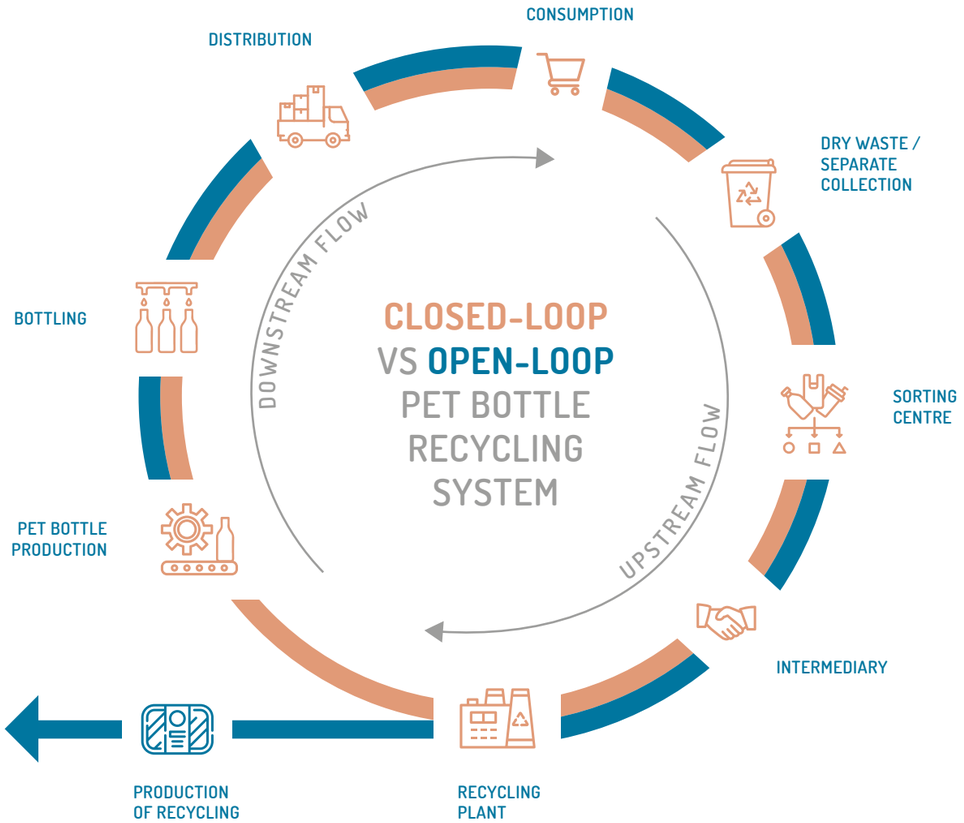


Fig. 1 PET bottles in closed loop and open loop recycling

However, even if not ranked “A”, open-loop recycling also results in a positive environmental impact reduction when compared to the utilization of virgin plastic feedstock, in particular if several cycles of utilization are ensured as it is the case with packages obtaining class “B” or “C”.

There are cases where functionality requirements make certain packaging hard to be designed for closed-loop recycling systems. However, design choices leading to the longer multiple-step cascaded recycling should be favoured as illustrated in figure 2.

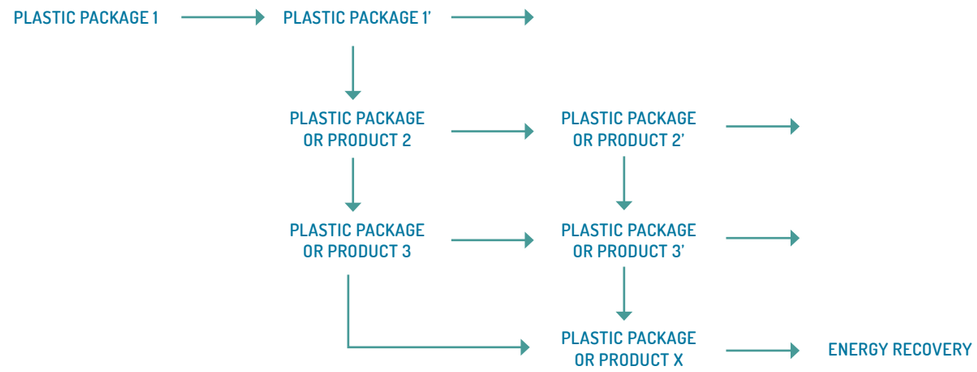


Fig. 2 Cascade open-loop recycling

2.3 MODUS OPERANDI OF THE RECYCLASS ONLINE TOOL

The RecyClass Online Tool is structured in 5 main sections that allows to self-assess plastic packaging recyclability following the present methodology:

1. Introduction for the users and packaging description
2. Suitability analysis, to define whether the packaging falls into the definition of plastics packaging or whether the packaging has generic design issues that render the packaging non-recyclable per definition, being the entry condition for using RecyClass methodology
3. Selection of the packaging’s type & sorting behaviour
4. Design for Recycling
   - Part 1: General Questions on the packaging design (recyclable plastic content)
   - Part 2: Questions related to the compatibility of materials used in the packaging
   - Part 3: Calculation of the residual content in the packaging via the "Easy-to-Empty" or "Easy-to-Acces" index
   - Part 4: Questions on compliance of the used materials with REACH
   - Part 5: Questions related to the recycled contents of the packaging
5. Final results

Sections 2, 3 and 4 are detailed below.

SUITABILITY ANALYSIS

The second section of the Tool aims at identifying whether the packaging is suitable for the analysis by asking whether it contains a minimum of 50% of plastics; whether it is intended to package non-hazardous goods, and whether it contains any bio-/oxo-degradable materials. This section determines whether the packaging is designed with elements that could compromise its sortability, and therefore impact the recycling of its main material.

The result of this section will not give an indication of recyclability but will only determine whether the analysis may continue.

Detailed information on each question of this section is illustrated in Figure 3.

Does your package consist predominantly of plastic by weight?

The efficiency of recycling is highly linked to the main polymer in the packaging. A packaging containing more than 50% of non-plastics likely belongs to another recycling path, as e.g. paper, aluminium, glass or combined cardboard materials. Designers need to ensure that if the package is a combination of materials, the materials are not welded together and that non-plastic materials can be removed by consumers to access the product. In case of multi-material packaging, the compatibility of the materials with plastics recycling processes will be further analysed in the following sections.

SUITABILITY SECTION DECISION TREE

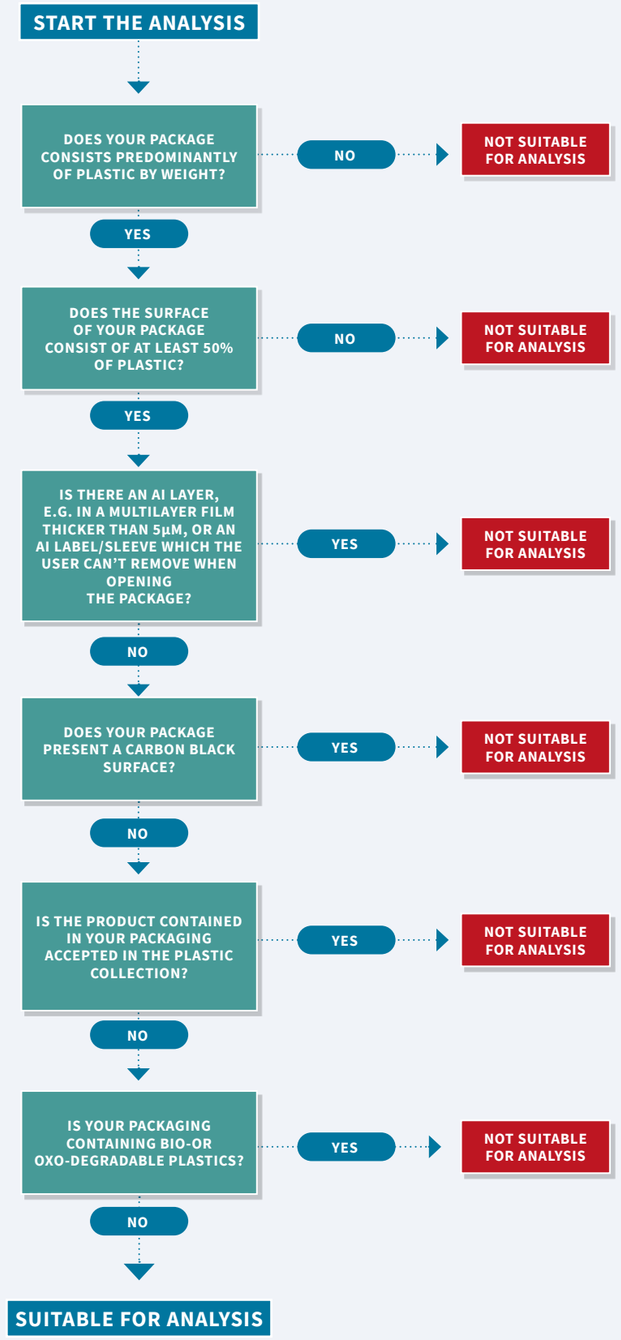


Fig.3. Suitability section decision tree

Does the surface of your packaging consist of at least 50% of plastic?

A packaging needs to be sorted into the right stream in order for its main material to be recycled. For this, it must be efficiently identifiable by optical (NIR) sorting devices. When less than 50% of the surface of a packaging is made of plastics, this identification becomes inefficient, faulty and expensive. If a plastics packaging contains a label or sleeve made out of another material than plastic, to ensure the package sortability, the maximum covering of the package body should be 50%; otherwise, the non-plastic materials should be removed by consumers to access the product or by compaction during the truck transportation. Consumers behaviour are not taken into account. Separability by compaction must be proved by testing the packaging with the RecyClass Sorting Protocol[6].

Is there an aluminium layer, e.g. in a multilayer film thicker than 5 µm, or an aluminium label/ sleeve which the user can't remove when opening the package?

Most commonly used eddy current sorters operated in MRFs or by the recyclers detect all thick aluminium parts and separate them into the aluminium fraction. Hence, a plastic package with a thick aluminium layer will end up in the aluminium recycling stream, and the plastics will be lost.

Does your packaging present a carbon black surface?

Near Infra-Red (NIR) technology is by far the most used technology to sort out collected packaging in Europe. Plastics packaging with non NIR-detectable black surface will not be detected by near-infrared technology due to light absorption phenomenon. NIR detectable black will be tested for sortability with the Sorting Protocol.

Is the product contained in your packaging accepted in the plastic collection?

Packaging containing hazardous substances should not be collected, and therefore recycled, with other household packaging, in order to prevent contamination of the recycled plastics. This is why in certain regions their collection is prohibited by the national authorities.

Please check the restrictions applied in the local markets.

Is your packaging containing bio- or oxo-degradable plastics?

Oxo- and bio-degradable plastics consist of polymers that are incompatible with today's conventional plastic polymers. That hence cannot be mixed with standard polymers because they have a strong negative impact on the recycled plastic properties.

TYPE OF PACKAGING

The main plastics polymer in the packaging has to be selected, as this choice will determine which guidelines[7] to use for that specific kind of packaging. The different types of packaging included in the RecyClass Online Tool are:

- Clear / light blue PET bottles
- Transparent Coloured PET bottles
- Clear PET thermoforms
- Coloured PET thermoforms
- Natural PE flexible film
- Coloured PE flexible film
- Natural PP flexible film
- Coloured PP flexible film
- Natural & white HDPE containers
- Coloured HDPE containers
- Natural & white PP containers
- Coloured PP containers
- Natural & white PS containers
- Coloured PS containers
- HDPE & PP crates & pallets
- EPS fish boxes
- EPS white goods

The type of packaging is linked to the availability of valuable recycling streams in Europe and recognized by Plastics Recyclers Europe, for which RecyClass developed a corresponding Design for Recycling guidelines.

The same design for recycling recommendations apply to natural and white plastic packaging, to preserve the high-value of these materials and to ensure the availability of both white and natural recycled plastic on the markets. However, natural and white packaging should be sorted into two distinct streams and recycled separately.

6. The Sorting Evaluation Protocol for plastic pacakaging is available at:https://recyclass.eu/recyclability/test-methods/
7. Design for Recycling Guidelines for plastic packaging are available at: https://recyclass.eu/recyclability/design-for-recycling-guidelines/

DESIGN FOR RECYCLING

The third section evaluates in detail the packaging design and its compatibility with recycling through 5 sets of questions. Any packaging feature is relevant and should be characterized in order to self-assess the impact of the packaging design on the targeted stream.

QUESTION PART 1 : GENERAL QUESTIONS - RECYCLABLE PLASTIC CONTENT

The first set of questions concerns the overall design of the packaging to assess the proportion of recyclable plastic in the target stream using a mass balance calculation. Based on the answers provided, the system will give a first provisional indication of the recyclability of the packaging, known as an intermediate result (cf: table 1). The calculation reflects the recoverable proportion of materials in the current recycling streams per type of packaging.

Maximizing the proportion of the main and preferably unique polymer is one of the principal requirements in designing a recyclable packaging and in improving the quality of the recycled plastics (generated). Therefore, the larger the content of one polymer in the packaging, the higher its recyclability yield.

Other polymers present as layers and/or welded to the main body's structure cannot be separated by the recycling process and will therefore be processed together during recycling thus limiting their possible end applications. This is mostly the case of the combination of polyolefins with other polymers like PET, PVC, etc., leading to complete packaging disqualification. If combination of PO is used, the packaging recyclability will not be completely compromised, but in any case, downgraded.

Please note that 'other polymers' do not refer to inks, additives, barrier (e.g., PA), adhesive for laminates, etc. These features will be evaluated in the next part: Design for Recycling Incompatibilities.

Table 1. Recyclable Plastic Content calculation

PE AND PP FLEXIBLE PACKAGING	The recyclable proportion consists of the weight of the main polymer (i.e., polymer of the targeted recycling stream) and possibly weights of any PE or PP additional components (e.g., cap, label, sleeve, others) compared to the overall weight of the packaging. Only the weight of the main polymer is counted in case of multilayer PE/PP in the packaging body. Any other combination of PO with non-PO materials as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ PO\ (except\ multilayers)}{Total\ wt\ of\ the\ packaging}$
HDPE AND PP RIGID PACKAGING	The recyclable proportion consists in the weight of the main polymer (i.e., polymer of the targeted recycling stream) and possibly weights of any PE or PP additional components (e.g., cap, label, sleeve, others) compared to the overall weight of the packaging. Any other combination of PO with non-PO materials as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ PO}{Total\ wt\ of\ the\ packaging}$
PET BOTTLES	The recyclable proportion consists in the weight of PET and possible weights of any PE or PP additional components (e.g., cap, label, sleeve, others) compared to the overall weight of the packaging. Indeed, the floating fraction (PE and PP) is recovered during the PET recycling process and recycled within the mixed polyolefins stream. Combination of PET with any other material as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ PET + wt\ of\ PO}{Total\ wt\ of\ the\ packaging}$
PET THERMOFORMS	The recyclable proportion consists in the weight of PET compared to the overall weight of the packaging. Combination of PET with any other material, other than PE, as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ PET}{Total\ wt\ of\ the\ packaging}$
PS RIGID PACKAGING	The recyclable proportion consists in the weight of PS compared to the overall weight of the packaging. Combination of PS with any other material as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ PS}{Total\ wt\ of\ the\ packaging}$
HDPE AND PP CRATES & PALLETS	The recyclable proportion consists in the weight of the main polymer (i.e., polymer of the targeted recycling stream) compared to the overall weight of the packaging. Any other combination of PO with non-PO materials as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ PO\ (except\ multilayers)}{Total\ wt\ of\ the\ packaging}$
EPS FISH BOXES	The recyclable proportion consists in the weight of EPS compared to the overall weight of the packaging. Combination of EPS with any other material as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ EPS}{Total\ wt\ of\ the\ packaging}$
EPS WHITE GOODS	The recyclable proportion consists in the weight of EPS compared to the overall weight of the packaging. Combination of EPS with any other material as multilayers is disqualifying. $Recyclable\ \% = \frac{wt\ of\ EPS}{Total\ wt\ of\ the\ packaging}$

Based on the answers provided in this first area of questions, the following interim results are provided by the Tool:

A: > 95% **B:** 90-95% **C:** 70-90% **D:** 50-70% **E:** < 50%

The class resulting from Question Part 1 – recyclable plastic content – is the maximal and theoretical recyclability class that the packaging can obtain. Indeed, the larger the content of the main polymer in the packaging, the higher its recyclability rate will be (i.e., the amount of recoverable and valuable plastic recycled).

QUESTION PART 2: DESIGN FOR RECYCLING INCOMPATIBILITIES

This section focuses on the evaluation of the compatibility of the different packaging components with the recycling of the main polymer, based on the information reported in the Design for Recycling guideline[8].

Based on the interim result obtained in the previous sections, the following rules are applied:

- **Presence of slightly negative features (limited compatibility - Annex III): one or more issues = -1 class**
- **Presence of very negative feature (low compatibility - Annex IV): one or more issues = -3 classes**
- **Presence of different severities = only the strongest penalty is applied. Indeed, the penalties evaluated in the Question Part 2- DfR incompatibilities – are never summed each other.**
- **Packaging with any PVC and PVDC component = Class F**
- **Packaging compromising the polymer density = Class F**
- **Packaging with any other disqualifying criterion (no compatibility - Annex II) = Class F**

QUESTION PART 3: EASY-TO-EMPTY & EASY-TO-ACCESS INDEXES

Presence of residual product content in the packaging negatively affects its recyclability. Therefore, a packaging which is designed to be emptied easily is more recyclable than one which retains significant quantities of the product it contained.

As a prerequisite for industrial and commercial packaging (B2B applications), presence of residual product content is limited to half by weight relative to the plastic weight of the packaging. Any packaging with higher residual content is disqualified as highly contaminating for the recycling streams. If the packaging meets this first condition, the residual content must be further calculated to evaluate its impact on the recycling process as explained below.

"Easy-to-empty" index (Ete_i) is to be assessed for packaging where the product content is not accessible for emptying (i.e., tubes); whereas the "easy-to-access" index (Eta_i) is to be used for packaging where the content is accessible for emptying (i.e., pots). Both indexes represent the percentage of product that remains in the packaging after its normal emptying.

For a package that contains liquids, creams, gels, or pasty products the easy-to-empty / easy-to-access index should be calculated. The results of the following index will influence the recyclability ranking as follows:

- **More than 5% = -1 class**
- **More than 10% = -2 classes**
- **Further loss of a class, with each gain of 5% in the calculated index**

The calculation method is the following:

$$Ete_i = \left(\frac{Pe - W}{Pf}\right) x\ 100$$

where,

- *W* = weight of a fully empty packaging (without product inside)
- *Pf* = declared net weight of content (in case of volume it must be converted in weight)
- *Pe* = average weight of empty packaging after normal use, in minimum 10 emptying tests.

Ete_i = Easy-to-empty (e.g., tubes): a packaging with the declared quantity of product has to be emptied easily without being forced (i.e., for liquids just holding the open package vertically for 1' with open side downwards; for pasty products just squeezing the tube as in its normal use, for creams taking them out of the jar as per normal use, etc.)

Eta_i = Easy-to-access (e.g., pots): a packaging with the declared quantity of product has to be emptied simulating a normal use by the end consumer (i.e., with a spoon).

The weight of non-plastic sortable (by magnet and eddy current) and valuable parts (by-product i.e., Al/Fe) must not be considered in the calculation; weight of components that must be completely removed by the consumer in order to empty/access the product must not be considered in the calculation.

The testing procedure to evaluate the Easy-to-empty index can be found on the RecyClass Online Tool[9].

Example 1*:* plastic bag of 100g containing 5kg of butter

- (prerequisite) Any residual butter content higher than 50g disqualifies the packaging.
- Calculation of the Ete index for less than 50g butter leads always to less than 5%, meaning no class penalty. The prerequisite is the discriminant rule for high amount of product content.

Example 2: plastic tube of 40g containing 250g of gel

- (prerequisite) Any residual gel content higher than 20g disqualifies the packaging.
- Calculation of the Ete index for less than 20g can lead to different scenarios:
  - Residual gel content below 12g = index < 5% and no class penalty
  - Residual gel content between 13 and 20g = index < 10% and one class penalty

Example 3: small plastic jar of 20g containing 10g of cream

- (prerequisite) In this case, since the cream content is already lower than half of the weight of the packaging, the prerequisite is always verified.
- Calculation of the Ete index is the discriminant rule and must be calculated with precision.

QUESTION PART 4: REACH COMPLIANCE

The final area of questioning refers to the packaging compliance with REACH regulation. Any substances of very high concern added to the composition of the packaging would result in a downgrade of the interim result by 3 additional classes.

The list of Substance of Very High Concerns (SVHCs) can be assessed by the following link: https://echa.europa.eu/candidate-list-table

QUESTION PART 5: RECYCLED CONTENT

A circular plastics economy is based on the fact that plastic is recycled and used in the production of new products. In order to foster this perspective, "+" bonus to the recyclability result is granted for the use of post-consumer recycled plastic as follows:

The use of recycled plastic in the packaging is considered as a bonus in the assessment because of the replacement of a certain rate of virgin plastic; however,

- **Between 15% and 50% of recycled content = +**
- **Between 50% and 89% of recycled content = ++**
- **More than 90% of recycled content = +++**

the content in recycled plastic never determines an improvement in the recyclability class.

This Question Area is introduced to make the users of the Tool aware that they can design packaging which is not only recyclable but also circular by re-integrating recycled plastics.

RecyClass developed an audit scheme to certify the share of recycled content in packaging, and in general in all plastic products. This scheme is based on a controlled blending approach as described in the international standard on the chain of custody (ISO 22095), as well as in line with the European standard on recycled plastics traceability (EN 15343:2007) which serves as basis for the Audit Scheme[10].

2.4 INTERIM RESULT AND SELF-ASSESSMENT REPORT

The Tool shows the recyclability interim results by compiling the questions of each section. In this way the users can monitor what affects the recyclability rank and to which extent. Once the analysis is completed, a self-assessment report is generated automatically by the system which may be downloaded as PDF. It includes all the questions and answers provided during the assessment, as well as the interim results for each of the sections and the final result. Highlighted in red are reported design aspects negatively affecting the recyclability of the packaging. Companies may contact RecyClass if they would like an expert to review the self-assessment report.

In addition, the Tool provides country-specific information on where the analysed packaging might be collected, sorted, and recycled in Europe. The mapping is regularly updated based on the evolution of the European waste management systems.

Following the completion of the assessment, companies are welcomed to apply for a Recyclability Certification. The certification is carried out by an independent and recognized auditor (cf: section 4 for more details).

8. Design for Recycling guidelines for plastic packaging are available at: https://recyclass.eu/recyclass/design-for-recycling-guidelines/
9. Details on easy-to-empty / easy-to-access index are available at: https://recyclass.eu/tool/easy-to-empty-easy-to-access/

10. More information on the RecyClass Recycled Content Traceability Certification is available at: https://recyclass.eu/get-certified/recycled-plastic/#1

RECYCLABILITY ASSESSMENTS

Chapter 03

RECYCLABILITY ASSESSMENT

The RecyClass Assessments provide a comprehensive evaluation of plastic packaging recyclability following the present methodology and considering the most commonly used technologies of sorting and recycling infrastructures in Europe. RecyClass developed two types of recyclability assessments: Design for Recycling and Recyclability Rate, that both consider the sorting behaviour of the packaging and the design incompatibilities that may impact the recycling process. The results of these assessments certify whether the packaging is compatible with recycling or effectively recycled, respectively.

RecyClass implemented a Certification Scheme to cover each recyclability assessment, offering the possibility to the plastic industry to get certified by third-party auditors and communicate externally about their packaging recyclability in a fair and robust way for both Business-to-Business and Business-to-Consumers models. (cf: section 4 for more details).

3.1 DESIGN FOR RECYCLING ASSESSMENT

The Design for Recycling is evaluated from the point of view of the technical feasibility of packaging being properly sorted and recycled in Europe. The Assessment considers the most commonly used technologies of the European waste management infrastructures, without taking into consideration local or country specificities.

Following the same methodology as the Online-Tool described in section 2, the packaging design is ranked from class A to F considering the sorting behaviour, the recyclable plastic amount extracted from the packaging and the compatibility of the design features with recycling.

The evaluation considers:

- If the packaging fit with an existing European packaging waste stream recognized by Plastics Recyclers Europe,
- If the packaging design is compatible with sorting and recycling processes,
- If and to which extent the recycled plastic obtained or generated by the packaging can be used to replace virgin in plastic products.

3.2 RECYCLABILITY RATE ASSESSMENT

The Recyclability Rate is calculated as a ratio between the weight of the recyclable plastic extracted from the package and the total weight of the package, according to the formula described in Annex I. The rate is determined as a percentage. Design aspects impacting the sorting and recycling processes, as well as the quality of recycled plastic, also impact the recyclability rate.

Meanwhile, the Design for Recycling Assessment is evaluated considering the most commonly used technologies of sorting and recycling infrastructures in Europe, the Recyclability Rate is assessed considering the collection schemes, as well as the effective availability of sorting and recycling infrastructures in the audited area.

The formula to evaluate the recyclability rate considers:

- Packaging collection (locally or at a European level)
- Availability of sorting and recycling infrastructures (locally or at a European level),
- Packaging compatibility with sorting (in line with the Sorting Evaluation Protocol);
- Packaging compatibility with recycling (with the same methodology used for achieving the Design for Recycling Assessment),
- Quality of recycled plastic generated by the packaging (with the same methodology used for achieving the Recyclability Class certification).

3.3 SORTABILITY

Sorting is a key step in the recyclability evaluation of plastic packaging and can be compromised by certain design aspects. The sorting process is a well-developed process based on the following steps:

1. **CONSUMER BEHAVIOR:** for certain packaging, consumer action is required to make it recyclable or not, like removing parts of a packaging. When consumer action is significant and needed to make the packaging recyclable, the packaging before consumer action should not be considered as recyclable.

2. **COMPACTION:** it occurs during the collection and transportation of packaging waste. This can have an impact on the detectability of the packaging during the sorting steps. Compaction conditions are defined in the RecyClass "Sorting Evaluation Protocol"[11].

3. **SMALL PIECES REMOVAL,** with any of the dimensions lower than 50 mm to purify the stream.

4. **METAL AND ALUMINUM DETECTION AND SEPARATION** by means of magnetic and eddy current separators,

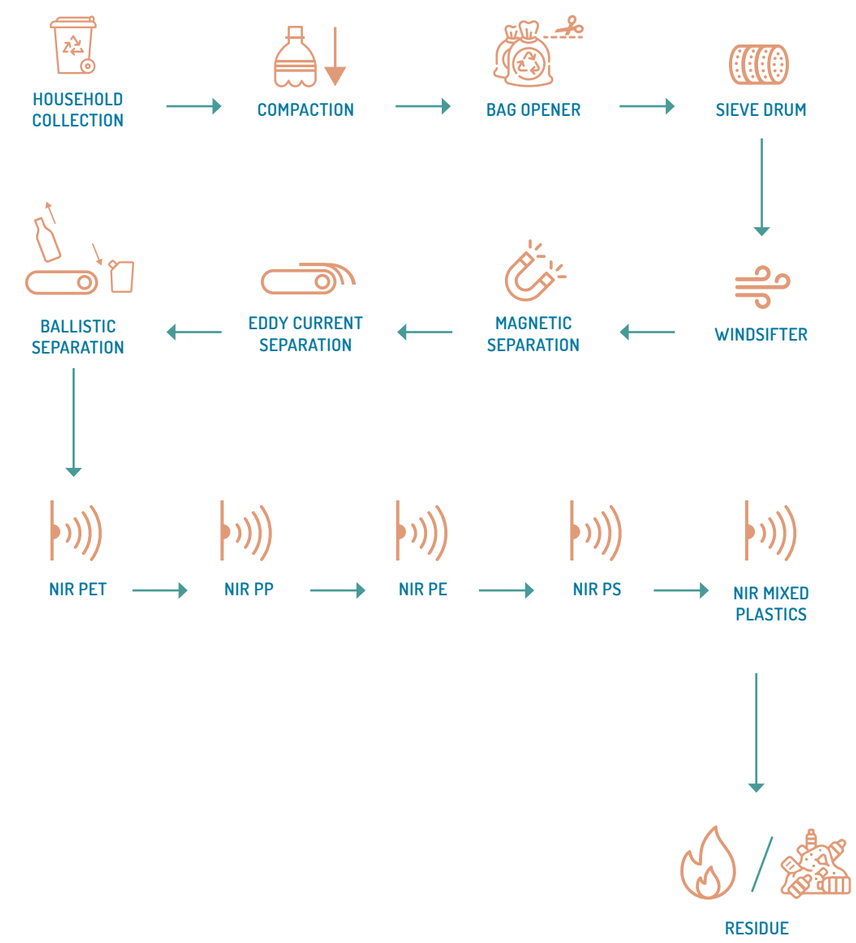
5. **DISCRIMINATION OF POLYMERS IN SEPARATE STREAMS BY A SERIES OF NIR** (near infra-red) detectors. Color sorting is not applied in general to olefin-based packages. However, color sorting is a standard for PET bottles.

On that basis, it is essential for certain types of packaging to be effectively sorted in the appropriate recycling stream. Moreover, the design can affect either partially or fully the packaging sortability, leading to the losses of materials.

In particular, the packaging designed with the following characteristics shall be tested with the RecyClass Sorting Evaluation Protocol in order to determine the sorting efficiency:

- Large labels (coverting > 50% of the surface for containers of 500 ml or less, and > 70% of the surface for containers bigger than 500 ml) made from a material other than the main packaging body
- Full body sleeves
- Perforated full body sleeves
- Multi-layer structures
- Metallization (excluding on the inside/in the middle layer)
- Non-NIR detectable colors (also if applied as internal layers)
- Different types of plastic used on front and back sides
- Different types of plastic (rigids and flexibles) used in the package (e.g., pouches) that may impact the separation between rigid and flexible packaging (ballistic separation step)
- Round shape, very rigid and hard to compact

FLOWSHEET OF THE SORTING PROCESS



11. RecyClass Sorting Evaluation Protocol

3.4 DESIGN INCOMPATIBILITIES

Compatibility of the packaging components is checked based on the Design for Recycling Guidelines and when necessary through dedicated tests based on the RecyClass Protocols.

Identified incompatibilities between components of the packaging are classified as:

- **Downgrading** the recycled plastic quality, referring to components that will be correctly separated but not recycled or inseparable substances/materials that will reduce the recycled plastic quality. A penalty will be applied to the evaluation, the value of which will depend on the kind of material/substance present in the packaging. Then, the recyclability class and/or rate will be reduced by the value of the penalty (slight or strong downgrading).
- **Disqualifying** the recycled plastic quality, referring to substances/materials that completely compromise the packaging recyclability. A class F and a multiply factor equal to "0" will be applied to the evaluation. Then, the final recyclability rate will be 0%.

The design incompatibilities are defined according to the most commonly used technologies of recycling infrastructures in Europe.

On that basis, certain design features can be separated during the process of increasing the purity of the recycling stream (e.g., by density separation and wind sifting). However, not all design features can be separated and can thus affect either partially or fully the packaging recyclability, reducing the quality of the recyclate.

The evaluation requirements of the Recyclability Assessments are described in the table on pages 30 and 31.

FLOWSHEET OF THE RECYCLING PROCESS

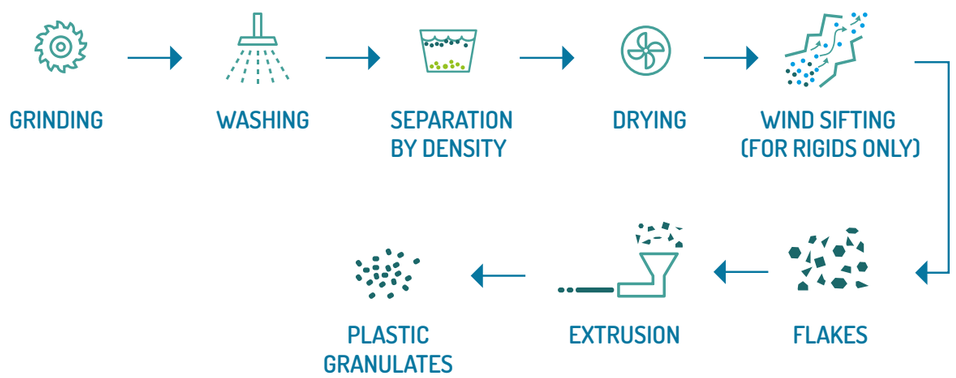


Table 2. Recyclability rating requirements

CRITERION	ASSESSMENT	DOWNGRADING OR DISQUALIFICATION	SCORE PENALTY	
			CLASS	RATE
1. SUITABILITY	Packaging belongs to the plastic recycling stream and will not jeopardize the process.	Disqualification if : • Less than 50% plastic • Less than 50% plastic surface • Bio- or oxo-degradable additives • Aluminum layer > 5 µm • Carbon black surface	Class F	"0" factor
2. PRE STREAM AVAILABILITY	Package with a PRE recycling stream in place, meaning that collection, sorting, and recycling are established and functioning at least in one European Country. PRE recognized recycling streams are: PET Bottles, PET Trays, PE Films, PP Films, HDPE Containers, PP Containers, HDPE and PP Crates & Pallets, PS Containers, EPS fish boxes and EPS white goods.	Disqualification if no collection or recycling stream established in Europe and recognized by PRE to recycle the packaging.	Class F	"0" factor
2A. LOCAL COLLECTION (RA ONLY)	Packaging collected in the countries of interest, based on the auditor knowledge.	Disqualification if no collection system in place to collect the given packaging in the countries of interest.	Class F	"0" factor
2B. LOCAL SORTING AND RECYCLING (RA ONLY)	Packaging sorted and recycled in the countries of interest, based on the auditor knowledge.	Disqualification if no available sorting or recycling infrastructure for the given packaging in the countries of interest.	Class F	"0" factor
3. RECYCLABLE PLASTIC CONTENT	Packaging contains a minimal amount of recoverable and valuable plastic for the targeted recycling stream.	Downgrading according to the proportion of any non-recoverable materials. The factor "X" represents (if any) the % of non-plastic material non separable by consumers from the main packaging (e.g., plastic blister coupled with cardboard on one side).	• X ≥ 5%: class B • X ≥ 10%: class C • X ≥ 30%: class D • X ≥ 50%: class E	"X" factor to deduct

CRITERION	ASSESSMENT	DOWNGRADING OR DISQUALIFICATION	SCORE PENALTY	
			CLASS	RATE
4. SORTABILITY	Packaging can be sorted into a polymer stream according to the most commonly used technologies in Europe. *Reference: Sorting Protocol*	Downgrading or disqualification based on the sorting efficiency evaluated on the base of big data or on the base of the results of testing with the "Sorting Protocol". "η"-factor is used to penalize the rate. The Protocol must be applied in the cases mentioned in section 3.3.	Refer to the Sorting Protocol	Refer to the Sorting Protocol
5A. DFR INCOMPATIBILITIES (REMOVABLE)	Package designed according to the Design for Recycling Guidelines. *Reference: Design for Recycling Guidelines*	Downgrading accounts for all the parts of packaging such as inks, adhesives, labels, sleeves, valves/seals, caps, etc. that will be separated by the recycling process and will not get recycled.	Strongest class penalty to apply for both criteria 5a and 5b.	"Y" factor to deduct (sum of all penalties)
5B. DFR INCOMPATIBILITIES (NON-REMOVABLE)	Package designed according to the Design for Recycling Guidelines allowing for high quality recycled plastic. *Reference: Design for Recycling Guidelines*	Downgrading of parts of the packaging such as barriers, additives, printing, and all other non-detachable components which will not be separated during the recycling process and will be part of the final recyclate.		"V" factor to deduct (sum of all penalties)
6. EASY-TO-EMPTY / EASY-TO-ACCESS INDEXES	Packaging easily accessible and emptied which minimises the contained residues in the recycling stream.	Downgrading if presence of product residues on the packaging is evaluated with "Z"-factor by applying the formula reported in section 2.3.3.3. Deductions will be applied in case of each 5 more points evaluated with the index.	• EtEi < 5: 0 class • EtEi < 10: -1 class • EtEi < 15: -2 classes • Etc.	• EtEi < 5: Z=0% • EtEi < 10: Z=10% • EtEi < 15: Z=20% • Etc.
7. REACH COMPLIANCE	Packaging complies with REACH regulation. *Reference: The list of Substance of Very High Concerns (SVHCs)*	Any substances of very high concern added to the packaging would result in a downgrading of the recyclability results.	- 3 classes	- 45%

CERTIFICATION SCHEMES & RECYCLABILITY

Chapter

04

RECYCLABILITY CERTIFICATION SCHEMES

Assessment procedures described in chapters 2 and 3 are a basis for a Recyclability Certification, which are respectively called Design for Recycling Certification and Recyclability Rate Certification. The procedures allow the applicant to communicate externally about the packaging recyclability by using the RecyClass logo to report the class achieved. Details are described in the "Recyclability & Recycled Content Use of Claims Guidance"[12] document.

It is worth noting that the class obtained through the self-assessment with the RecyClass Online Tool is a first indication of the packaging recyclability. The packaging may be audited to certify its recyclability, since the self-assessment provides only a preliminary indication of the packaging recyclability. It must be also highlighted that the results of the certification process may vary from the results of the self-assessment, especially for more complex packaging that needs to undergo sorting and/or recycling tests following the RecyClass Protocols.

4.1 FOCUS & SCOPE

The Certification Scheme aims at recognising the compatibility of plastic packaging with mechanical recycling process. It specifies requirements for companies pledging plastic packaging in the European Market who wish to claim their recyclability under a comprehensive Certification Scheme. The scheme focuses on recyclability by considering as main benchmark the ability of the recycled plastic Packaging to be re-used in Closed-Loop and Cascade Open-Loop applications.

Recyclability of plastic packaging must be verified throughout the whole steps of the waste management process, which includes collection, sorting, and recycling, in order to make a claim of recyclability in final packaging. Therefore, certification may be granted to all companies commercialising final plastic packaging, mainly brand owners and retailers but not exclusively.

The Schemes are developed according to the RecyClass Recyclability Methodology and EN 13430 - Requirements for packaging recoverable by material recycling.

4.2 ELIGIBILITY REQUIREMENTS

Packaging which has already been introduced to the European market is eligible for Recyclability Certifications, as well as packaging which has not yet been introduced to the market but where no further alterations are to be made to its design (i.e., only final packaging are eligible for the certification). Semi-finished packaging cannot be assessed with the Recyclability Certification scheme. However, they can be evaluated and receive a Letter of Compatibility (cf: section INFO-BOX – Letter of Compatibility).

As a second eligibility requirement, the packaging should be entirely covered by the Design for Recycling guidelines, meaning that all its features are already known and classified according to their recycling compatibility. Any innovative technology or product should be tested first following the RecyClass testing protocols[13] in order to assess its compatibility. Tested and approved innovative packaging can be certified based on the approval letter granted by the RecyClass Technical Committees. Figure 5 summarizes the existing routes of recyclability assessments.

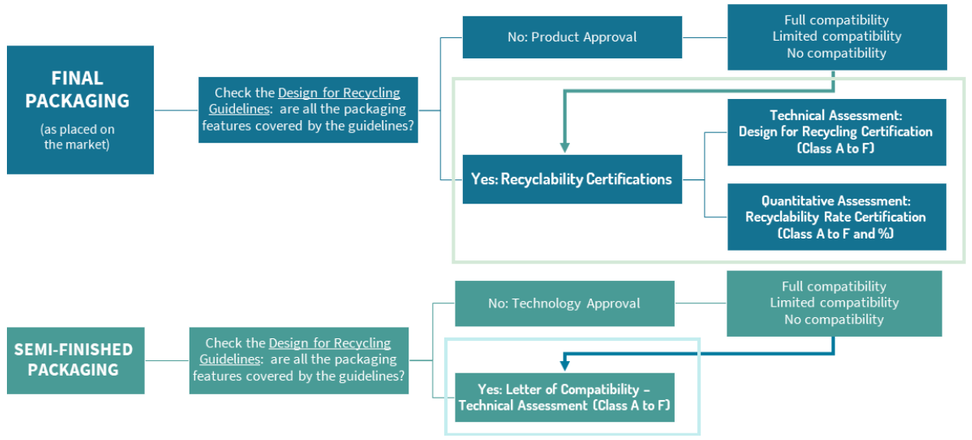


Fig.5: Recyclability Assessments scenarios

Detailed information about the material composition of a given packaging must be provided to the auditor to ensure sound scientific recyclability analysis. As packaging often consists of multiple components with specific functionalities, to certify its recyclability the behaviour of each component (e.g., bottle, label/sleeve, closure system, seal, adhesive, ink, printing, other attachments, etc.) in sorting and recycling processes must be considered by the auditor.

12. Recyclability & Recycled Content Use of Claims Guidance available at: https://recyclass.eu/get-certified/use-of-claims/

13. RecyClass Testing Protocols available at: https://recyclass.eu/recyclability/test-methods/

4.3 CONFORMITY ASSESSMENT

The Certification Scheme assesses the level of compatibility of a plastic packaging with recycling with a system of class ranking scale from A to F and rate from 0 to 100%. Packaging evaluated with class A, B or C and rated above 50% is stated conform and recyclability can be claimed. The scheme considers two types of non-conformities:

- Packaging is not suitable according to RecyClass Recyclability Methodology (cf: suitability analysis section 2.3.1), and therefore cannot be ranked and rated by this certification scheme.
- Packaging is ranked D, E or F and rated below 50%.

4.4 CERTIFICATION DETAILS

As input requirements, the Certification Body will require the applicant:

- To specify whether the assessment concerns a Design for Recycling or Recyclability Rate Certification and, in the case of the latter, for which geographical area (all Europe or specific countries),
- To share the self-assessment report from the RecyClass Online Tool,
- To fill in a standard template[14] with details on the different components of the packaging and on the packaging design,
- To provide a number of samples of the packaging that varies from 10 units to several kg depending on the scope of the tests.

Based on the information provided by the applicant, the Certification will conduct the recyclability audit as per the steps defined in Section 3 and as per Table 2:“Recyclability rating requirements”.

Additionally, similar packaging (e.g., with only modification of the artwork or the sizes) of audited packaging may be submitted by the applicant. In this case, input requirements for all similar packaging must be provided to the auditor to ensure equivalence with the audited packaging. Similar packaging is considered equivalent as long as the components’ proportion remains the same and the results of the audit are not affected.

As an outcome of the audit, the applicant will receive:

- An audit report, including the recyclability class and recyclability rate of Audited Packaging – following the criteria cited above – and reporting its composition. The audit report is identified with a unique certification code.
- The Recyclability Certificate, identifying the recyclability class and recyclability rate achieved by Audited Packaging. As for the audit report, the certificate is identified with the same certification code as the audit report. The Auditor shall include an Annex to the certificate if equivalent packaging has been assessed, listing them with unique identifications.
- The RecyClass logo including the recyclability class,
- Tests results, if any performed by the auditor.

The certificate is valid for 3 years and guarantees that the packaging is designed to be recycled in Europe. Any change in the packaging design must be communicated to RecyClass in order to revise its recyclability.

Retailers, brands, converters and any other companies involved in manufacturing or designing of the packaging can apply for the Certification. Detailed information on how to apply for the Recyclability Certification and on the procedures may be found in the document “Recyclability Certification Quality Management & Procedures” available on the RecyClass website[14].

INFOBOX

LETTER OF COMPATIBILITY

The Letter of Compatibility allows for the evaluation by an accredited auditor of semi-finished plastic packaging. This evaluation is based on the certification scheme of the Design for Recycling Assessment described in the previous sections.

Upon the completion of the evaluation, the Applicant will receive a Draft Evaluation Report issued by the Certification Body outlining the results and a corresponding Letter of Compatibility. RecyClass strongly encourages the applicant to certify the final package, as changes in design, print, used materials and/or the effect of product-content or residue, might change the outcome of the assessment of a final packaging.

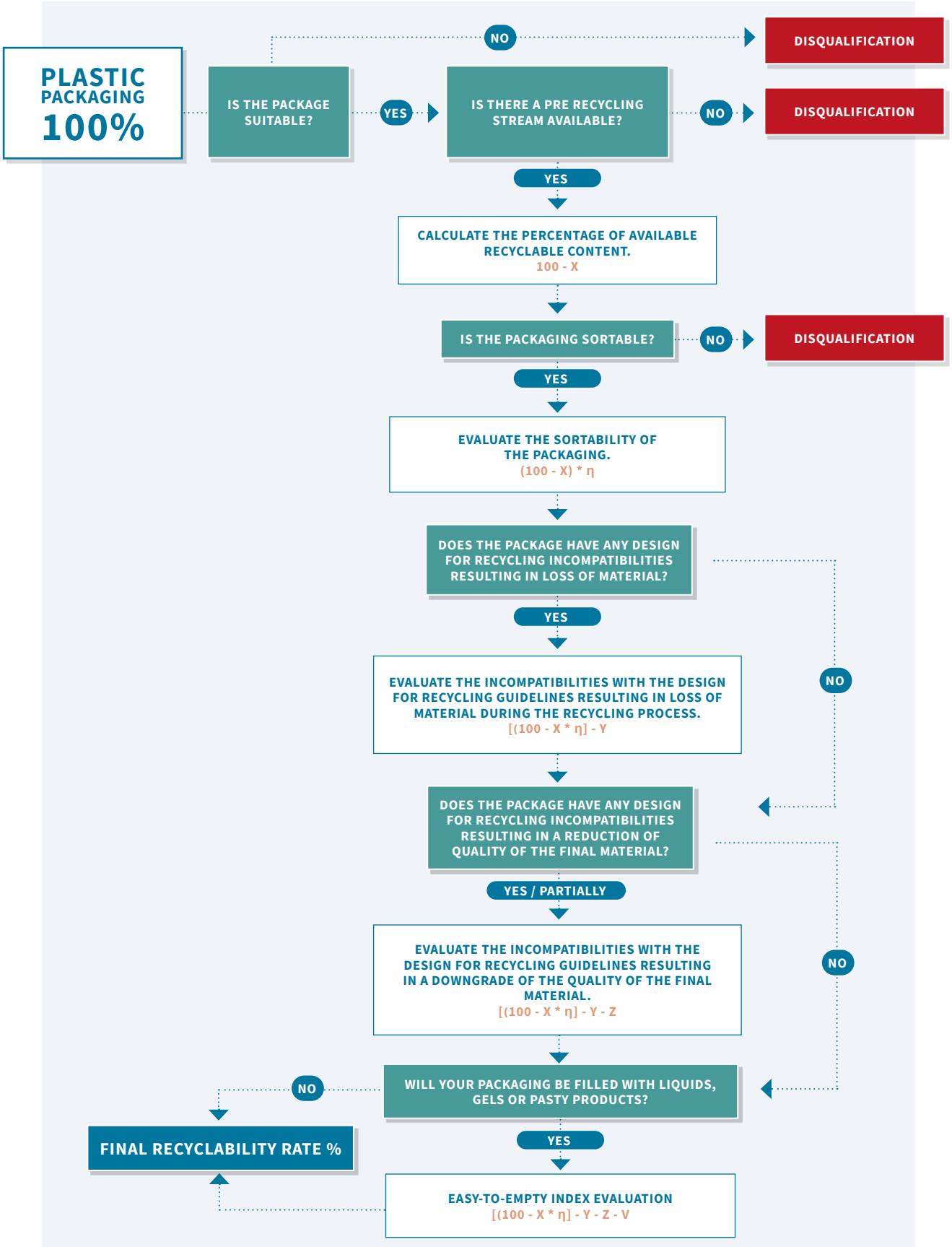
The Letter of Compatibility does not allow the use of the RecyClass recyclability certification mark. The use of any claims on the recyclability of the semi-finished product is not supported by RecyClass. RecyClass endorsement and usage of the logo are permitted only for certified final packaging.

The Letter of Compatibility is valid for 3 years and guarantees that the semi-finished packaging is at this stage designed to be compatible with recycling in Europe. Any change in the packaging design must be communicated to RecyClass in order to revise its compatibility.

12. Product Data Specification Sheet provided by the Certification Body
15. The “Recyclability Certification Quality Management & Procedures” available at: https://recyclass.eu/get-certified/recyclability/recyclass-certification-documents/

ANNEX

ANNEX I. FORMULA AND EVALUATION OF THE RECYCLABILITY RATE



CLEAR PET BOTTLE

COMPOSITION

- PET BOTTLE 88,0%
- PP CAP 9,0%
- PE LABEL 3,0%

ADDITIONAL INFORMATION

- PET BOTTLE WITHOUT BARRIER LAYER
- NO DIRECT PRINTING ON THE BOTTLE
- 0,1% WATER-RELEASABLE ADHESIVE (IN HOT ALKALINE WASH WATER)
- 0,2% PRINTING ON THE LABEL

1. SUITABILITY:
It is made of more than 50% plastic. More than 50% of its surface is made of plastic. The bottle is not coupled with other materials.
The packaging is suitable for the analysis.

▷ Interim result = class A and 100%

2. PRE RECYCLING STREAM EXISTS:
Clear transparent PET bottles stream

- 2a- Local collection: to be checked in the country(ies) of interest

- 2b- Local sorting and recycling: to be checked in the country(ies) of interest

The packaging is collected, sorted, and recycled in the geographical area of interest.

▷ Interim result = class A and 100%

3. RECYCLABLE PLASTIC CONTENT
Weights of non-recoverable non-plastic parts are removed from the recyclable proportion (adhesive and printing inks), representing 0,3 wt%.
X = 0,3 leading to (100 – X) = 99,7%. Recyclable plastic content > 95% leading to no class penalty.

▷ Interim result = class A and 99,7%

4. SORTABILITY
No carbon black surface, No Al layer > 5 microns, no full sleeves, no dark color, no multilayers, no metal components, label covering < 50% the bottle surface -> No need to perform a sorting test
η_{sort} = 1, leading to (100 – X) *η_{sort} = 99,7% and no class penalty.

▷ Interim result = class A and 99,7%

5. DFR INCOMPATIBILITIES
Identify the removable DfR incompatibilities that will get separated by the process, and the DfR incompatibilities that will get recycled within the stream and will therefore affect the recyclate quality.

- 5a- Removable DfR incompatibilities
No disqualifying items. The PP cap will float and will be recovered as by-product, as well as the PE label because the water-releasable adhesive will allow the PE label to detach from the bottle. PO weights that will get recycled in a mix of polyolefin stream are therefore only slightly deducted (-0,25 x wt%).
Y = 3%, leading to [(100 – X) * η_{sort}] – Y = 96,7% and no class penalty.

▷ Interim result = class A and 96,7%

- 5b- Non-removable DfR incompatibilities
The PET bottle is designed with all separable materials/substances.
V = 0%, leading to [(100 – X) * η_{sort}] - Y – V = 96,7% and no class penalty.

▷ Interim result = class A and 96,7%

6. EASY TO EMPTY
The bottle will be completely emptied after use (Index = 0)
Z = 0, leading to [(100 – X) * η_{sort}] – Y – V – Z = 96,7% and no class penalty.

▷ Interim result = class A and 96,7%

7. REACH COMPLIANCE
All materials comply with REACH.

FINAL RESULTS = CLASS A AND 96,7%

A
ABCDEF

NATURAL PE POUCH

COMPOSITION

- PE POUCH 95,6%
- PE WHITE CAP 4,4%

ADDITIONAL INFORMATION

- MULTILAYER PE WITH 4% EVOH BARRIER
- TiO_2 MASTERBATCH 0.4%
- DIRECT PRINTING WITH CLEAR COLOUR 3%
- < 50% PRINTING COVERING
- NO LABEL OR OTHER ATTACHMENTS

1. SUITABILITY:
It is made of more than 50% plastic. More than 50% of its surface is made of plastic. The pouch is not coupled with other materials.
The packaging is suitable for the analysis.
Interim result = class A and 100%

▷ Interim result = class A and 100%

2. PRE RECYCLING STREAM EXISTS:
PE flexibles stream

- 2a- Local collection: to be checked in the country(ies) of interest

- 2b- Local sorting and recycling: to be checked in the country(ies) of interest

The packaging is collected, sorted, and recycled in the geographical area of interest.

▷ Interim result = class A and 100%

3. RECYCLABLE PLASTIC CONTENT
Weights of non-recoverable non-plastic parts are removed from the recyclable proportion (EVOH, inks and coloured masterbatch), representing 7,4 wt%.
X = 7,40 leading to (100 – X) = 92,6%. Recyclable plastic content > 90% leading to one class penalty.

▷ Interim result = class B and 92,6%

4. SORTABILITY
No carbon black surface, No Al layer > 5 microns, PE Multilayers, Clear colour. However, mix of flexible and rigid parts -> need to perform a sorting test
Sorting test according to the Sorting Protocol to identify where the pouch will end and the sorting efficiency. Tests confirmed it is sorted in the PE flexible stream with a sorting efficiency 80%.
η_{sort} = 1, leading to (100 – X) * η_{sort} = 92,6% and no class penalty.

▷ Interim result = class B and 92,6%

5. DFR INCOMPATIBILITIES
Identify the removable DfR incompatibilities that will get separated by the process, and the DfR incompatibilities that will get recycled within the stream and will therefore affect the recyclate quality.

- 5a- Removable DfR incompatibilities
No disqualifying items. No elements separated by the process.
Y = 0, leading to [(100 – X) * η_{sort}] – Y = 92,6% and no class penalty.

▷ Interim result = class B and 92,6%

- 5b- Non-removable DfR incompatibilities
EVOH and direct printing will affect the recyclate quality. These features are indeed reported as limited compatible on the DfR guidelines and will therefore penalize the pouch by 1 class and -15% each.
V = 30%, leading to [(100 – X) * η_{sort}] - Y – V = 62,6% and one class penalty.

▷ Interim result = class C and 62,6%

6. EASY TO EMPTY
The pouch will be almost completed emptied after use (Index < 5)
Z = 0, leading to [(100 – X) * η_{sort}] – Y – V – Z = 62,6% and no class penalty.
Interim result = class C and 62,6%

▷ Interim result = class C and 62,6%

7. REACH COMPLIANCE
All materials comply with REACH.

FINAL RESULTS = CLASS C AND 62,6%

C
ABCDEF

CLEAR PET TRAY

COMPOSITION

- PET TRAY 73,0%
- PAPER DISPLAY 25,0%
- PE LIDDING FILM 2,0%

ADDITIONAL INFORMATION

- CLEAR PET TRAY
- PE LIDDING FILM
- 0,1% WATER SOLUBLE ADHESIVE
- NON WELDED/GLUED PAPER DISPLAY

1. SUITABILITY:
The paper display will be removed and completely separated by the consumer to access the product. The paper display will be then discarded in the paper bin and the tray in the plastic bin.
Then, the tray is suitable for the analysis (made of more than 50% plastic; more than 50% of its surface is made of plastic, etc.).

▷ Interim result = class A and 100%

2. PRE RECYCLING STREAM EXISTS:

- 2a- Local collection: to be checked in the country(ies) of interest

- 2b- Local sorting and recycling: to be checked in the country(ies) of interest

The packaging is collected, sorted, and recycled in the geographical area of interest.

▷ Interim result = class A and 100%

3. RECYCLABLE PLASTIC CONTENT
Weights of non-recoverable non-plastic parts are removed from the recyclable proportion (PE lidding film and adhesive), representing 2,8 wt% as the paper proportion is not considered anymore.
X = 2,8 leading to (100 – X) = 97,2%. Recyclable plastic content > 95% leading to no class penalty.

▷ Interim result = class A and 97,2%

4. SORTABILITY
No carbon black surface, No Al layer > 5 microns, no full sleeves, no dark color, no multilayers, no metal components -> No need to perform a sorting test
η_{sort} = 1, leading to (100 – X) * η_{sort} = 97,2% and no class penalty.

▷ Interim result = class A and 97,2%

5. DFR INCOMPATIBILITIES
Identify the removable DfR incompatibilities that will get separated by the process, and the DfR incompatibilities that will get recycled within the stream and will therefore affect the recyclate quality.

- 5a- Removable DfR incompatibilities

The PE lidding film will float and will be discarded, as the water-soluble adhesive will allow the PE lidding film to be completely detached by the tray. Weights already removed in criterion 3 and no further penalty to applied.
Y = 0%, leading to [(100 – X) * η_{sort}] – Y = 97,2% and no class penalty.

▷ Interim result = class A and 97,2%

- 5b- Non-removable DfR incompatibilities

The PET tray is designed with all separable materials/substances. No direct printing is applied on the tray.
V = 0%, leading to [(100 – X) * η_{sort}] - Y – V = 97,2% and no class penalty.

▷ Interim result = class A and 97,2%

6. EASY TO EMPTY
The tray will be completely emptied after use (Index = 0)
Z = 0, leading to [(100 – X) * η_{sort}] – Y – V – Z = 97,2% and no class penalty.

▷ Interim result = class A and 97,2%

7. REACH COMPLIANCE
All materials comply with REACH.

Final results = class A and 97,2%

NATURAL HDPE BOTTLE

COMPOSITION:

- HDPE BOTTLE 79,0%
- PE/PP CLOSURE 20,0%
- PP FILM LABEL 1,0%

ADDITIONAL INFORMATION:

- CLEAR HDPE BOTTLE
- PP < 4% IN THE CLOSURE
- PP FILM LABEL
- 0,3% WATER SOLUBLE ADHESIVE
- 0,1% PRINTING ON THE LABEL

1. SUITABILITY:
It is made of more than 50% plastic. More than 50% of its surface is made of plastic. The bottle is not coupled with other materials. There is no aluminium layer, no bio- or oxo-degradable plastics.

▷ Interim result = class A and 100%

2. PRE RECYCLING STREAM EXISTS:
Natural HDPE containers stream

- 2a- Local collection: to be checked in the country(ies) of interest
- 2b- Local sorting and recycling: to be checked in the country(ies) of interest

The packaging is collected, sorted, and recycled in the geographical area of interest.

▷ Interim result = class A and 100%

3. RECYCLABLE PLASTIC CONTENT
Weights of non-recoverable non-plastic parts are removed from the recyclable proportion (adhesive and printing), representing 0,4 wt%. X = 0,4 leading to (100 – X) = 99,6%. Recyclable plastic content > 95% leading to no class penalty.

▷ Interim result = class A and 99,6%

4. SORTABILITY
No carbon black surface, No Al layer > 5 microns, no full sleeves, no dark color, no multilayers, no metal components. However, PP label covering on both side -> need to perform a sorting test
Sorting test according to the Sorting Protocol to identify where the bottle will end and the sorting efficiency. Tests confirmed it is sorted in the HDPE rigid stream with a sorting efficiency 80%.
η_{sort} = 1, leading to (100 – X) * η_{sort} = 99,6% and no class penalty.

▷ Interim result = class A and 99,6%

5. DFR INCOMPATIBILITIES
Identify the removable DfR incompatibilities that will get separated by the process, and the DfR incompatibilities that will get recycled within the stream and will therefore affect the recyclate quality.

• 5a- Removable DfR incompatibilities
No disqualifying items. The water-soluble adhesive will allow the PP label to detach by the bottle. The PP label will therefore float and be removed via air elutriation (i.e., -wt% penalty and 1 class deduction).
Y = 1%, leading to [(100 – X) * η_{sort}] – Y = 97,6% and one class penalty.

▷ Interim result = class B and 97,6%

• 5b- Non-removable DfR incompatibilities
The PP component in the closure will float and cannot be separated by the HDPE stream. The PP components in the closure will thus slight reduce the r-HDPE quality (i.e., -wt% penalty). The coloured cap will slightly colour the final natural recyclate (i.e. -5% penalty).
V = 9%, leading to [(100 – X) * η_{sort}] - Y – V = 88,6% and 1 class penalty.

▷ Interim result = class B and 88,6%

6. EASY TO EMPTY
The bottle will be almost completely emptied after use (Index <5)
Z = 0, leading to [(100 – X) * η_{sort}] – Y – V – Z = 88,6% and no class penalty.

▷ Interim result = class B and 88,6%

7. REACH COMPLIANCE
All materials comply with REACH.

FINAL RESULTS = CLASS B AND 88,6%

B
ABCDEF

ANNEX VI. DEFINITIONS

APPLICANT: Company applying for a recyclability assessment.

PACKAGING: Packaging shall mean all products made of any materials of any nature to be used for the containment, protection, handling, delivery, and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer [Packaging and Packaging Waste Directive].

AUDITOR: Accredited person to perform the audit to grant the Recyclability Certification.

EQUIVALENT PACKAGING: Equivalent shall designate similar executions of packaging, for which the only differences do not impact the result of the audit.

SEMI-FINISHED PACKAGING: packaging consisting of at least its body or main component, but without all its final attachments (e.g., closure systems, labels, artwork).

EUROPEAN MARKET: The Geographical Area of the Certification is limited to EU 27+3 area, plus the following countries: Serbia, Bosnia and Herzegovina, Albania, North Macedonia, Montenegro, Andorra, Monaco, Liechtenstein, San Marino, Holy See.

RECYCLING: Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations [art 3(17) OJ L 312 22.11.2008, p. 3-30].

MECHANICAL RECYCLING PROCESS: Physical process which converts collected and sorted used packaging and scrap, together in some instances with other material, into secondary raw material or products.

CLOSED-LOOP APPLICATIONS: Utilisation of the recycled plastic packaging back into its original application.

CASCADE OPEN-LOOP APPLICATIONS: Several cycles of utilization of the recycled plastic packaging in new plastic product.

PLASTIC: Material consisting of a polymer as defined in point 5 of Article 3 of Regulation (EC) No 1907/2006, to which additives or other substances may have been added, and which can function as a main structural component of final products, with the exception of natural polymers that have not been chemically modified.

ANNEX VII. CONTROL TABLE OF CHANGE

VERSION	DATE	SECTION	UPDATE DESCRIPTION
2.4	February 2025	2.4; Annex I, II,III, IV	New type of packaging Coloured PET Thermoforms; Revision of Annexes.
2.3	February 2024	2.4	Clarification about the self-assessment results and use in the certification procedure Clarification about the audit report's outcome
2.2	February 2023	Introduction, 2.3, 3.3, 4.2, 4.4, Annexes	Wording clarifications and corrections. Revision of Annexes and case studies.
2.1	May 2022	2.3	Wording clarifications and corrections
2.1	May 2022	Annex II, III, IV and V	Revision of Annexes and corrections
2.0	December 2021	2.3.1	Wording clarification
2.0	December 2021	2.3.3	New types of packaging (EPS fish boxes and white goods)
2.0	December 2021	4.1	New section to clarify the focus and scope of the certification scheme
2.0	December 2021	4.2	New section to clarify the eligibility requirements of the certification scheme
2.0	December 2021	4.3	New section to clarify the conformity assessment of the certification scheme
2.0	December 2021	4.3	New section to clarify certification details of the certification scheme
2.0	December 2021	Annex II	EPS disqualifying criteria
2.0	December 2021	Annex III	Update of the light downgrading criteria following the Design-for-Recycling Guidelines & EPS criteria
2.0	December 2021	Annex IV	Update of the strong downgrading criteria following the Design-for-Recycling Guidelines & EPS criteria
2.0	December 2021	Annex VI	New annex on definitions
2.0	September 2021	2.3.3	New type of packaging (PS containers)
2.0	September 2021	2.3.3	New rule for the EtE index (pre-requisite)
1.2	September 2021	1.0	Wording clarification
1.2	September 2021	2.0	Paragraphs reorganisation
1.2	September 2021	2.1	New section to clarify the recyclability definition
1.2	September 2021	2.2	Wording clarification
1.2	September 2021	2.3	Alignment of the tool's modus operandi with the tool's updates
1.2	September 2021	3.0	Section generalized to both recyclability assessments (3.1. DfR and 3.2. Recyclability Rate)
1.2	September 2021	3.3	Wording clarification
1.2	September 2021	3.4	Wording clarification & new graphic
1.2	September 2021	3.4	Revised table of the recyclability rating requirements
1.2	September 2021	4.0	Wording clarification
1.2	September 2021	4.0	Introduction of the Letter of Compatibility
1.2	September 2021	Annex II	Revision of the disqualifying criteria following the Minimum Standards (Zentrale Stelle) & PS criteria
1.2	September 2021	Annex III	PS light downgrading criteria
1.2	September 2021	Annex IV	PS strong downgrading criteria
1.2	September 2021	Annex X	Revision of the case studies
1.1	November 2020	3.1.3 and 3.2	Additions to the "sortability" section.
1.0	June 2020		First publication of the document

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