Kennisinstituut
Duurzaam Verpakken
onderdeel van **verpact**

Background document

Recycle Check Beverage cartons 2026



Table of contents

Part I: Basic information

1. Introduction 4
2. Recyclability and fee modulation 8
3. Select the right Recycle Check 10
4. Target material and secondary material 18
5. Manual for the checklist 19
6. After the Recycle Check: tips and tools for sustainable packaging 21

Part II: Beverage cartons

1. Introduction 25
2. Collection and sorting 26
3. Focus areas for recyclability 31
4. Printing, labels and sleeves 36
5. Closures and other subcomponents 38
6. Glued-on labels, sleeves or other components 39
7. Additional sources of information 40

Background document Recycle Check Beverage Cartons 2026
Publication date: September 2025

© Verpact

The Recycle Checks are updated annually. Check the website of the Netherlands Institute for Sustainable Packaging (KIDV) for the latest version.

For questions about a Recycle Check, please contact the KIDV.

The KIDV would like to thank the trade organisations, material and packaging manufacturers, manufacturers and importers of packaged products and sorters and recyclers for contributing to this Recycle Check. The KIDV has created this document with the utmost care and attention. Should the document nevertheless be incomplete or contain any inaccuracies, please let us know.

Stichting Verpact assumes no liability for any damage resulting from or related in any way to the use of this document. Verpact also rejects any responsibility for claims made based on this Recycle Check.

No part of this publication may be reproduced by means of printing, photocopying, automated data files or any other means without the prior written permission of Verpact.

Netherlands Institute
for Sustainable Packaging
part of **verpact**

Part I:
Basic information

1. Introduction

The Recycle Checks (published since 2019) enable companies to relatively easily and quickly assess whether packaging is easily recyclable. In recent years, Recycle Checks have been published for rigid plastic packaging, flexible plastic packaging and packaging made of paper and cardboard, glass, metal, and beverage cartons.

The Recycle Checks are based on the current system of collecting, sorting and recycling packaging materials in the Netherlands. The processes examined are those used to process the largest tonnages of household waste stream: what happens to packaging after a consumer disposes of it at home and how is this (household) waste processed in the sorting and recycling plants? Local initiatives, market developments or innovations may affect the recyclability of packaging. The KIDV monitors these developments and changes in the market as closely as possible. The Recycle Checks are updated in close conference with the relevant chain parties if and when new developments apply to the majority of the packaging released on the Dutch market.

The Recycle Checks apply to packaging that is discarded as waste by households, offices, shops and the catering industry. The Recycle Checks are also used for packaging collected through the system for returnable packaging for which consumers have paid a deposit.

In the Netherlands, municipalities themselves determine how residents should dispose of their waste. Glass and paper/cardboard are separated at source. So-called PMD packaging (plastic, metal, beverage cartons) can be collected using source or post-collection separation.

With separation at the source, residents are asked to perform the initial sorting step themselves by discarding PMD separately in a bin or bag. Everything else is residual waste. Post-collection separation means that residents dispose of all their waste in the same bin or bag. After being collected by the municipal waste collection service, a specialist organisation further sorts the waste to separate material with recycling potential. Milieu Centraal's Waste Separation Tool is a handy tool to check in what bin each type of waste must be deposited.

1.1 The Recycle Check.

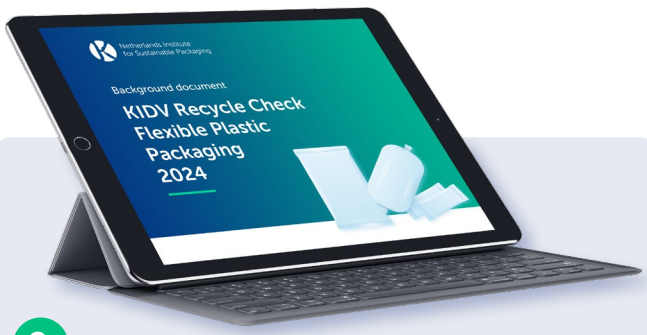
The Recycle Check consists of two parts:



1

The online Recycle Check checklist serves to assess the recyclability of the packaging (optimal, reasonable, limited or non-recyclable). The contents of the Recycle Check were updated in September 2025.

Optimal	Reasonable	Limited	Non-recyclable



2

The **background document**, consisting of two parts:

Part I: basic information about how to use the Recycle Check, definitions and concepts and information on determining disposable units. This part is the same for all documents.

Part II: material-specific information about collection, sorting, and recycling processes, as well as instructions on how to assess certain properties of packaging components. The background document can also be used as a source of reference with guidelines to improve the recyclability of packaging. The documents are available for the following materials:

- Flexible plastic
- Rigid plastic
- Paper / cardboard
- Glass
- Metal
- Beverage cartons

Part II starts on page 24.

The KIDV website also features **tools** to help you do the Recycle Check, such as Guidance on the Use of Recyclate, and guidance around determining colour. Also take a look at the **Packaging Glossary** for a list of the most frequently used terms and their definitions. These documents may be updated throughout the year.

1.2 Legislation.

The Recycle Check and accompanying documents take into account, wherever applicable, the European and national legislation in force at the time of publication. On 22 January 2025, the new packaging regulation, the Packaging and Packaging Waste Regulation (PPWR), was published. The specifics of this still need to be elaborated further, and it is expected that they will be announced in 2027. If the PPWR gives reason to do so, the Recycle Check will be adjusted. Further information about the PPWR is available on the **Verpact website**. This information will be updated throughout the year.

Essential Requirements

When placing packaging on the Dutch market, it must, at the time of writing, comply with the so-called **Essential Requirements** from the Packaging Management Decree ('Besluit Beheer Verpakkingen'). Please monitor the website for updates on this legislation.

The Essential Requirements stipulate that the environmental impact of packaging must be minimal. This is recorded in a product file, which must also include an explanation of how material can be recovered. The **KIDV Recycle Check** answers several of the questions from the associated standard. Use the results of the Recycle Check, as well as related specifications and other explanatory information, and add them to the product file.

The PPWR will also ask for such information, so it would be smart to start working on it ahead of time, so as to comply with current legislation and be well prepared for future legislation.

1.3 Food safety.

Food packaging may contain various chemical substances. When such packaging comes into contact with a product, substances from the packaging can migrate into the food. This may pose risks to human health. Some substances are prohibited (e.g. almost all PFAS), while other substances can be used under certain conditions (e.g. BPA). The KIDV offers various tools to support producers and importers of packaging and packaged products in assessing their packaging materials in this area. Please see the **food safety dossier** for more information.

1.4 Exceptions.

A number of product-packaging combinations may not be collected with household packaging waste because they can seriously disrupt the process, or cause unsafe situations. In this case, consumers can dispose of the packaging by an alternative route. The Recycle Check will then not apply.
There are two reasons why packaging should be collected separately:

- Packaging material creates problems in the process
- The product that was packaged in the packaging creates problems in the process

Packaging materials that cause problems

Most material streams contain packaging materials that may disrupt the sorting and recycling process, including the following:

- **EPS (polystyrene)** is difficult to process during the sorting and recycling stages, as the small static plastic spheres cause a lot of nuisance. Small EPS packaging such as cups and trays must be placed in the residual waste. Larger EPS crates and buffer material should be taken to a municipal recycling facility. The material can then be processed further by a recycler.
- **Wooden packaging:** there is no separate collection system for wooden packaging materials, such as wine boxes. Small wooden packaging can be disposed of with residual waste, and larger pieces should be taken to a municipal recycling facility.
- **Plastic (fruit) nets** often get stuck in the systems during the sorting of plastics. This causes them to disrupt and contaminate sorting systems. These nets must, therefore, be placed in the residual waste.
- **Ceramic, stone, and porcelain** are often deposited in bottle banks by consumers, which is not where they belong. These materials are not glass and are not collected as a separate stream in the Netherlands, but they go with the residual waste.
- **Bio-degradable** disposable units containing compostable plastics can have a major impact on recyclability, even if they end up in the mixed stream. The **Yes/No** lists for the separation of plastic, metal and beverage cartons at source state that compostable plastic packaging must not be disposed of with plastic, metal, and beverage carton waste. For more information, read the KIDV fact sheets on **bio-based** and **bio-degradable** packaging.

Product inside the packaging that causes problems

Small chemical waste consists of a list of hazardous substances that are released in small quantities from households, such as certain cleaning products, alcohol and medicines. Properly emptied packaging for medicines and small chemical waste may be disposed of with household packaging waste, but if the packaging is not completely empty, it and its contents must be disposed of separately via the recycling facility or pharmacy. This does not apply to empty buckets or packaging that once contained silicone, paint, latex, and cement; these should be disposed of with residual waste.

Clearly indicate on the packaging where the product may or may not be disposed of, so consumers do not dispose of the residual product via residual waste or flush it down the drain.

Example

An empty glass jar of skin cream or perfume bottle is not considered to be small chemical waste and may be disposed of in the bottle bank, while a jar that contains or contained a remnant of medication (e.g. antibiotics) does constitute small chemical waste and must be taken to a recycling facility or pharmacy.



Figure 1. Glass bottle containing medication

Milieu Centraal's Waste Separation Tool helps consumers figure out what bin to deposit the different kinds of packaging into. On www.recycleklaar.nl, you can check whether or not your packaging can be disposed of in the plastic, metal, and beverage carton (PMD) waste stream.

2. Recyclability and fee modulation

2.1 Definition of recyclability

The recyclability of packaging is partly determined by whether and to what extent it can be collected, sorted, recycled and reused. In addition, there are recycling targets for the various materials. While these are two different things, they are still related.

- **Recyclability** concerns the extent to which packaging or a disposable unit can be processed by the current system of collecting, sorting, and recycling, and how the raw material can be reused. Packaging can be non-recyclable, limited recyclable, reasonable recyclable or optimal recyclable. It is an assessment of the disposable unit that looks at how likely it is that the packaging will have an optimal passage through the recycling process, looking at the specific design of that disposable unit. As a basis for that assessment, the KIDV uses the definition given in the box below.
- **The recycling target** is a legal target that concerns the amount of material that must be collected, sorted and recycled after it has been placed on the market. For most materials, a larger percentage of packaging – of what has been placed on the market in the Netherlands – must be recycled each year.

Packaging must meet four basic criteria to be deemed to be recyclable:

1. The disposable unit must be made in such a way that it can be collected or picked up by approved waste collectors.
2. The disposable unit must be sorted and/or bundled into pre-defined streams for recycling processes.
3. During the recycling process, the material* is processed on an industrial scale** and is reclaimed into a raw material.
4. Recovered raw material has a uniform composition*** and is used to produce new packaging or products.

The extent to which these four basic criteria are met can be assessed using the Recycle Checks. A Recycle Check assesses whether the disposable unit is optimal, reasonable, limited or non-recyclable (see paragraph 2.2).

* *Depending on the material of the main component in the disposable unit, the amount of target material that can be recovered has to be above a certain minimum for the recycling process to make packaging highly recyclable, which is determined for each Recycle Check.*

** *Industrial scale means that more than half of the disposable units entering the market end up at recyclers and there is sufficient recycling capacity to recycle the sorted material within Europe.*

*** *Uniform composition means that the recyclate offers predictable and consistent quality as a new raw material and is used in a new product or packaging.*

The aim of the Recycle Checks is to help companies make their packaging (more) circular. The vision set out by the Ellen MacArthur Foundation serves as the basis for this endeavour:

> *'A circular economy is one that is restorative and regenerative by design and aims to keep products, components and materials at their highest utility and value at all times'*
>
> MacArthur, 2015

This commitment to circularity underpins the definition of recyclability developed by the KIDV, as mentioned above.

2.2 Categories of recyclability

In the checklist, we distinguish between optimal recyclable, reasonable and limited recyclable, or even non-recyclable packaging. The lowest score has the greatest weighting in determining the overall score. The coloured borders designate the following categories:

Non-recyclable
This qualification is used for packaging that contains a disruptor, i.e. materials that severely disrupt the recycling process and lead to the material stream being rejected.

Limited recyclable
Packaging that cannot be easily recycled because it, for example, ends up in the mixed stream (a mixture of various kinds of materials) after sorting. The material remaining after recycling has limited applications, because it contains components that (severely) disrupt recycling and are difficult to remove.

Reasonable recyclable
Packaging that requires an additional processing step before it can be classified as 'highly recyclable'. While this type of packaging does end up with the recycler as a homogeneous stream, there is something in its composition that somewhat affects the quality of the recyclate or the effectiveness of the process*.

Optimal recyclable
All properties of this type of packaging are optimally suited for recycling, making it 'highly recyclable' according to the aforementioned definition from the Recycle Check.

2.3 Fee modulation (for plastic packaging)

Are you required to pay a waste management contribution to Verpact? If you are, make sure you check whether your packaging qualifies for a **modulated fee**.

In 2024, Verpact introduced Fee Modulation 2.0, which incentivises highly recyclable **plastic packaging** and the use of recyclate. This applies to all packaging containing more than 50% plastic by weight that does not qualify for other fee reductions. A distinction is made between rigid packaging and flexible packaging, each of which has its own starting fee.

Plastic Fee Modulation 2.0 differs from its predecessor (in force since 1 January 2019) in that it also rewards minor improvements. There are four conditions that each entitle parties to a discount of 10 cents on the starting fee, and since 2025, a 20-cent discount for the use of post-consumer recyclate. One of the conditions is that packaging must have a 'highly recyclable' rating in the Recycle Check.

Innovative materials
Producers of innovative materials must be able to demonstrate that these materials can be collected and sorted in sufficient quantities and that they are compatible with existing industrial recycling processes or that new processes are available on an industrial scale. To coordinate innovative materials with fee modulation, the innovation trajectory for the plastic chain is in place. Verpact stimulates innovation in plastic packaging through a special programme within the Plastic Fee Modulation Regulation, which provides scope for new materials or production processes/techniques. The aim of this programme is to improve the recyclability, circularity and sustainability of plastic packaging and thus contribute to the objectives of Verpact's Plastics Guide. Please see **Verpact's website** for more information.

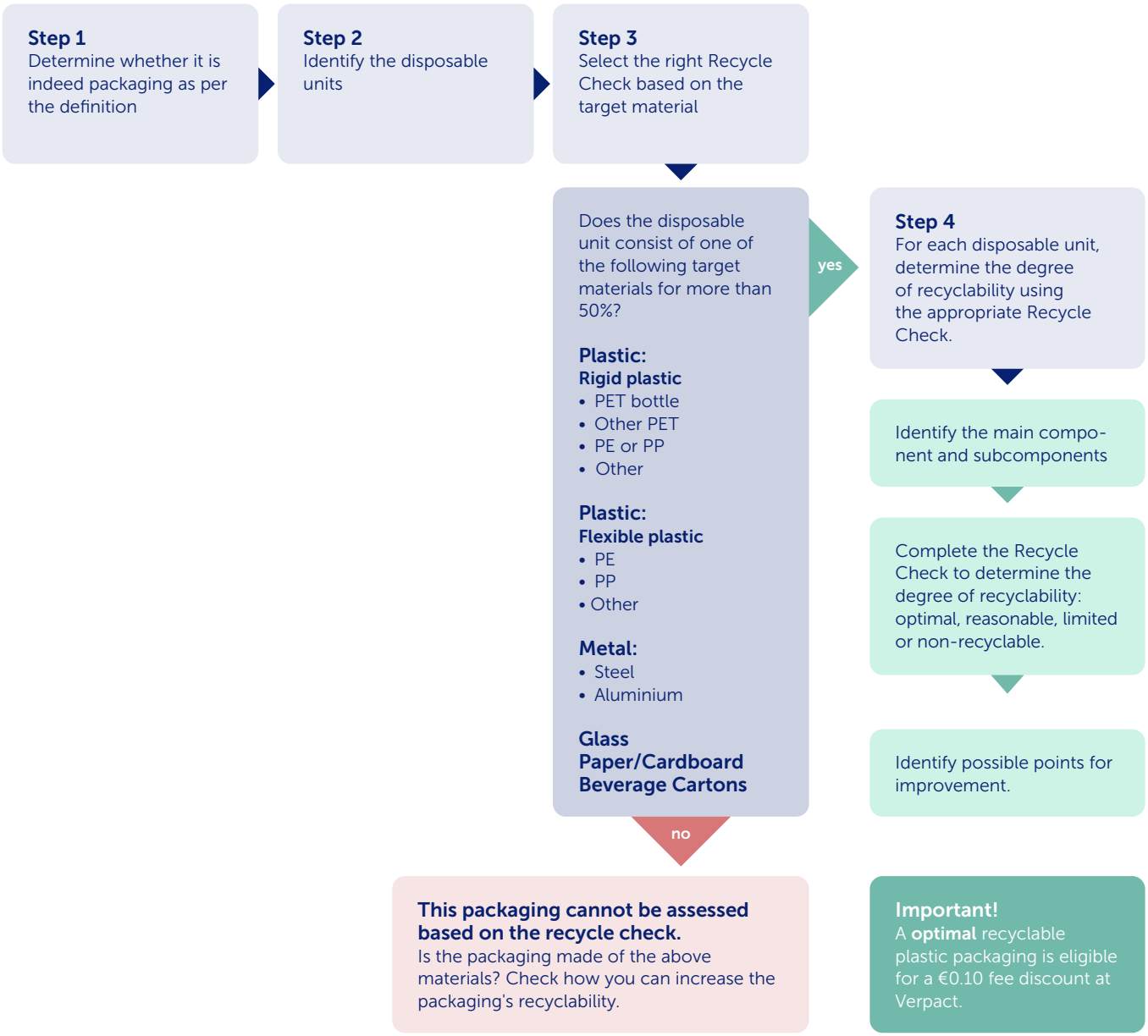
* The ideal composition of this stream varies per material and is explained for each material separately.

3. Select the right Recycle Check

The Recycle Checks were developed specifically to assess the recyclability of packaging. Packaging often consists of several different components, which may or may not be made of different materials, which users discard at different times. This affects the packaging's overall recyclability. The Recycle Checks first split packaging up into its constituent disposable units and then into a main component and subcomponents. To determine which Recycle Check(s) should be completed, it is important to first determine which disposable units the packaging consists of, and then to categorise these units by material. This section explains these terms and details the steps for choosing the right Recycle Check.

A preview of these steps is provided in the figure below, and they are further explained in the paragraphs below:

Figure 2. Select the right Recycle Check



Step 1. Determine whether it is indeed packaging

Recycle Checks can only return a reliable outcome for **packaging**. Therefore, it must first be verified that the object to be assessed meets the definition of packaging. The KIDV uses the following definition for that:

Packaging:
All products, made of materials of any kind, that can be used to contain, protect, ship, deliver and offer other products, ranging from raw materials to finished products, along the entire pathway from producer to user or consumer, including disposable items used for this purpose.

For the full definition of 'packaging', see Verpact's **policy document**. If in doubt about whether something does indeed constitute packaging, consult the (non-exhaustive) **Packaging Catalogue** on Verpact's website.

Step 2. Identify the disposable units

Most packaging is discarded in its entirety after use and is therefore considered a **single disposable unit**. Packaging that is not discarded in its entirety but as several separate components consists of **multiple disposable units**.

Whether different components or materials go through the sorting and recycling process together or separately can have a significant impact on recyclability. In practice, a single piece of packaging can consist of highly recyclable, moderately recyclable and poorly recyclable disposable units at the same time.

The KIDV goes by the principle that each packaging consists of a single disposable unit, unless:
- it consists of several unconnected components.
- part of the packaging must be permanently and completely removed in order to use the product.
- it features components, such as a lid, that can be detached by applying slight mechanical force

For some packaging, it is not always immediately clear whether it concerns one or more disposable units. A test is then required to determine how many units the packaging consists of. Some examples are elaborated below.

Packaging consisting of a single disposable unit

Table 1. **Single disposable unit**

Packaging that consists of a single piece of one material.	 Single disposable unit	***Example 1:*** *A cardboard box that is clean and dry can be disposed of with waste paper.*

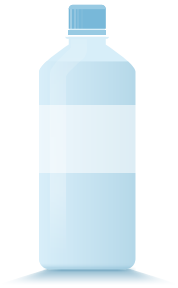
Packaging with fixed closure.



Single disposable unit

Example 2:
Glass packaging with a bracket closure are considered a single disposable unit because the bracket permanently connects the main component and lid. Even plastic bottles and beverage cartons currently often come with a permanently attached cap.

Packaging with bonded labels.



Single disposable unit

Example 3:
Labels glued to the packaging are considered subcomponents, and are not a separate disposable unit. Caps are not a separate disposable unit either, as they are generally screwed back on, and are, moreover, often attached to the bottle these days.

Packaging with multiple disposable units

There are several categories of packaging that consist of multiple disposable units. To clarify this, some examples are detailed below. Step 3 will further explain how to then choose the appropriate Recycle Check for each disposable unit.

Table 2. Multiple disposable units

Packaging consisting of several unconnected components.

The components are disposed of at different times.



Thirteen disposable units

Example 1:
A cardboard carrier tray that holds 6 small bottles. The cardboard tray and bottles each belong in a different waste stream. The crown caps on the bottles also constitute separate disposable units. So, what we have here are 13 disposable units made of 3 different materials.



Five disposable units

Example 2:
Cardboard box containing four bars, each wrapped individually in plastic wrappers. Users will take a bar from the box at different times/in different places. Therefore, the wrappers and the box are discarded at different times and places, and should be assessed separately with a Recycle Check.

Packaging with a component that must be permanently and completely removed in order to use the product

It should be possible to remove this part completely without tools (such as scissors) and without leaving any material residue.



Multiple disposable units

Example 3:
A cardboard sleeve around a plastic container. The sleeve has to be removed to open the container and access the product.



Multiple disposable units

Example 4:
A (champagne) bottle with a cork and a muselet (a wire cage that goes over the cork). These are three disposable units (bottle, cork and muselet) that go in different waste streams.

Further evaluation

There is also packaging that consists of multiple parts, which sometimes form separate disposable units and sometimes not. Further evaluation is needed to determine which disposal units the packaging consists of. A couple of examples are elaborated below.

Packaging with a component that does not necessarily have to be removed at all or not completely to be able to use the product.



Single disposable unit

Example 1:
Plastic flask with a paper sleeve that is, for example, held in place by the tapered design of the flask. The sleeve is not glued to the flask and does not need to be removed to be able to use the product. Packaging and sleeve make up a single disposable unit together, whereby the sleeve must be considered to be a label.

Short self-assessment

Sleeve detachment test

Some units of packaging feature a sleeve that is supposed to come off entirely when the packaging is compressed. This includes plastic cups with a perforated cardboard sleeve that is designed to detach when the cup is compressed. There is a protocol to test whether cup and sleeve indeed detach from each other and behave like individual disposable units. Called the Pollution and Compression Protocol, this protocol is available on the **protocols page** of the KIDV website.

Cardboard sleeve
If plastic packaging comes with a cardboard sleeve around it that consumers do not undo, but which has been shown to come loose during collection and sorting, the sleeve and packaging behave as individual disposable units. It must then be taken into account that in this case the cardboard sleeve will end up in the wrong sorting stream and must be considered non-recyclable.

The packaging features components, such as a lid, that can be detached by applying slight mechanical force.

There are types of packaging that have components, such as lids, that come off during the collection and sorting process, causing them to be processed as individual units during the sorting step.



Multiple disposable units

Example 1:
Margarine tub with a rigid lid. The lid comes off easily when subjected to minor mechanical force, meaning that it is an individual disposable unit in the packaging sorting process, even if the tub and the lid were originally discarded together.



Multiple disposable units

Example 2:
Cardboard tube with plastic cap. This lid comes off easily after being subject to minor mechanical force, becoming an individual disposable unit in the sorting process, even if the tube and the cap were originally placed in a bag or bin together as one whole.

Short self-assessment

Simple lid detachment test

You can test whether a lid detaches when slight mechanical force is applied by squeezing the empty packaging with the lid on. If the lid pops off completely, it is deemed an individual disposable unit.

Packaging with components such as a release liner



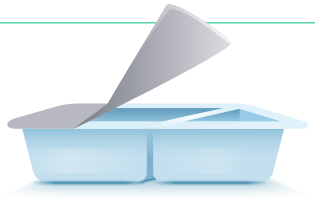
Multiple disposable units

Example 1:
Pouches/containers with ingredients in a ready-to-eat salad. These various individual components are separate disposable units and are discarded individually after use.



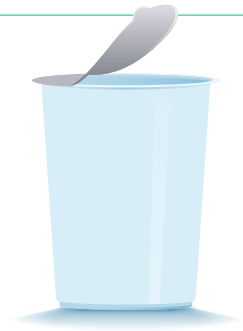
Multiple disposable units

Example 2:
A tamper-evident seal on the neck of a jar or bottle with a diameter of up to 40mm. The product cannot be used properly if the seal is not completely removed first. Used means that the product cannot be poured, spooned or dispensed, depending on the intended use of the container. Cap and bottle together make up one disposable unit, while the seal is a separate disposable unit.



Multiple disposable units

Example 3:
Plastic tray with release liner that must be completely removed to be able to use the tray's dispensing functionality.



Single disposable unit

Example 4:
Cups, trays with a wide neck, and trays where the release liner does not have to be detached completely to be able to use the product are also considered single disposable units. The liner can even be used to reseal the packaging.

Short self-assessment

Simple release liner detachment test

You can test whether a release liner detaches when slight mechanical force is applied by grabbing the open, empty packaging by the release liner and shaking it. If the foil comes off easily, it is deemed an individual disposable unit. At the start of the test, at least 25% of the release liner must still be attached to the rest of the packaging.

If there is doubt as to whether packaging consists of one or multiple disposable units, and the above examples do not provide clarity, please contact us using the **KIDV Q&A**.

Step 3. Categorise the disposable unit or units

The Recycle Check involves completing an individual checklist for each disposable unit. For each unit, determine the most common overarching and, if applicable, specific **material type** (see list below) to categorise the unit. The type of material that makes up at least 50% of the unit's weight determines what category the unit falls into. This is also referred to as the **target material**, see Section 4.

If none of the types of material make up more than 50% of the disposable unit, the disposable unit cannot be assessed using a Recycle Check. The packaging should then be adapted (see also paragraph 1.2 on legislation in this document).

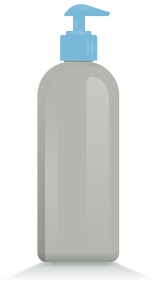
The types of material:

- **Rigid plastic**
  - PET bottle
  - Other PET (incl. PET trays)
  - PE or PP
  - Other rigid plastic
- **Flexible plastic**
  - PE
  - PP
  - Other flexible plastic
- **Metal**
  - Steel
  - Aluminium
- **Glass**
- **Paper/cardboard**
- **Beverage cartons**

To illustrate this, some examples are detailed below.

Example 1:
A hand soap container. The soap comes in a luxurious metal bottle with a plastic pump. The pump cannot be easily removed from the bottle. It is determined that the bottle and the pump make up one disposable unit, as explained in step 2. Only one checklist needs to be completed in this case, choosing steel packaging because more than 50% of the disposable unit is made of steel.

Figure 3. Hand soap container



Example 2:
A granola bar wrapper. The bars come in individual wrappers and are packaged with four in a box. According to the explanation in Step 2, it is determined that this packaging consists of five disposable units: the box and the four wrappers. To assess the packaging, a checklist must be completed for each disposable unit. In this case, choose a checklist for the cardboard box and a checklist for the flexible plastic wrappers. For several of the same disposable units, such as four identical wrappers, one checklist is sufficient.

Figure 4. Multi-packaging



In case of doubt as to what category a disposable unit falls into, please contact us using the KIDV Q&A.

Step 4. Determine the degree of recyclability

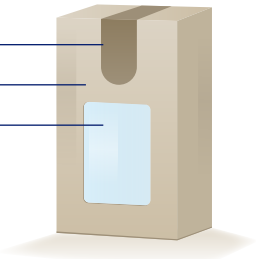
After choosing the appropriate Recycle Check to assess the recyclability of the disposable unit, the next step is to identify the **main component** and any **subcomponents**.

The main component of packaging is that which holds the product, and usually the component that makes up most of the packaging's weight. Besides its main component, a disposable unit often also has one or more subcomponents. These are added components, such as labels and closures, which are processed along with the main component in the recycling process.

The table on the next page shows some examples of how to identify the main component and subcomponents. More information on each material type is available in the material-specific background documents.

Table 3. **Determining main and subcomponents**

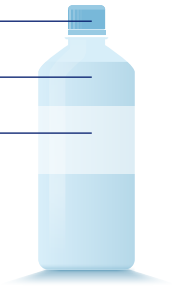
Subcomponent = tape
MAIN COMPONENT = box
Subcomponent = window



Single disposable unit

Example 1
Box (main component) with window and tape label (subcomponents).

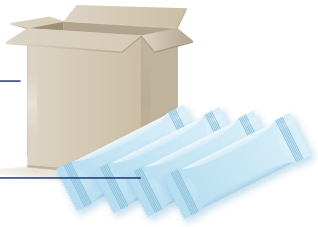
Subcomponent = closure
MAIN COMPONENT = bottle
Subcomponent = label



Single disposable unit

Example 2:
Flask (main component) with cap and label (subcomponents).

MAIN COMPONENT = box
MAIN COMPONENT = wrappers



Five disposable units

Example 3:
Box (main component) with 4 granola bar wrappers (also main components).

If there is any doubt about the difference between the main component and subcomponents of the disposable unit, and the above examples do not provide clarity, please contact us using the KIDV Q&A.

4. Target material and secondary material

What is the target material?

The target material is the material that will ultimately be recycled into a new raw material. Typically, this is the **most common material** in the disposable unit, often the material of the **main component**.

Exceptions: if a subcomponent (such as a heavy steel cap) is heavier than the main component, the subcomponent is the target material.

If a subcomponent **is made of exactly the same material** as the main component (e.g. paper label on a cardboard box or PE cap on a PE bottle), this counts towards the target material. Properties such as colour, additives and printing of these subcomponents must be taken into account in the assessment.

When does packaging have sufficient target material?

The target material must constitute at least 70% of the total weight of the disposable unit:

Target material weight / Total weight of the disposable unit x 100% ≥ 70

Secondary stream Materials that are **not the target material** form the **secondary stream**.
These can affect the processability of the target material, but can also be recycled themselves if properly coordinated (design for recycling).

Example: returnable bottles made of PET with caps and labels made of PE or PP. The caps can be easily separated from the PET and can themselves be easily recycled as a secondary stream.

In **Part II**, you will find the material-specific information that goes with the checklist. See Section 6 of Part I for more tips and tools for sustainable packaging.

5. Manual for the checklist



Step 1: Creating packaging

Open the Recycle Check dashboard, add the packaging and fill in some information about the packaging being assessed and click 'Save' at the bottom of the page.



Step 2: Creating the disposable units of the packaging

Click the play button that says 'Edit packaging'. Click the green button for an explanation of how to identify disposable units. Next, add the disposable unit or units that make up the product-packaging combination. Each disposable unit of the packaging must be assessed separately.

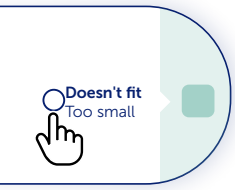
Step 3: Completing the checklist

Go through the corresponding checklist for each disposable unit by clicking the 'Start checklist' button. Upon opening the checklist, general information is provided that can be clicked away after reading. The questions include links to additional explanations for each material in the background document.



Step 4: The final score

Once all checklist questions have been answered, the 'Complete' button at the bottom of the list leads to the summary page, which gives you the final recyclability score for the disposable unit. The heading 'Final Score' shows how many questions from the checklist have already been answered. For example, if it says 8/10, then the checklist consists of ten questions and eight have been answered. As soon as the full list has been filled in, the box with the tick turns the colour that matches the checklist outcome (**optimal**, **reasonable**, **limited** or **non-recyclable**). If the packaging consists of multiple disposable units, proceed with the next checklist.



Important: data are saved locally while you are completing the Recycle Check. If you close the checklist when you are halfway through completing it, you can continue from the same computer at a later time; the previously entered details will still be there. You can only complete the list on another computer if you download the entire portfolio (see step 5).

Step 5: Saving and sharing results



The summary page offers the option to export the results to a PDF file using the 'Download PDF' button. If the packaging assessed consists of multiple disposable units, the checklists for all units of each packaging are included in one PDF export.

Tip: An empty Recycle Check can be downloaded by entering the packaging and adding a disposable unit, while not starting the checklist. When downloading a PDF, the checklist will be displayed as an empty list.

In addition, there is the option to download the entire portfolio, consisting of all completed checklists, so that, for example, a colleague can upload the entire set on their computer. You can do this by clicking the 'Export packaging' button in the top-right corner of the dashboard. This will download a .json file. An entire set can then be imported by clicking 'Import packaging' and uploading the .json file here.

! Some checklists use this symbol to mark questions as complex. This means that it is more difficult to determine the right score in one go (**optimal**, **reasonable**, **limited** or **non-recyclable**). In these cases, you can usually perform a test to see whether your packaging qualifies for a higher level of recyclability. For example, it may be necessary to perform a test in order to answer one of these questions. Two scores are possible for these types of questions. The Recycle Check automatically ticks the lowest score. After a positive test result, the higher score may be ticked. However, it is important to have proof of a positive test result on hand. Where possible, references to available protocols are provided; in some cases, such protocols have yet to be developed. For updates on this, see the KIDV's **protocols page**.

Tip: Answer all questions first and determine if a test can improve the final score. Some criteria later in the checklist mean that a positive test result will not result in an improvement in the final score of the check. For example, when a test has to do with a disposable unit's sortability and it does not score optimally on recyclability to begin with. Of course, it may still be wise to perform the test to gain more knowledge about this particular aspect.

If you want to up your sustainable packaging game, the KIDV's **7 tips** will get you off to a good start. This section will further explain what other information and tools the KIDV has available to help you get started with sustainability.

6.1 Disposal Guide

The **Disposal Guide** makes it easier for consumers to dispose of packaging waste the right way. Research shows that there is strong support among consumers for separate collection, but they need to know which bin to put their waste into. Disposal Guide logos on packaging encourage consumers to put the packaging into the right waste stream after use so that it can be optimally processed and recycled. The logos are available
from the KIDV on request.

6.2 E-learnings and training

Sustainable packaging is so much more than just changing or reducing the amount of packaging material. To provide guidance on this, the KIDV has developed a number of e-learnings:

- **Packaging recycling in the Netherlands**
  Using real-life examples, the KIDV provides insight into the collection, sorting and recycling of different kinds of packaging. This e-learning module covers every packaging material: rigid and flexible plastic, glass, metal, and paper and cardboard.

- **Plastic packaging sorting and recycling processes**
  To add further depth to the 'Packaging recycling in the Netherlands' e-learning module, the KIDV has developed this more technical module. This module further explains the basic techniques used to sort and recycle plastic packaging, going into things such as the influence of packaging design on the various sorting and recycling processes.

- **Five perspectives on sustainable packaging**
  When developing successful sustainable packaging, several aspects must be taken into account. Consider the packaging process and logistics, for example, as well as customers' purchasing and disposal behaviour and the company's packaging and sustainability strategy. The **Five perspectives on sustainable packaging® KIDV model®** covers the main approaches. This model allows you to zoom in on issues of importance in specific situations from any angle, with background information, tips and examples that can help you on your way. In this e-learning module, the KIDV shows people how to use the model, using real-life examples and assignments that apply specifically to their own packaging practices.

- **R-strategies**
  The next step is turning the opportunities and threats into actual actions, such as redesigning your packaging. The so-called R-strategies are strategies that can be applied to make packaging or a product-packaging combination more sustainable. This e-learning module goes into the specifics of using the R-strategies through real-life examples and assignments.

Training programmes

In addition to the e-learnings, the KIDV offers **training programmes**, with packaging experts introducing participants to both the theory and practice of sustainable packaging. This kind of training adds value in that it lets participants practise using the theory under the guidance of a packaging expert. There are also opportunities to ask in-depth questions and to network with other businesses. The knowledge and skills gained during this training can subsequently be harnessed in formulating your own packaging sustainability strategy and applying practical tools in your own practices.

6.3 Further information

The KIDV website features fact sheets, publications, and tools on various topics in the sustainable packaging domain. A few of them are presented below.

Fact sheets

- When can a company put an environmental claim on its packaging and when is it being made falsely and potentially misleading to consumers? The KIDV has prepared the **Environmental Claims Fact Sheet** on this subject, describing the legal frameworks for these claims, using some common examples.

- Bio-based and bio-degradable packaging materials can often help reduce CO_2 emissions and reduce demand for fossil resources. At the same time, whether these materials are a good alternative also depends on the product being packaged. For more information on these materials, their potential and the issues involved, see the **Bio-Degradable Packaging and Bio-Based Plastic Packaging Fact Sheet**.

- The KIDV's **Symbols on Packaging Fact Sheet** provides an overview of logos that consumers may find on packaging, as well as their origin and meaning and whether their use is mandatory or voluntary.

- The KIDV has put together a comparison of the use of **Disposal Guide logos on packaging in different European countries**. This overview makes it clear to companies which logos are used in those countries, whether that is voluntary or mandatory, and where companies can find information about the regulations that apply there. The KIDV also manages the **Dutch Disposal Guide**.

Dossiers

Take a look at the KIDV's dossiers to gain insight into the latest developments, get practical examples and read about focus points in making packaging sustainable. The dossiers are specific to sectors or industries and to relevant topics around sustainable packaging, such as chemical recycling and reusable packaging. Click **here** for the dossiers.

- What legislation (directly) affects the design of packaging and the reuse or disposal of packaging waste after use? The KIDV has plotted information on laws and regulations on a **clear timeline**. The timeline contains background information and links to the specific legislation itself.

- Manufacturers and/or importers that place packaging on the Dutch market are responsible for ensuring that their packaging complies with the so-called '**essential requirements**'. These pertain to the composition and nature of the packaging to minimise their volume and weight and ensure they are suitable for reuse and recovery of the materials.

- Packaging affects consumer behaviour when they purchase, use and discard products and their packaging. Sustainable packaging can, therefore, also contribute to sustainable consumer behaviour. Read more about **consumer behaviour** here.

- How consumers interact with packaging also partly determines the sustainability of packaging. Based on scientific research on consumer behaviour, the KIDV has compiled an overview of key insights. The **Sustainable Consumer Behaviour Tool** is a set of three tools that companies can use - particularly for food packaging - to look at sustainable packaging from a consumer perspective.

Reuse

To reduce the environmental impact of packaging, **reuse** can be an effective strategy. Unlike single-use packaging, the energy it takes to produce the packaging is distributed over the number of use cycles, which can greatly reduce the environmental impact of producing the packaging per use cycle.

This reduction does need to account for additional steps relative to single-use packaging, such as cleaning and transportation. A saving in environmental impact (and costs) when switching to glass packaging reuse depends on this, as do the return rate, the life of the packaging and transportation distances. Scale can also have a significant effect, particularly on costs, as it allows investments in (cleaning) equipment and more efficient processes to be recovered more quickly. To determine whether switching to reusable packaging could be an attractive option, the KIDV has developed a **Calculation Tool**.

Sustainable Packaging Compass

The KIDV has developed the **Sustainable Packaging Compass** as a tool to provide insight into the recyclability, circularity and environmental impact of packaging. This does not only indicate whether the packaging is recyclable, but also to what extent the packaging is circular. The tool also gives an indication as to the packaging's environmental impact.

Companies can harness these insights to compare different units of packaging and types of packaging, assessing their scores on various aspects of sustainability. They can then use this information to set sustainable packaging objectives and quantify the effects of packaging optimisation. There is also the opportunity to get an indication of possible fee modulation for rigid and flexible plastics.

State of Sustainable Packaging

This KIDV publication offers a strategic perspective on the collaboration and innovations needed when it comes to sustainable packaging, identifying social and economic obstacles that stand in the way of sustainable packaging.

More information

If you have more questions about the Recycle Check or about making packaging more sustainable, contact the KIDV through our **Q&A**. For more information about making packaging sustainable, go to our **website** or sign up for the KIDV newsletter **here**.

Netherlands Institute
for Sustainable Packaging
part of **verpact**

Part II: Recycle Check Beverage cartons 2026

1. Introduction

Part II of this document provides background information to support the Recycle Check for beverage cartons. It provides additional information on collection, sorting and recycling. All matters that are the same for all materials are covered in Part I: The basic information is the same in each background document. It includes things such as the definition of recyclability, how to choose and use the Recycle Check correctly and how to make packaging more sustainable.

The Recycle Check for beverage cartons was created with a lot of information from 4evergreen (consortium of manufacturers, designers, brand owners, researchers and recyclers) and FBCA Food and Beverage Carton Alliance).

The following are some definitions that are specific to beverage cartons.
Part I lists all the definitions that are important for conducting a Recycle Check.

For definitions of all the terms used in this document, see the Packaging glossary on the KIDV website.

2.1 Definition of beverage cartons

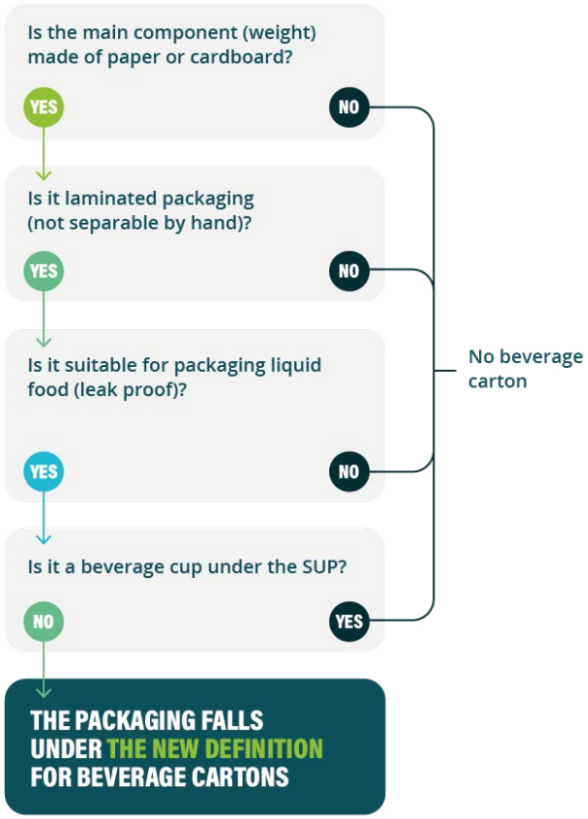
This Recycle Check is exclusively intended for packaging that falls under the definition of beverage cartons.
See Part I, Section 3 for more information about what constitutes **packaging**.

The definition of **beverage cartons** is stated in the Packaging Management Decree 2014, and has been tightened as from 1 January 2023. The definition is: 'packaging suitable to contain liquid foodstuffs, other than beverage cups, of which paper or cardboard is the main component'. Whereas in the old definition the cardboard content had to be at least 70%[1], according to the new definition the main component is determined by the relative share compared to the packaging. The cardboard content must therefore be dominant over other materials to qualify as beverage cartons.

This adjustment means that more packaging is covered by this definition than the traditional beverage cartons. To clarify this, Verpact interprets the legal definition 2 as follows[2]:

1. **"Packaging":**
   Laminated packaging where the paper and plastic parts cannot be separated by hand.
2. **"Suitable for packaging liquid foodstuffs":**
   For the purposes of this definition, it is not important whether the packaging actually contains a liquid food product, but only whether the packaging is suitable to contain a liquid food product. In case of doubt, it should be determined whether the packaging is (and remains) watertight.
3. **"Not being beverage cups"**
   When packaging falls under 'beverage cups' for the SUP (Single Use Plastics[3]) regulations, it does by definition not fall under the definition of beverage cartons. The decision-making framework at the SUP indicates that 'cups' containing, for example, dairy products, ice cream or yoghurt, are not considered a 'beverage cup' under the SUP regulations, but as food packaging. Cups containing a powder that needs to be diluted with water on the other hand, are classed as 'beverage cup'.
4. **"Of which paper and/or cardboard is the main component"**
   As with other materials, the 'main component' is determined on the basis of the weight of the different materials in the relevant product packaging. In which the part accounting for the most weight is the main component.

Figure 6. Decision tree to determine whether a package is a beverage carton or not



Source www.verpact.nl

1 The old definition of beverage cartons was: packaging that can be used to contain liquid foodstuffs, consisting of at least 70% paper and cardboard, with the remaining percentage consisting of (a) different material(s)
2 Source and more background information: https://www.verpact.nl/nl/drankenkartons
3 More information about the SUP regulations can be found here.

Figure 7. Examples of beverage cartons



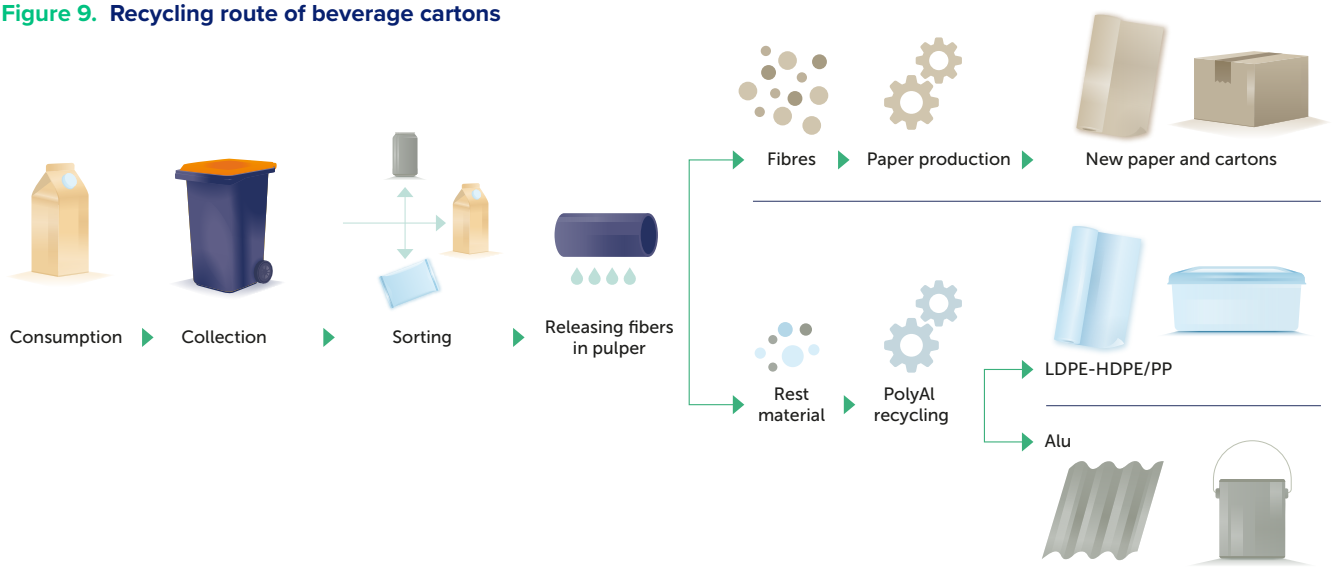
At present, sorting and recycling are optimised for the most well-known packaging types of the major suppliers. As a result, it is possible that a new generation of beverage cartons cannot be sorted or recycled yet. This will become clear when the checklist is completed. The situation is reviewed annually and the Recycle Check is adjusted, if necessary.

Note: although some questions may score "Optimal", the final score for beverage cartons can be a maximum of "Moderately recyclable". This is because currently, structurally, less than half of the disposable beverage carton units entering the Dutch market end up with recyclers (industrial scale). The target material for beverage carton recycling is cardboard. PolyAl forms a secondary stream in recycling (you can read more about target and secondary materials in Part I, Section 4). Currently, PolyAl recycling is still very much in development and does not yet have a stable end market. In this Recycle Check, an "Optimal" score can still be given for each question, because this indicates what is technically the most recyclable option.

2.2 Sorting and recycling

In the Netherlands, beverage cartons are mainly collected via PMD (Plastic, Metal and Beverage Cartons), but many beverage cartons also find their way to specialised paper mills via post-collection separation. This is because beverage cartons cannot be processed in standard paper mills. The specialised plants use a separate technology to free the fibres from the rest of the packaging. The biggest difference with traditional paper recycling is that the packaging is cut and/or ripped open. The amount of time spent in the pulper is also much longer. The released fibres can be immediately transported to the paper machine, where they are often merged with another layer of paper.

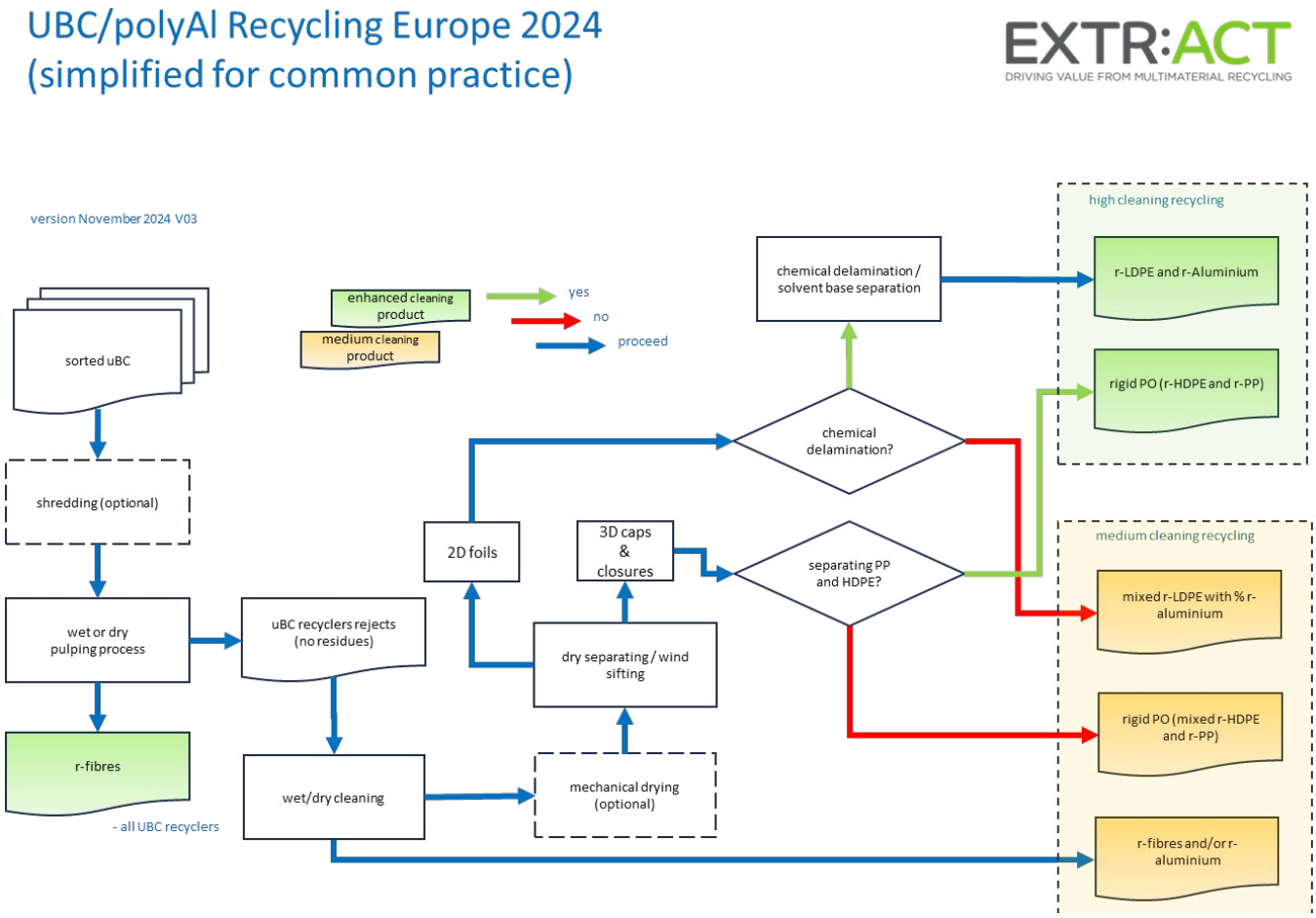
Figure 9. Recycling route of beverage cartons



The remaining materials, being PolyAl (collection of polymers and aluminium), LDPE (low-density polyethylene), HDPE (high-density polyethylene) and PP (polypropylene) go to PolyAl recyclers that make these components usable again, either combined or separately. Broadly speaking, this can be achieved in the following three ways:

1. mechanically extracting the last fibres from the PolyAl fraction (dry process) and extruding the remainder (LDPE, Alu, HDPE and/or PP) into granules that are used to make transport pallets.
2. separating the residual materials by means of wet, mechanical steps, into the raw materials LDPE, aluminium and the rigid plastics HDPE and PP.
3. an additional process after the wet mechanical steps to separate the LDPE and aluminium even better by means of dissolution, during which the LDPE is dissolved, separated and then crystallised again. This process yields the purest fractions.

Figure 10. Overview of beverage carton recycling



The image above provides an overview of beverage carton recycling and shows how they are separated into different types of material and subsequently recycled. (source: Extract, Nov 2023)

2.3 Dimensions and shape of a disposable unit

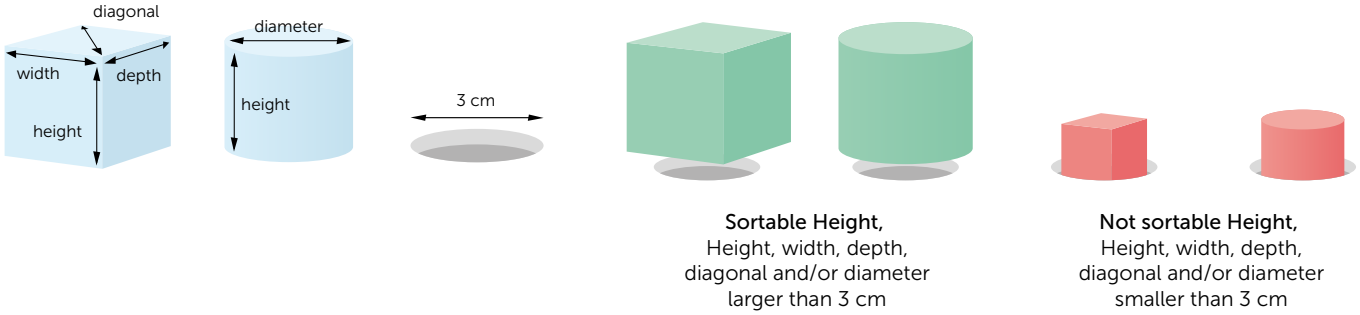
The most common sizes of beverage cartons in the Netherlands have a capacity of 200, 500, 1000 or 1500 ml. Sorting facilities sort disposable units by size. The first step involves a large rotating drum with holes of different sizes, which sifts the packaging waste. This separates components that are either too small or too large for the sorting process from all other material. Disposable units that are too large and too small are usually not submitted for recycling, even if they could technically be recycled.

Smaller than 3 cm

Disposable units that can pass through a 3 cm round hole, i.e. the smallest size, are too small to be sorted. Overly small disposable units are removed from the sorting stream, because they are often heavily contaminated. Furthermore, the fraction is made up of many different types of material, which are difficult to separate using common techniques.

In some cases, the small fraction is post-sorted again in order to recycle small components made from high-quality raw materials, such as caps. In this process, sorters go on a targeted search for highly recyclable components. This makes it worth paying attention to the design of small disposable units as well, which is why they can still get a 'moderately recyclable' score in the Recycle Check.

Figure 11. Packaging volume



Cylindrical/conical packaging

Cylindrical or conical beverage cartons can pose a problem when sorting. Such packaging, such as tubes, is normally flattened in a so-called compactor truck after collection. This is beneficial for the sorting process, as it prevents packaging from rolling along the belt. Cylindrical or conical units of packaging that are higher than half their diameter and that cannot be flattened are very awkward during the sorting process, as they tend to roll on the conveyor belt and become very difficult to sort. After the packaging is scanned using near-infrared technology and grouped with the appropriate stream with a blast of air, cylindrical packaging often behaves rather unpredictably in this step and often ends up in the wrong stream.

To test whether a cylindrical or conical package is compressible or not, the following simple practical test can be performed:



TEST
whether cylindrical or conical packaging is compressible or not:

Using your foot, press down on the round side of (empty) packaging.

1. If the packaging is not flattened or springs back into its circular shape, chances are that the packaging retains its circular shape during the collection and sorting process, which means it cannot be sorted properly.
2. If the packaging can be flattened and does not spring back to its cylindrical shape, it will move through the sorting process properly. In the checklist, change the answer to this question to 'optimal'.

If in doubt about the outcome of this test, use NTCP's Pollution and Compression Protocol, which simulates the collection and sorting step.

3. Recyclability focus points

The material composition of the main component affects the recyclability of the disposable unit in question. The use of coatings, fillers and additives all affect how well recyclers can process the material. This section describes the extent to which the main component of packaging is recyclable.

3.1 General

Traditional beverage cartons consist of various layers. The main raw materials in beverage cartons are wood fibre, plastic and sometimes aluminium. Together these materials provide mechanical strength and barriers. During paper production, wood pulp is processed into paper. This involves treating the pulp and forming it into a thin paper layer. After this, the following steps are completed:

- Lamination: The paper is laminated on both sides with a thin layer of plastic and sometimes aluminium.
- Printing: a print can be applied to the laminate in two ways; either on the cardboard or on the LDPE layer.
- Forms: The laminated paper can be transported to the filler on rolls or it can be formed into flat packaging before being transported. The flat packaging may already be fitted with caps and markings for straws.
- Filling and packaging: the filler forms beverage cartons from the rolls or flat packaging, which are immediately filled and sealed. If applicable, caps are fitted. This step is completed in a controlled environment to ensure shelf life.

The simplest construction consists of cardboard laminated with LDPE on both sides. These beverage cartons are suitable for packaging chilled products.

To provide a slightly stronger barrier, especially for fresh dairy drinks, a layer of Polyamide (PA) can be applied. In the case of fresh juices, barrier materials can be laminated into the LDPE.

Beverage cartons with an aluminium layer are used for shelf-stable products. Some products can achieve a shelf life of more than a year when contained in such packaging.

Figure 12. Example of hinged cap



A beverage carton may also have a cap. These caps are usually made of PE (polyethylene) and sometimes of PP (polypropylene). The cap is attached to the beverage carton using a spout made of the same material as the cap (also called a shoulder). This functionality has improved the pouring and closing of beverage cartons, but it has also made them heavier. In addition, the fibre content has decreased as a percentage. The most common beverage carton holds 1 litre and weighs around 30 grams including the cap, with the loose cap with spout (shoulder) weighing around 3 grams[5].

According to the *Packaging Management Decree*, which includes the SUP guideline (among other things), (composite) beverage packaging (containing a beverage) must feature caps and lids that remain attached to the packaging during use, with effect from 3 July 2024. Beverage cartons therefore feature so-called *tethered caps*[6]. These are hinged caps that stay attached to the beverage carton after opening the packaging.

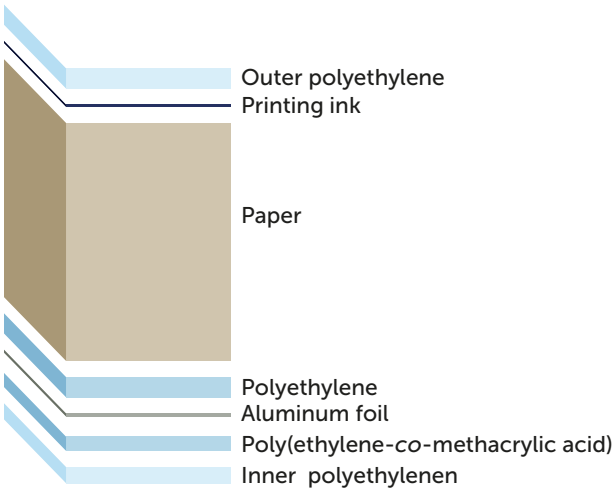
5 Source: Packaging barometer data KIDV, 2024.
6 More information: Packaging Insights, Tetra Pak - Tethered caps, SIG - Tethered caps.

On average, the weight of aseptic beverage cartons for shelf-stable products can be distributed as follows:

- 78% paper (new, long fibres);
- 20 percent LDPE for plastic layer and/or HDPE (high-density polyethylene) or PP for cap and shoulder;
- 2% aluminium.

There are no composition data yet for other packaging that falls under the new definition.

Figure 13. Schematic representation of a beverage carton with aluminium layer [7]



3.2 Material composition of beverage cartons

Below is a more detailed description of points of interest regarding the different layers that beverage cartons can be constructed from:

Fibre layer

Paper and cardboard packaging is produced mainly from wood fibre, although fibres from other crops can be used as well, such as cotton, flax, grass, hemp and bagasse. Other alternative plant-based, fibrous raw materials are also being explored, such as elephant grass (Miscanthus) and tomato stalks. These fibres are known as cellulose fibres.

If the paper fibres come from trees, use fibres that are FSC and/or PEFC certified where possible, to ensure they come from responsible and sustainable forestry.

Mixed plant-based materials that are not suitable for the production of new paper must be removed during the recycling process. This also applies to synthetic fibres added to packaging, such as nylon (PA) or polyethylene (PE). Some packaging materials resemble paper or cardboard but do not contain cellulose fibres. These packages do not belong in either paper recycling or beverage carton recycling, because they contain no or insufficient fibres. Examples include stone paper and variants of beverage cartons made entirely of plastic.

Wet strength

- The cardboard of most beverage cartons currently consists of 2 or 3 layers of paper of a bleached or clay-coated outer layer of sulphate kraft and an inner layer of chemo thermo mechanical pulp.
- To prevent the cardboard from becoming limp when wet, especially that of beverage cartons for the fresh produce shelf, it can be given a certain decree of wet strength. However, this can negatively affect the recycling of the fibres. The cardboard can also be given temporary wet strength using, for example, Glyoxalpolyacrylamides (GPAM), in which case the impact on recycling is minimal.
- In order to achieve permanent wet strength, urea formaldehyde (UF), melanin formaldehyde (MF) or polyamide epichlorohydrin (PAE) can be used,among other things However, these materials all reduce recyclability.

LDPE layer

Recognition in the sorting facilities

Beverage cartons are recognised in the sorting facility using near-infrared (NIR) detection, set to detect cardboard layers with PE coating. A beverage carton of which the outer layer consists of a varnish layer or dispersion coating instead of a PE layer can be regarded as paper/cardboard and as such be rejected and therefore not recycled. Only if independent sorting tests have shown that the beverage cartons are not rejected, can optimal scoring be achieved here. These tests can be performed at independent institutes such as NTCP, CHI (Cyclos-HTP Institute) and Circpack.

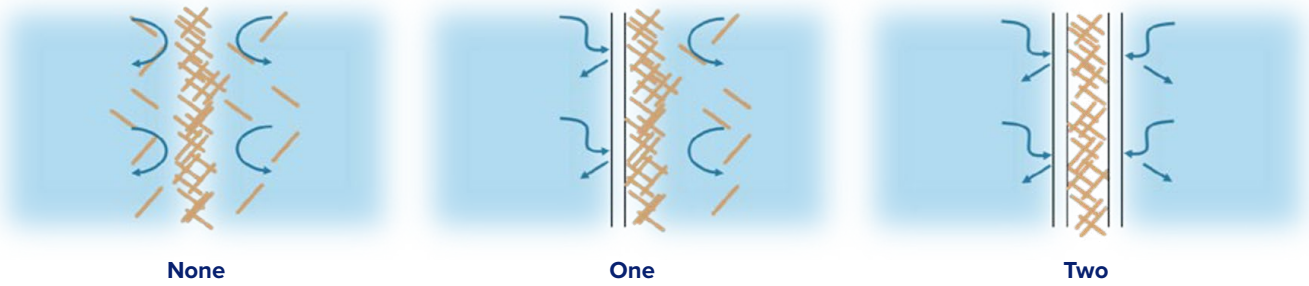
7 *Source: Recycling of Aseptic Beverage Cartons: A Review, Gordon L. Robertson.*

Processing in paper recycling
The LDPE outer layer must be thicker than 7 µm. Films thinner than 7 µm can slip through the paper machine filter and cause problems in the production of recycled paper.

Barrier layers

When processing beverage cartons, the cellulose fibres in the paper and cardboard are separated in a special pulper. These separated fibres are then used to produce new paper or cardboard. Added layers complicate the pulping process, especially if the paper and/or cardboard is sandwiched between two other layers, as is the case in beverage cartons. The diagram below shows how the pulping process works with paper featuring no added layers, one added layer and two layers.

Figure 14. Cellulose fibres in laminate



Paper/cardboard packaging collected in the Netherlands can be processed in two types of factories:

Paper mill with a conventional process
Paper/cardboard that is coated or laminated on one side only can be processed in a normal pulper. This concerns disposable units that are collected via waste paper. These units enter a large water basin where they remain for a maximum of 10 minutes.

Paper mill with a specialised process
Because beverage cartons, or other packaging that falls under the definition of beverage cartons, are usually laminated on both sides, they need to be processed in specialised plants. In the first step, the beverage cartons are cut into pieces and "ripped" open, which tears open the layers, making the fibres more accessible for soaking. The cartons then enter a special pulper. This pulper usually consists of a rotating horizontal cylinder in which the beverage cartons remain for up to 60 minutes.

Possible inner layers and barriers

LDPE
In addition to the LDPE outer layer, beverage cartons always contain an inner layer of LDPE as well. This layer is in direct contact with the product and acts as a moisture barrier and seal. This inner layer, like the outer layer, must be thicker than 7 µm to avoid problems in the production of recycled paper.

Aluminium (optional)
The aluminium layer that is applied is 6-7 µm thick and provides a very strong barrier for shelf-stable products at room temperature, but it increases the environmental impact and is not easy to recover qualitatively after recycling the beverage cartons. Therefore, alternative barrier materials are being sought. We discuss a few below:

EVOH (optional)
EVOH (ethylene vinyl alcohol) co-extruded into the LDPE layer increases the oxygen barrier. Since EVOH is very moist-sensitive, it must be enclosed between two LDPE layers. An EVOH layer is usually a few micrometres thick and is used in beverage cartons for orange juice, among other things. At a concentration of up to 5 percent EVOH in the LDPE layer, it does not disrupt the recycling of beverage cartons in specialised recycling plants.

Metallisation, SiOx, AlOx (optional)
An even higher barrier can be achieved through metallisation or vacuum-deposited SiOx (silicon oxide) and AlOx (aluminium oxide) in/on the LDPE layer. These do require a stiff surface to prevent cracking. These layers are only a few nanometres thick. At a concentration of up to 5 percent metallisation, SiOx or AlOx in the LDPE layer, it hardly disrupts the recycling of beverage cartons in specialised recycling plants[8].

Polyamide (PA) (optional)
PA (polyamide, type 6 or copolyamide 6/6.6 as coextrusion) can also be opted for to act as a barrier layer in the LDPE. This application is currently sometimes used for fresh milk. PA on its own can be a problem in recycling, but laminated or coextruded with compatibiliser MAH (maleimide anydride) recycling can be greatly improved. At a concentration of up to 20 percent PA in the LDPE layer, it has much less impact on the recycling of beverage cartons in specialised recycling plants.

However, using one of the three above alternatives for aluminium can make recycling more complex, and result in a less clear composition of the recovered raw material. This therefore requires a careful balance between durability and recyclability.

3.3 Materials that impact the recycling process

A disposable unit may contain materials that affect or disrupt the recycling process. Some substances only have a negative impact on the efficiency of the recycling process or on the quality of the end product of recycling (recyclate). There are also materials that, to a greater or lesser extent, cause even highly recyclable materials in the stream to be rejected. Below are some examples of substances that, to a greater or lesser extent, have a disruptive effect:

PET
Some beverage cartons, which are produced from the roll, contain a PET strip to shield the aluminium from the product and carton. This strip can impede the recycling of PolyAl. Nowadays new techniques are available and this PET strip is used less and less. See Section 3.1 for an explanation of beverage cartons produced from the roll. Up to a percentage of 5% PET, the disposable unit is considered to be poorly recyclable; at an even higher percentage it is practically deemed non-recyclable.

Wax
Wax is undesirable; it can impede the release of fibres and cause defects in the subsequent application of paper fibres.

Disruptors

PVC
The presence of PVC (PolyVinylChloride) can cause a disposable unit to end up in the separated non-fibre component stream (rejects). Once incinerated, these rejects can lead to the formation of components that harm the environment and the incinerator.

PFAS
Fluoroalkyls (PFAS compounds) are applied both in the wet part of the paper machine and on the surface of the substrate, e.g. to make paper and cardboard packaging water-repellent or grease-resistant. These materials can disrupt the production of paper/cardboard from recycled fibres. Furthermore, almost all PFAS have now been banned from food packaging in the Netherlands for food safety reasons. For more information, see the **KIDV dossier on Food Safety and Packaging**.

Biodegradable
Biodegradable polymers, even at low concentrations, can disrupt the mechanical PE, PP and mixed PO recycling processes and negatively impact the quality of the final recyclate, unless testing with PolyAl processing proves otherwise.

Oxo-degradable plastics
Oxo-degradable or oxo-biodegradable plastics are plastics containing additives that disintegrate into small pieces (microplastics) when exposed to ultraviolet light and oxygen. These additives can be added to all plastics. Oxo-degradable plastics are mainly used in carrier bags, but they can also be found in rigid plastic applications, such as straws. If oxo-degradable materials end up in recycling streams, they affect the quality of the plastic recyclate,

8 *Ace Design for Recyclability Guidelines*

Oxo-degradable packaging was banned in the Netherlands with the introduction of the Packaging Management Decree 2014. The European Union banned the use of oxo-degradable material in packaging covered by the SUP (Single Use Plastics) Directive with effect from 3 July 2021.

Silicones
Packaging with components made of elastomers and silicones, acrylates and other rubber-like plastics may disrupt the recycling process. The same applies to packaging used for products that contain silicones.

Elastomers such as silicones, acrylates and other rubber-like plastics are used for applications that require elasticity, resilience and tensile strength. They occur in packaging as closures, valves and dosing systems. These silicone parts can disrupt the recycling process if they end up in the recycling stream. Generally speaking, elastomers cause various types of damage, such as imperfections and defects in the surface of products made from recycled plastic.

Silicones can also be added to the material as a slipping agent during the production process. This reduces the friction coefficient and makes it easier to process the material. Silicones used as a slipping agent are not considered a packaging component, but a processing aid used to produce and fill packaging. They do not disrupt the recycling process and are not considered a disruptive substance.

3.4 Future developments

Nanofibres
Pilots are currently underway with beverage cartons in which a barrier layer has been created based on paper fibre with some additives. KIDV is closely monitoring this development and will share more information as it becomes available.

4. Labels, sleeves and prints

Most beverage cartons are printed and the use of labels and/or sleeves in combination with beverage cartons is therefore limited. Yet all three can have an impact on the sorting and recycling process:

Impact on sortability

Depending on the size of the beverage carton, surface coverage can affect the sorting process:

- If the carton can hold a volume of 500ml or less, a maximum of 50 percent may be made black or shiny by a label, sleeve or prints. If more than 50 percent, it becomes difficult to determine the type of material of the beverage carton and thus to sort it correctly, with the risk of it ending up at the wrong recycler.
- If the carton can hold a volume of more than 500 ml, a maximum of 70 percent may be made black or shiny by a label, sleeve or prints. If more than 70 percent, it becomes difficult to determine the type of material of the beverage carton and thus to sort it correctly, with the risk of it ending up at the wrong recycler.

Impact on recyclability

Different materials used in any labels or sleeves have different impacts on recycling. Certain combinations of materials used in the main component and label or sleeve are more difficult, or easier, to separate. Not all materials affect the quality of the recycling process to the same degree.

In the Recycle Check, the extent to which labels, sleeves or direct prints affect both sorting and recycling is determined one step at a time.

4.1 Influence of labels, sleeves or prints on sortability

Near-infrared (NIR) scanners are used to recognise the material of the main component.
It is important that the disposable unit is properly identified in this way. Besides size, there are other factors to consider:

- **A label or sleeve** made of LDPE or with a detectable varnish layer is correctly recognised and the disposable unit will be sorted into the correct stream to end up with the correct recycler. This is independent of its size.
- **A label or sleeve that must be completely removed to access the product** is a disposable unit (see Part I, Section 3). The material will not interfere with the sortability of the main component.
- **Small labels, sleeves or prints** do not affect the sortability of the disposable unit.

If the **labels, sleeves or prints are too large and made of a different material than the main component, or if they are black or shiny**, a sorting facility cannot identify the material of the main component. Consequently, the disposable unit may end up in the wrong material stream during sorting.



TIP
The National Circular Plastics Test Centre has developed a handy tool to determine the size of labels and sleeves relative to the main component. To assess the coverage ratio, always look at the most covered side of the disposable unit. Click **here** to go to the tool.

4.2 Influence of labels, sleeves or prints on recyclability

Printing
Using one of the following printing techniques is preferred: Off-Set, Flexo, Gravure and digital. Also avoid mineral-based offset inks, hotmelt-based digital inks and UV inks[9].

Use inks that comply with the **EuPIA** guidelines; these release fewer harmful substances into the residual stream after de-inking. However, the EuPIA guidelines provide no indication of how well inks can be separated from the materials.

Inks can have a major impact on recycling. They can disrupt the process due to foaming and gelling. They can also contribute to NIAS (non-intentionally added substances) which pose a safety risk to food contact materials. Much research is being conducted into the recyclability of inks. It is expected that this will lead to stricter regulations or design guidelines.



TIPS • The use of inks on beverage cartons, labels or sleeves:
- Minimise the use of inks, especially those based on nitrocellulose.
- Make sure that the inks and the labels can be separated from the material of the main component. Inks that dissolve in the washing water can precipitate on the target material during drying and cause discolouration.
- It is best to use laser coding when applying information directly to the main component.

*For more information, consult the **KIDV fact sheet on inks - printing on packaging**.*

Labels and sleeves
Any labels and/or sleeves will all go into the pulper. It is therefore important that these materials do not interfere with the production of new paper/cardboard from the recycled fibres and that they can be easily removed from the pulp.

Plastic labels and sleeves must be thicker than 7 µm, otherwise they cannot be sufficiently filtered out and may cause disruptions in the paper machine. The adhesive on labels must also not disrupt recycling. You can read more information about adhesives in Section 6.

4.3 Future developments

Bio-based
Fossil resources are generally used for the production of LDPE plastic layers. However, it is also possible to produce LDPE with biomass (e.g. sugar cane). This bio-based LDPE is also used in the production of beverage cartons. The properties of bio-based LDPE are identical to those of fossil LDPE and form part of the laminate in a similar manner[10]. LDPE can also be made from tall oil, which can be obtained from the resinous waste materials of the pulp and paper industry. The use of fossil raw materials can be reduced by using bio-based plastics.

9 Design Guidelines 4evergreen
10 Further information: Green Deal Green Certifications - Best practices.

5. Closures and other subcomponents

The rule of thumb in recycling is always: what has not been added need not be removed. If a disposable unit has no subcomponents, they cannot interfere. Disposable units that do have subcomponents have to be assessed to determine whether they are compatible with the material of the main component. If they are not, you will have to assess whether the main component and subcomponents can be separated to avoid any negative effects on recycling. When assessing recyclability, you have to factor in how all components can be processed.

More information about distinguishing between main components and subcomponents can be found in Part I, Section 3.

5.1 Influence of closures and subcomponents on recyclability

Subcomponent containing PE and/or PP-based material with a density <1 g/cm³

Caps and shoulders of beverage cartons are mainly made of PE or PP. These materials allow for easy sorting in the PolyAl recycling process and can be recycled for new applications, but they must first be separated from the LDPE and aluminium in the stream.

Subcomponent made of PE and/or PP with a density >1 g/cm³ and other plastics, such as PET, PS, PC or PLA

Materials with a density >1g/cm3 are more difficult to separate from the PolyAl and other PE and PP components. Subsequently, these rigid plastics cannot therefore be properly processed further by the recycler of the secondary stream, which mainly consists of PE and PP.

Flip-top lids made of PET, PS of PC

These flip-top lids are not permanently attached to the main component. It is very likely that the lids will be separated from the main component during collection and sorting. As a result, flip-top lids behave as separate disposable units and must therefore be treated as such (see also Part I, Section 3). This means that if it is printed, for example, the ink from the print will cause discolouration of the colourless transparent flip-top lid.

Closures containing disruptors such as PVC and PVdC

PVC (polyvinyl chloride) and PVdC (polyvinylidene chloride) used in packaging material disrupt the recycling of other plastics. When PVC enters the recycling stream of other plastics, e.g. as part of a component, it triggers an unwanted chemical reaction. Recycling equipment can get damaged due to the formation of hydrochloric acid. The same applies to PVdC, which is mainly used as a barrier in films.

Closures containing disruptors such as silicones and/or elastomers

Elastomers such as silicones, acrylates and other rubber-like plastics are used for applications that require elasticity, resilience and tensile strength. They occur in packaging as closures, valves and dosing systems. These silicone parts can disrupt the recycling process if they end up in the recycling stream. Generally speaking, elastomers cause various types of damage, such as imperfections and defects in the surface of products made from recycled plastic.

Loose straws

If a straw is used, it is usually discarded together with the beverage carton and therefore forms one disposable unit with the beverage carton. Make sure the straw is made of recyclable cardboard and use the **Disposal Guide logos** to ensure it is disposed of together with the beverage carton disposable unit. Also note the following points:

- If the straw is made water-resistant, it will be poorly recyclable.
- A sachet containing a straw is a separate disposable unit because it must first be pulled off the beverage carton before the straw can be removed.
- If the straw and/or sachet are made of plastic, they may fall under the **SUP Directive**
- If the straw is attached to the beverage carton with glue, ensure that (residues of) this glue do not disturb the recycling process. See also Section 6 on adhesives.

6. Glued-on labels, sleeves and other components

Beverage cartons use LDPE inner layers to seal seams. Such disposable units without adhesives are optimal with a view to their recyclability. If the disposable unit does feature glued-on labels, sleeves or other components, it has to be assessed to determine whether the adhesive used will affect the recyclability of the main component.

How subcomponents are glued to the main component plays an important role in eliminating potential risks in the recycling process:

- The type of adhesive used determines whether labels, sleeves or other components in the recycling process will detach properly from the main component for subsequent disposal.
- If the subcomponents can be detached, the adhesive should either be disposed of with the washing water or with the material of the subcomponents.
- If the subcomponents and main component are recycled together, it is important that the adhesive used does not affect the quality of the recycling process.

Most bonding in a beverage carton is achieved by fusing the LDPE layers together. If adhesives are used, such as for the bag with straw, minimise the amount.

Below is a list of adhesives.

Table 4. Adhesive use

Type of adhesive	Explanation	Effect on recycling
Water-soluble	Dissolves in the process water and can be separated via the water treatment system. Soluble chemicals must not have any adverse effects on the recycling process, product quality, the environment or employees	Not disruptive
Rigid curing	Stays rigid during the hot-wash process and therefore separates well during wet sorting. Soluble chemicals must not have any adverse effects on the recycling process, product quality, the environment or employees.	Not disruptive
Neither water-soluble nor rigid-curing adhesives, e.g. hotmelts	Although these adhesives are not optimal for the recycling process, they are still sorted.	Slightly disruptive
Hotmelts that melt below 68°C and smaller than 1.6 mm	Do not dissolve but are made viscous by the hot water, which greatly complicates separation in the recycling process. This type of adhesive, if strictly necessary, is best applied in one long line, rather than in small dots, so that it can be sifted out more easily.	Highly disruptive; these adhesives become sticky in the wet and hot recycling process. These stickies become sticky in the hot and wet recycling process and stay this way throughout. Despite the fact that the processing systems are equipped with various filters, they can penetrate deep into the recycling process and cause problems, such as tears in newly recycled paper.

Testing recyclability of adhesives

Glues and other adhesives that are approved for recycling according to EPRC can be used for beverage cartons. These adhesives will not interfere with recycling Any claims of recyclability will have to be proved with tests first.

7. Additional sources of information

Relevant organisations and links

KIDV

- KIDV Tools for Recycle Checks and Fee Modulation
- KIDV packaging glossary
- Recycle Check for paper and cardboard
- Disposal Guide

CEPI

The interest group for the European paper industry.

- Definitions
- Approved test institutes

4evergreen

A consortium of manufacturers, designers, brand owners, researchers and recyclers seeking to optimise fibre-based packaging for circularity and environmental impact reduction.

- Test Protocol
- Design For Recycling Guidelines
- Evaluation protocol

FBCA The Food and Beverage Carton Alliance

BCA is the result of the merger between ACE (The Alliance for Beverage Cartons and the Environment) and EXTR:ACT.

It is an association of beverage carton manufacturers and their suppliers that aims to expand and optimise collection and recycling.
In addition, they are looking for sustainable packaging solutions that improve food safety, reduce waste and promote low-carbon circular economies.

Test institutes for sorting:

- NTCP
- CHI
- Circpack



Netherlands Institute
for Sustainable Packaging
part of **verpact**

Contact
T: +31 (0)70 762 05 80
E: info@kidv.nl
W: www.kidv.nl
@kidv_verpakken
linkedin.com/company/kennisinstituut-duurzaam-verpakken/