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

Background document

Recycle Check Rigid Plastic Packaging 2026



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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.

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Netherlands Institute
for Sustainable Packaging
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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.

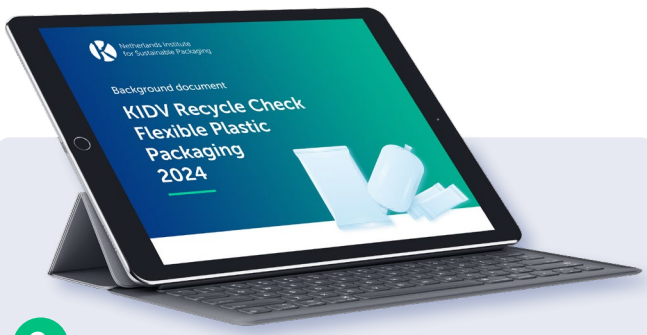
The Recycle Check consists of two parts:



1

The online Recycle Check checklist serves to assess the recyclability of the packaging (optimal recyclable, reasonable recyclable, Limited recyclable, 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.

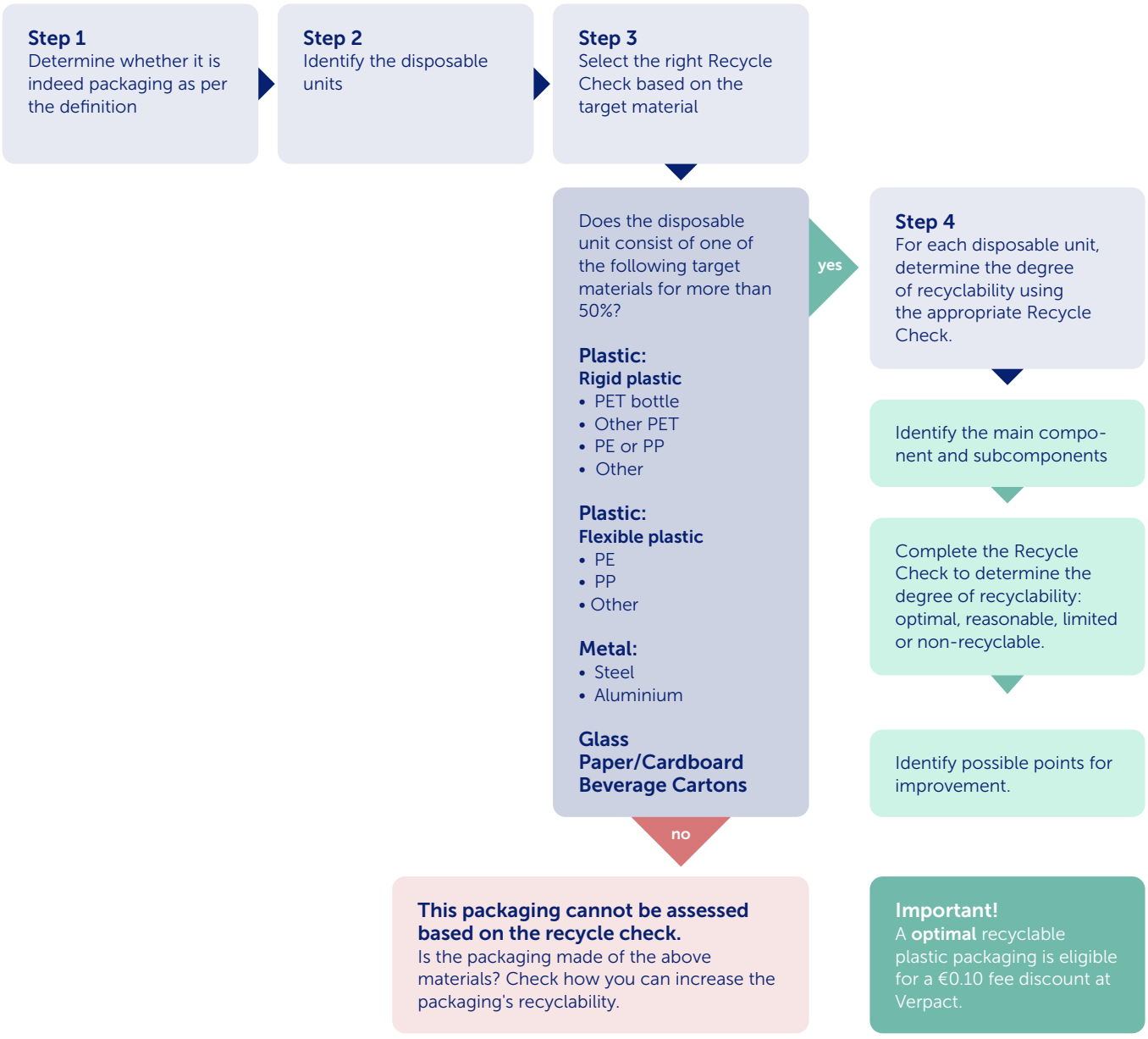
* The ideal composition of this stream varies per material and is explained for each material separately.

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.*

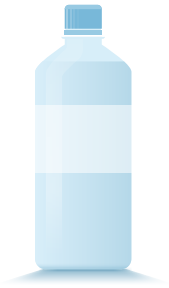
Packaging with fixed closure.



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



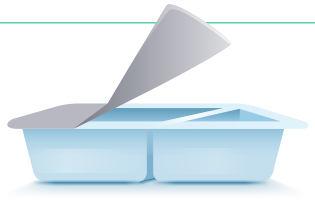
Multiple disposable units

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.



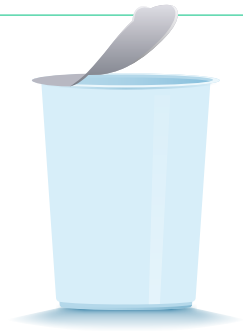
Multiple disposable units

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).

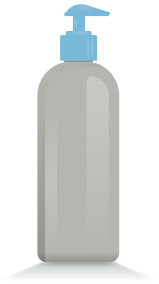
The types of material:

- **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

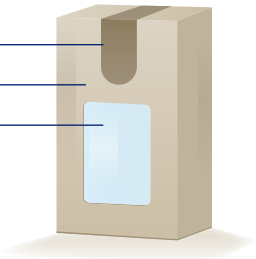
After choosing the appropriate Recycle Check to assess the recyclability of the disposable unit, the next step is to identify the **main component** and any **subcomponents**.

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**

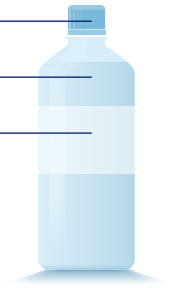
Subcomponent = tape
MAIN COMPONENT = box
Subcomponent = window



Single disposable unit

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

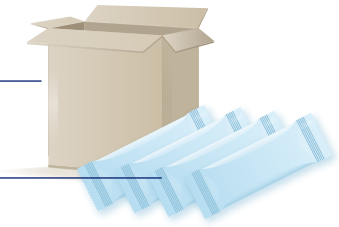
Subcomponent = closure
MAIN COMPONENT = bottle
Subcomponent = label



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

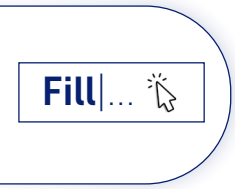
Secondary stream

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.

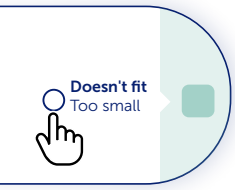
Step 3: Completing the checklist

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 a run-down 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 Rigid Plastic Packaging 2026

1. Introduction

Part II of this document provides background information to support the Recycle Check for rigid plastic packaging. 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 rigid plastic packaging is harmonised with Recycle Checks and guidelines developed by other countries and international organisations such as Plastic Recyclers Europe (RecyClass), PETcore Europe and European PET Bottle Platform (EPBP).

2. Collection and sorting

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

For definitions of all the terms used in this document, see the **Packaging glossary** on the KIDV website. A number of characteristic terms and definitions specific to rigid plastic packaging are explained below.

2.1 Definition of rigid plastic packaging

This Recycle Check is intended for rigid plastic packaging only. See Part I, Section 3 for more information about what constitutes packaging.

Rigid packaging is stiff packaging that cannot easily be crushed or crumpled up (even when empty).

Properties:
- The material of the main component is usually thicker than 180 µm.
- The packaging usually has the same shape before and after it is filled.



Figure 6. Examples of rigid packaging

2.2 Dimensions and shape of a disposable unit

Sorting facilities sort disposable units by size, in 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

Small disposable units, which can pass through a 3 cm round hole in the drum screen, are usually not recycled. This fraction is very difficult to sort further and contains a lot of contamination. Disposable units ≥ 3 centimetres are included in the fraction to be recycled.

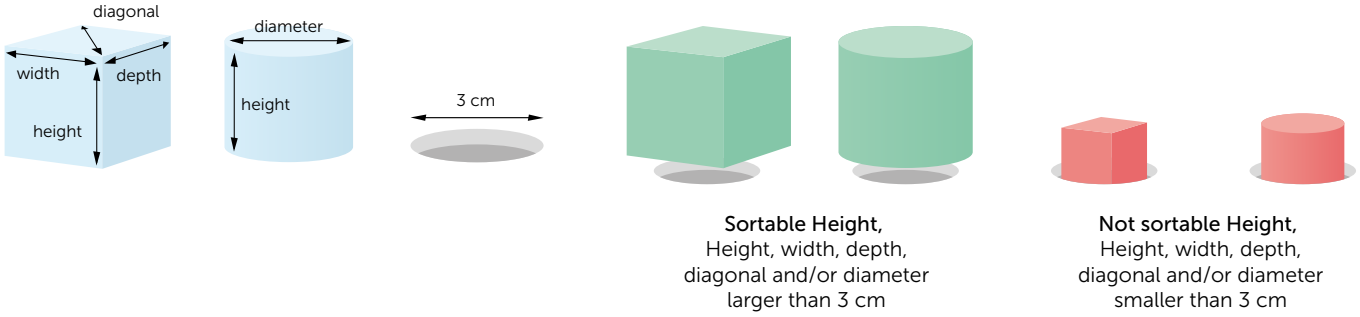
In some cases, the small fraction is post-sorted again in order to recycle small components made from high-quality raw materials, such as caps. In this process, sorters go on a targeted search for highly recyclable components. This makes it worth paying attention to the design of small disposable units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

Larger than 5 litres

If the volume of the packaged product is greater than 5 litres, the packaging is removed from the sorting stream and usually not recycled. It is worth noting that this type of packaging can usually be recycled as commercial waste.

Some waste sorters, especially those using post-separation techniques, cut up the incoming waste stream into smaller pieces, compacting oversized packaging so that it can be sorted. This is currently done on a small scale only, but once it becomes more widespread, this Recycle Check will be updated accordingly.

Figure 7. Packaging volume



Cylindrical/conical packaging

Cylindrical or conical plastic packaging, such as a bottle or jar, can pose a problem when sorting. During the sorting process, the packaging is transported over a conveyor belt, where near-infrared (NIR) technology is used to scan the packaging and blow it into the correct sorting stream by means of an air flow.

Cylindrical or conical shaped packages can start to roll on the conveyor belt and when blown out they often travel in unpredictable directions, preventing them from entering the correct sorting stream.

During collection, many packages are flattened in a so-called compactor truck. This is beneficial for the sorting process, as it prevents packaging from stating to roll on the belt. However, some packages cannot be compressed. This mainly involves smaller packages with a content of less than 200 ml. These must therefore be tested for compressibility.

For cylindrical or conical packages with a height greater than half their diameter, the package is likely to remain in place when moving along on the conveyor belt and not roll onto its side. This makes it easier to sort.



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. Different types of materials, coatings, fillers and additives all affect how well recyclers can process the material.

This section explains material structure and what this means in terms of recyclability. A distinction is made between main components of PET, PE or PP and other materials. This section also explains the difference between mono-materials and multi-materials.

3.1 Explanation of material structure of the main component

Mono-materials

Mono-materials are made of one type of polymer. This could be a layer made of a particular polymer or multiple layers made of the same polymer (e.g. two outer layers made of virgin plastic with an intermediate layer made of the same, recycled polymer).

Figure 8. Material layer



A mono-material does not contain any layers made of other materials. However, additions may have been applied to the material, such as prints, coatings, adhesives, fillers or additives.

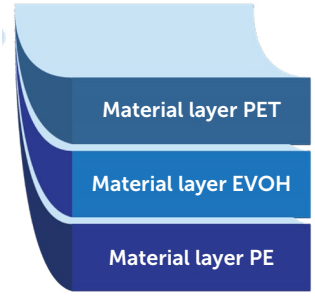
Figure 9. Material layer with addition



Multi-materials

Multi-material packaging consists of several layers that are combined by means of adhesives, coextrusion or lamination. It can also feature additions, such as a prints. The layers that make up a multi-material are very difficult or impossible to separate. Multi-materials come in different forms:

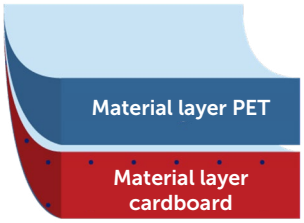
Figure 10. Multi-materials



Multi-materials consisting of layers of different plastics, e.g. combinations of PET and PE

Multi-materials made of different plastics affect recycling because the materials cannot be separated. When a combination of different plastics is introduced into the recycling process, it can be difficult to predict how the various materials will affect the material properties of the recyclate. Mono-materials are more predictable. In some combinations of multi-materials, the properties of the plastics are so far apart that they cannot be processed together, such as combinations of PET and PE.

Figure 11. Combination of multi-materials



Multi-materials consisting of plastic layers combined with non-polymer layers
Examples include packaging made from combinations of PP with a layer of cardboard, e.g. for frozen vegetables. Always use the Recycle Check for the material that makes up the greatest share of the packaging by weight (for more information, see Part I, Section 3).
The properties of these combined materials are usually so far apart that they cannot be recycled together.

Material layers

A material layer is a separate layer within packaging that consists of one main material or polymer type.
This layer:

- Generally has a thickness of more than 1 micrometre (1 µm = 10^{-6} m).
- Is applied to films via co-extrusion or lamination.
- Injection-moulded packaging can have multiple layers formed during multi-shot injection moulding or co-extrusion.
- Forms a functional material layer in itself.
- Is often used as a barrier layer or structural component in packaging.

Coatings

A coating is an addition to the surface of a material layer.
Properties:

- Usually has a thickness of a few nanometres (nm = 10^{-9} m).
- Does not form an independent material layer.
- Is often used as a sealing layer, printing, or surface treatment.
- May consist of vapour-deposited materials, adhesive layers or lacquers.
- Example: a thin seal coating on a tray to attach a release liner.

Fillers and additives

Fillers and additives are added to plastic to give it certain properties. The Recycle Check distinguishes between:

- Fillers and additives needed for the processability of the raw material or packaging material, such as *stabilisers*, antioxidants and solvents and substances that do not change the density of the material. These additives do not disrupt the recycling process.

- Examples of fillers that have a high impact on the density or properties of the material include minerals (e.g. lime or tallow for barrier properties), fibres (e.g. paper, glass or grass for added strength), mica (for a decorative pearlescent effect), *metal flakes* (for a decorative metallic effect) and iron oxide (for a decorative terracotta colour). Not all of these additions are plastics and they may have different properties, e.g. they may melt at different temperatures. These differences complicate the recycling process, e.g. because melt filters may get clogged. They may also affect the properties of the recycled material, making it less suitable as a raw material for the production of new packaging or products.

Barrier layers

Barrier layers are added to plastic to make the material less permeable, for example to moisture, oxygen, aromas or light. They can be applied as a coating, layer or additives in the material. Examples of barriers are EVOH, SiOx, AlOx and vapour-deposited aluminium. Not all of these additions are plastics and they may have different properties, e.g. they may melt at different temperatures. These differences complicate the recycling process, e.g. because melt filters may get clogged. They may also affect the properties of the recycled material, making it less suitable as a raw material for the production of new packaging or products

.

3.2 Influence of material composition on recycling

Main components of mono PET, PE and PP without additions that are optimally recyclable

A main component made of PET, PE or PP as a pure mono-material, i.e. without any additions such as coatings, barriers or additives, generally will not disrupt the recycling process. In plastic sorting installations, packaging is first sorted by shape (flexible or rigid), by material type (plastic, metal, beverage carton) and then by type of plastic. Rigid plastic packaging is sorted by identifying the main component and its constituent plastic: PP, (HD)PE or PET. This also includes bio-PE and bio-PET, as they have the same molecular structure as PE and PET, respectively.

Other plastics

Rigid plastic packaging that is not made of PE, PP or PET is sorted in a mixed stream. These types of packaging are not classified as highly recyclable. Examples include polycarbonate (PC), polystyrene (PS) and polylactic acid (PLA). These materials make up a relatively small percentage of the total volume of the household waste stream. As they are difficult to sort and recycle cost-effectively, this is not done on a large scale.

Bio-degradable disposable units

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.

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. If oxo-degradable materials end up in recycling streams, they affect the quality of the plastic recyclate, which makes them disruptors.

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 with effect from 3 July 2021.

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 a label, 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.

PVC is widely used in imported products and in transparent plastic boxes. It is also used in tamper-evident seals, e.g. on closures, in blisters or in sleeves around rigid packaging. PVC in applications other than packaging, also known as vinyl, is highly recyclable when processed as a separate stream. PVC recyclate is widely used and features in PVC sewage pipes, for instance.

Elastomers, silicones and other rubbery substances

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 are also used in packaging as anti-slip or heat insulation. After recycling, these materials cause irregularities and defects in products made from recycled material.

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. This does not disrupt the recycling process and is not considered a disruptive substance.

In the case of elastomers, an exception is made for TPO (Thermoplastic Olefin, based on PE or PP). TPO is a specific type of TPE (Thermoplastic Elastomer) which has only a limited impact on the recycling of PE and PP.

PETG

PETG is PET with modified glycol. The modified glycol in the main component of packaging ensures that the material crystallises less. During the washing and drying step in the recycling process, the modified glycol causes the material to become soft and sticky. This in turn causes blockages in the system further along in the process, which impedes the recycling of PET. The presence of PETG in recycled PET can also lead to defects in the end product. This is true for both transparent and coloured PET.

PETG is used for PET bottles, pots and blisters with sharp edges and corners.

PETG is also used in full-body sleeves. As these sleeves are removed during the recycling process, PETG used in sleeves is not considered a disruptor.

CPET

In the production of CPET, crystallinity is maximised to achieve better heat resistance. For thermoforming applications, agents are also often added to increase the rate of crystallisation and to achieve a uniform colour. This causes unwanted discolouration of transparent PET recycling. The material can be easily processed in the coloured PET stream.

How barriers, fillers and additives affect density

All materials have a specific density. Plastics such as PP and PE, for example, will float in water (density <1g/cm^3). Plastics such as PET, PS and PLA sink in water (density > 1g/cm^3). Recyclers make effective use of this property during the separation process with the help of a so-called sink-float tank. These tanks make it easy to separate e.g. PE and PET.

However, by e.g. adding gas bubbles to PET (foaming), the material's density is altered, causing it to float. As a result, the sink-float method loses its effectiveness and the PET will end up in the wrong material stream. In this example, the foamed PET will contaminate the PE stream. In contrast, adding talc or lime to PE and PP can increase their density, causing them to sink and contaminate the PET stream.

Figure 12. Layer of PET with fillers



The impact of additions can differ from one main component to the next. Tests have shown that PE and PP packaging containing EVOH is highly recyclable under certain conditions. When used in PET packaging, however, EVOH affects the colour of the recyclate.

3.3 Colour of the main component

Plastic packaging with no added colourants offers more possibilities in terms of post-recycling applications than coloured packaging. Colourless transparent packaging can be used to produce new transparent packaging. After recycling, white packaging can be used to produce new packaging in a variety of bright colours. Colourless and white packaging is therefore often recyclable for several cycles and can be used for new packaging.

Main components can be coloured in various ways, such as mixing a colourant into the base material (master batch). These colours can affect sortability and recyclability. To determine whether packaging is white or transparent, the KIDV has written a guideline together with FieldLab Circular Packaging. The colour guide is available on the **KIDV tools page**.

Coloured PET, PE or PP

Mixing plastics with uncoloured plastics causes discolouration. Discoloured material cannot be restored to its colourless or transparent state using conventional mechanical recycling techniques, thus limiting the possible applications of this material.

Extremely light-blue bottles, which are primarily used for water, are an exception, as they can be recycled with colourless transparent PET. Since the amendment of the **Packaging Management Decree** (1 July 2021), these bottles are subject to the deposit obligation and rarely end up in household waste.

PE and PP are also increasingly sorted by colour during recycling. Coloured material is still widely processed and sold. That is why, unlike with PET, no distinction is made between the recyclability of uncoloured and coloured material.

Opaque PET

Opaque PET is non-translucent and is often coloured white using e.g. titanium oxide, calcium oxide, calcium carbonate or tin oxide as a colourant. In large quantities, these colourants may interfere with the recycling process.

Opaque PET is not as common in the Netherlands as it is in France, for instance, where it is widely used for light-sensitive products such as dairy products. The colour causes cloudiness and discolouration in the rPET, so transparent PET is preferred. In France, opaque PET is sorted separately and recycled separately, as it is more common there.

Main components with Carbon black

The most commonly used sorting technique uses near-infrared (NIR) scanners, which analyse the spectrum of the reflected infrared light to identify different plastics. In packaging that is coloured black by carbon black (soot), the infrared light beam is not reflected properly, but absorbed. Carbon black is a cheap colourant that is commonly used to produce black and dark packaging. This prevents the NIR scanner from 'reading' the reflection. As the type of plastic cannot be identified, the disposable unit is not sorted (properly). This is especially true if the material of the main component is fully coloured. Likewise, there is a significant risk of sorting errors if the main component is printed black, if a black intermediate layer is applied or if a large of its surface is covered with a black label or sleeve. (Small) black lids or caps of a disposable unit and black text on labels do not affect detection, because the NIR scanner normally only scans the main component of the packaging. Since there is still sufficient surface area scannable for the NIR scanner and most of the target material is usually located in the main component, this does not pose any problems.

Some sorting systems are capable of detecting plastic with carbon black, but cannot yet sort plastic by material type. As the type of plastic cannot be identified, the packaging will end in the mixed stream. Although there are black colourants that affect the sortability of packaging to a lesser extent, the risk of sorting errors is still present. On top of that, black colourants have a major impact on the colour of the recyclate, limiting its future applications.



TIP

One advantage of black packaging is that it is easy to use in combination with recycled content. Carbon black is a cheap colourant and makes it irrelevant what colour the recycled material originally was. However, black packaging is less likely to be sorted and recycled properly after the next cycle. Non-black packaging is more likely to be sorted properly and therefore more likely to be recycled. If it is absolutely necessary to colour packaging black, make sure to use as much recycled material as possible.

3.4 Future developments

In the future, packaging will increasingly be sorted by colour. Very interesting examples have emerged of manufacturers separating packaging with a highly specific colour, so that it can be turned into new packaging with virtually the same colour. On top of that, various bodies are investigating the extent to which barriers, fillers and additives affect recyclability. The PPWR design guidelines are expected to provide more detailed insight into this. As soon as more is known, an update will be published on the KIDV website.

There are developments to make it possible to sort specific packaging using marks/codes on the packaging or using AI. This would make it possible to, for example, sort specific colours or non-food packaging into a separate stream. Such techniques are used to simplify the recycling process.

4. Labels, sleeves and prints

Labels, sleeves and prints can affect the recyclability of the disposable unit in the following two ways:

Impact on sortability
First, the size of the label or sleeve has an impact on sortability. In the event of a high coverage and a label or sleeve that covers all or most of the disposable unit, it will be more difficult to determine the material type of the main component. Depending on the material used for the label, sorters may be unable to sort the disposable unit into the correct material stream, which means it will end up with the wrong recycler.

Impact on recyclability
Different materials used in the label or sleeve 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. Paper labels, for example, are big disruptors of the plastic recycling process and should therefore be avoided as much as possible. In certain cases, the same is true for the inks used for direct prints. If these inks end up in the recycling process, they can significantly affect the quality of the recyclate.

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

Small labels and sleeves are easy to sort
Small labels or sleeves do not affect the sortability of the main component. Near-infrared (NIR) scanners are used to recognise the material of the main component. If the labels or sleeves are too large and made of a different material than the main component, a sorting facility cannot always identify the material of the main component. Consequently, the packaging may end up in the wrong material stream during sorting.

The figure below shows what percentage of the main component can be covered by the label or sleeve (the coverage), so that the NIR scanner can still recognise the material of the main component.
- For packaging with a volume < 500 ml, the label or sleeve may not cover more than 50% of the frontal surface.
- For packaging with a volume ≥ 500 ml, the label or sleeve may not cover more than 70% of the frontal surface.

Figure 13. Labels and sleeves size

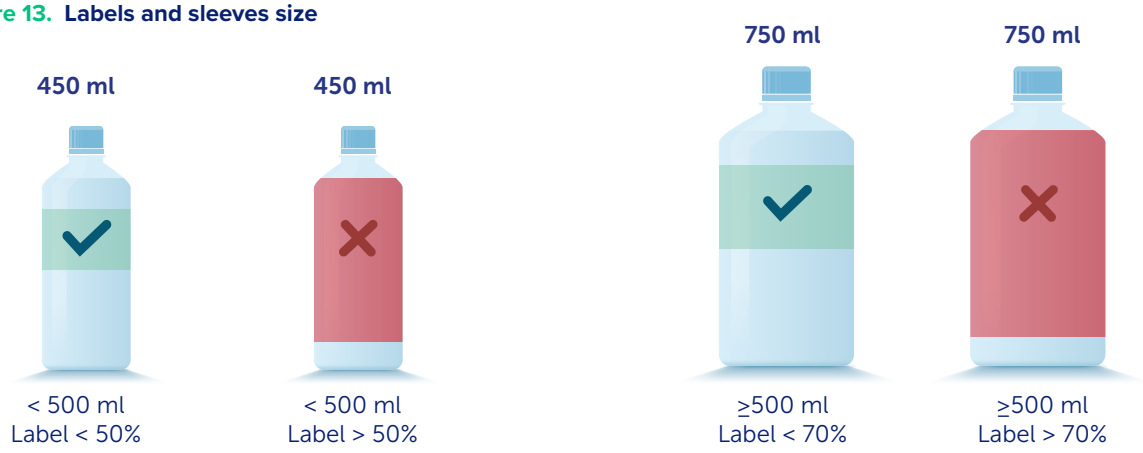
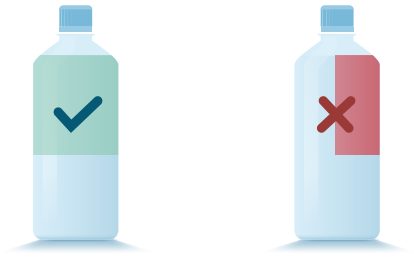


Figure 14. Labels and sleeves



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.

When determining the extent to which a label or sleeve covers the main component, the side of the packaging where the largest portion of the label is visible must be assessed.

Sortability of large labels and sleeves

The National Circular Plastics Test Centre (NTCP) and FieldLab Circular Packaging have extensively tested the sortability and recyclability of large labels and sleeves. It follows on from this that a disposable unit with a large label or large sleeve can be sorted **well** in the following situations:

- **A label or sleeve made of the same material as the main component** is correctly recognised and the main component will be sorted into the correct stream to end up with the correct recycler.
- **A label or sleeve that must be completely removed to access the product** is a disposable unit. The material will not interfere with the sortability of the main component.
- **A label or sleeve is made of PET, PS, PE or PP and does not form a barrier to light.** Tests show that NIR scanners can accurately determine the material of the main component through these sleeves, allowing it to be sorted properly.
- **It concerns labels or sleeves made of mono-material with a maximum thickness of 120 µm (0.12mm)**
- **It concerns direct printing.** Direct printing does not affect sortability (with the exception of large areas containing carbon black ink).

In the following situations, the label or sleeve **impedes** the sortability of a disposable unit:

- **The material of the label or sleeve consists of plastics other than PET(G), PS, PE or PP**
  Other plastics have not yet been properly investigated and it is not yet known to what extent NIR scanners can accurately determine the material of the main component through these sleeves.
- **The colour of the material of the label or sleeve and/or large areas in the print contain carbon black.**
  A large surface of carbon black is difficult to scan in the sorting facility; this often leads to sorting errors.
- **A shiny metallic layer covers large parts of the surface.**
  A large shiny surface with a high coverage (see Figure 13) is difficult to scan in the sorting facility.
- **Layers have been applied that are impermeable to light.**
  Large labels and sleeves with impenetrable light barriers, such as paper labels, interlayer applications of carbon black or metallisation, make it impossible for the sorting facility to determine the material of the main component, leading to sorting errors.

4.2 Influence of labels, sleeves or prints on recyclability

To ensure recyclability of disposable units with labels, sleeves or direct printing that can be properly sorted, one of the following factors must be met:

1. **It must be possible to separate the materials used in the labels or sleeves from the main component, or**
2. **It must be possible to recycle the materials used in labels, sleeves or direct prints along with the main component.**

Recyclers mostly prefer to be able to remove labels and sleeves. This ensures that the inks with the labels are removed from the target material. Inks can affect the recycling process and the final quality of the recyclate. If labels or sleeves can be separated from the main component, it is preferable that this separated stream can again be processed into a new raw material (Section 6 discusses in detail the role of any adhesives in the removability of labels or sleeves).

The following list explains how labels, sleeves and prints specifically affect the recyclability of various materials

PET packaging with...

...labels/sleeves made of PE/PP
PE and PP labels or sleeves (with a density <1g/cm^3) on main components made from PET are preferred, because they can be easily separated using flotation separation. PET will sink, while PE and PP will float in water.
The labels and sleeves separated from the main component can themselves be processed into a polyolefin blend (PO blend of PE and PP).

...labels/sleeves made of other plastics
Labels and sleeves made of other plastics, such as PET, PETG, PS and PE/PP with a density >1g/cm^3, are more difficult to separate from main components made from PET using flotation separation. While recyclers can use other methods to separate these materials from the rigid PET, such as zigzag wind shifters, there remains a risk that they are not removed sufficiently and that inks and non-PET materials disrupt the recycling process. The removed label material can subsequently be poorly recycled as a secondary stream, because these materials mix poorly with polyolefins, which removed subcomponents mainly consist of.

...foamed labels
Foaming a plastic, i.e. injecting gas bubbles into the material to alter its texture, changes its density and may therefore interfere with flotation separation. Foamed PET is easier to separate from a main component made of PET. However, foamed labels reduce the recyclability of the secondary stream due to PET and PE/PP combination.

...direct printing
Direct printing on PET packaging is bad for recyclability. When PET packaging with direct prints is recycled, inks are also drawn into the recycling process, where they end up discolouring transparent material. An exception is made for (small-size!) best-before dates printed on packaging, as long as they are printed directly on the PET, i.e. not on a fully printed background.

PE/PP packaging with...

...labels/sleeves made of PE/PP
PE and PP labels or sleeves (with a density <1g/cm^3) are preferred on main components of PE and PP. A label or sleeve made from the same material as the main component does not pose any problems. The recycler will separate the labels and sleeves as much as possible, in order to maximise the purity of the main component and remove any inks. The stream of PE and PP labels and sleeves is also suitable for further processing. The PE and PP recycling processes can accommodate small quantities of PE from labels in the PP stream, or small quantities of PP from the labels in the PE stream. PP in the PE stream is more critical, and should be limited as much as possible.
...in-mould labels
In-mould labels are applied to packaging and integrated into the main component by means of injection moulding. This eliminates the need for adhesives. This usually involves PP labels on PP packaging, but other plastics can be used as well.

The result is comparable to a directly printed packaging made entirely of PP. When determining recyclability, an in-mould label should be assessed as part of the main component, i.e. not as a removable label. In-mould labels with non-plastic layers or any fillers or additives should therefore be assessed as part of the main component with these additions. In that case, any prints are assessed as direct prints.

There are also removable in-mould labels; these are assessed the same as removable labels. In this case, this means that the removability must also be demonstrated in accordance with the label releasibility **test protocol**.

...direct printing
If a large area of the packaging is printed with colours containing carbon black, it may affect the sortability of the packaging The same restrictions apply as those for large black labels (see paragraph 4.1). Printing inks may affect recyclability and recyclate quality, Inks can react and produce unwanted substances in the recyclate. Since packaging with direct prints can be processed in the coloured stream of rigid PE and PP packaging, and because PE and PP are not yet recycled on a large scale with food safety in mind, they are still permitted. Paragraph 4.3 on 'future developments' explains that we expect the rules regarding direct prints to become stricter.

As indicated in the Tip at the end of this section: we recommend using as little ink as possible and avoiding large dark and black areas.

...foamed labels
Foaming a plastic, i.e. injecting gas bubbles into the material to alter its texture, will change the material's density. This may affect the flotation separation process, as foamed PET is more difficult to separate from the PE or PP of the main component.

...labels/sleeves made of other plastics
Labels and sleeves made of materials such as PS, PETG and PLA with a density >1g/cm^3 sink during flotation separation and are therefore easy to separate from main components made of PE or PP. Traces of these polymers can remain in the main component and may negatively impact the chemical composition of the recycled material. In addition, these materials cause the secondary stream (which is not a target material for the recycler) to be less recyclable, because these materials mix poorly with polyolefins, which removed subcomponents mainly consist of.



TIP • Ink use

- 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.
- Do not use bleeding inks. Inks that dissolve in the washing water can precipitate on the target material during drying and cause discolouration.
- Use inks that comply with EuPIA guidelines.*
- It is best to use laser coding when applying information directly to the main component.

** EuPIA-compliant inks release fewer harmful substances into the residual stream after deinking. The EuPIA guidelines provide no indication of how well inks can be separated from the materials.

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

4.3 Future developments

Raw materials used for subcomponents such as labels and fasteners are becoming increasingly important when assessing the recyclability of packaging. The focus is shifting from removing undesirable materials to isolate the main component to producing subcomponents from materials that can be recycled as a secondary stream in and of themselves. The secondary stream plays an important role in achieving the recycling targets of plastic packaging materials.

Inks have a major impact on recycling quality. They can disrupt the process due to foaming and gelling. They also contribute to NIAS (non-intentionally added substances) which pose a safety risk to contact sensitive materials. These are materials that may be used for packaging food, or products that are used on the skin, such as creams or ointments. Much research is being conducted into the recyclability of printed plastics. It is expected that this will lead to stricter regulations or design guidelines.

There is increasing attention for the use of adhesives on labels and sleeves. It plays an important role in removing unwanted materials during the recycling of the target material. More information on the impact of adhesives can be found in Section 6.

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. Packaging that does have subcomponents has 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 General effects

Enclosed metal parts

Metal parts, such as springs and ball bearings in soap dispensers or trigger sprays complicate recycling if they end up in the plastic stream after sorting. Other metal components, such as RFID chips (*Radio Frequency Identification*) also hinder recycling.

The fact that metal parts are not separated from the plastic may be because they are not magnetic, or due to other causes, such as being enclosed within or attached to the packaging. Alternatively, they may be so small relative to the packaging as a whole that they cannot be sorted into the metal stream using a magnet or eddy currents and end up in the mono-stream of PET, PE or PP instead. When that happens, the metal disrupts the shredding process and the further processing of the packaging by the recycler.

Non-plastic materials

There are many examples of non-plastic materials that are used in closures and other components attached to the disposable unit:

- Materials such as wood, which is sometimes used in decorative caps
- Paper or cardboard used for product information cards inside a blister
- Aluminium used in cover seals of bottles and trays

All these materials are undesirable in the recycling processes for plastic packaging. Materials that do not melt in the recycling process, for example, can clog the sorting filters, while paper fibres can burn, harming the quality of the recyclate. It is often difficult to remove these materials entirely during the sorting process, with paper fibres in particular sticking to the plastic. Similarly, parts of aluminium seals may stick to the adhesive edge of the main component and end up in the recycling stream after all.

Wooden, aluminium and paper or cardboard components are in any case undesirable, regardless of whether they come loose from the disposable unit, because they can contaminate the secondary stream, making it impossible to process this stream into new raw materials.

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.

PVC is widely used in imported products and in transparent plastic boxes. It is also used in *tamper-evident* seals, e.g. on closures, in blisters or in sleeves around rigid packaging. PVC in applications other than packaging, also known as vinyl, is highly recyclable when processed as a separate stream. PVC recyclate is widely used and features in PVC sewage pipes, for instance.

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 subcomponents as closures, valves and dosing systems. A cap, for example, can contain a silicone membrane as part of a dosing mechanism. 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.

TPO

An exception is made for the application of a TPO (Thermoplastic Olefin, based on PE or PP) part, such as a dosing valve in a PE or PP cap on a PET bottle. The cap is easy to separate from the target material PET in a flotation separation step. TPO is a specific type of TPE (Thermoplastic Elastomer) which has only a limited impact on the recycling of PE and PP.

PET packaging with...

...PE and/or PP-based material with a density <1 g/cm³
These subcomponents are made of other materials than the rigid PET of the main component. They have to be separated from the main component during the sorting and recycling process. This is easiest for subcomponents made from PP or PE. When the separated subcomponents are collected, they create a secondary stream of their own. For PP and PE materials, this residual stream is still easily marketable for the PET recycler.

...other plastics such as PET or PE and/or PP with a density >1 g/cm³
Materials with a density >1g/cm³ are not easy to separate from the PET of the main component. The recycler does have other techniques to separate these materials from the rigid PET, but there is still a high risk of any inks and non-PET materials disrupting the recycling. Subsequently, alternative plastics too cannot be properly processed further by the recycler of the secondary stream, which mainly consists of PE and PP.

...flip-top lids made of PET
Flip-top lids made of PET 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 just as separate disposable units and should be treated as such. This also means that printed flip-top lids can cause discolouration in the colourless transparent PET (see Part I, Section 3).

PE/PP packaging with..

...PE and/or PP-based material with a density <1 g/cm³
These subcomponents are made of other materials than the rigid PET of the main component. They have to be separated from the main component during the sorting and recycling process. This is easiest for subcomponents made from PP or PE. When the separated subcomponents are collected, they create a secondary stream of their own. For PP and PE materials, this residual stream is still easily marketable for the PET recycler.

...other plastics such as PET, PS, PC or PE and/or PP with a density >1 g/cm³
Several steps of the recycling process for rigid PE and PP packaging are designed to separate subcomponents such as caps, pumps and release liners from the main component. These materials have a different density than PE/PP and are therefore easy to separate. The resulting secondary stream, however, is not highly recyclable.

5.2 Future developments

It is becoming common practice to factor in the materials used for subcomponents when assessing the recyclability of packaging. The focus is shifting from removing undesirable materials in order to isolate the main component to producing subcomponents from materials that can be recycled as a secondary stream in and of themselves also. Adhesives also play an increasingly large role in this, as we are finding out more and more about how adhesives and inks affect recycling. More information on the impact of adhesives can be found in Section 6.

6. Adhesives

6.1 The impact of bonded subcomponents and labels on recycling

Disposable units without bonded labels or other components are optimally recyclable. In the case of bonded labels, sleeves or other subcomponents, it must be assessed to what extent the adhesive impacts the recyclability of the main component. Not only the adhesive itself, but also the material of the components and the inks used play a role.

Important factors:
- **Removability:** Subcomponents must be separated from the main component during the recycling process.
- **Disposability:** Adhesive residues must be disposed of together with the subcomponents. Soluble adhesives that re-adhere should be avoided.
- **Compatibility:** If subcomponents are recycled, the adhesive must not affect the quality of the recycled material.

There is still limited insight into the impact of adhesives on plastic recycling. Claims about recyclability must therefore be substantiated by testing. The Recycle Check focuses on the removability of subcomponents including adhesive.

6.2 Bonding of subcomponents to plastic main components

After sorting, the disposable unit is washed at a low temperature, shredded and cleaned with water and cleaning agents. These steps should ensure that adhesives and subcomponents separate from the main component.

It is essential that adhesive residue does not re-adhere during drying. Adhesives that are not removed effectively, such as solvent-based and heat seal adhesives, disrupt the recycling process and should be avoided.

6.3 Labels on release liners and deviating subcomponents

Labels on release liners or subcomponents made of a material other than the main component do not need to be soluble or washable, as they are separated together with those components. However, these labels must be made of polyolefins (PE/PP), so they remain recyclable in the secondary stream.

6.4 Assessment framework for bonding on PET main components

For PET disposable units, removability is tested according to the EPBP protocol. More information is available on the KIDV protocols page.

Assessment framework for a PET main component

Glued-on subcomponents e.g. labels, sleeves and closures. If the adhesive fails one of the following steps, it is classified as moderately recyclable by default:

Step 1 Use the specification to determine the composition of the main component, label and adhesive.
Step 2 Check with RecyClass, or your label supplier, whether the adhesives used have been approved under the EPBP protocol.
Step 3 If not, have the adhesive tested according to the EPBP protocol.
Step 4 If the test result is positive, change the answer on your checklist to *optimally recyclable*.

Requirements for bonding to PE or PP main components

For packaging to be easily recyclable, bonded components, such as labels, must be completely removable. In 2024, the NTCP developed a new protocol on behalf of the KIDV to determine whether labels can be removed during recycling. The following parameters are central to this:

- Friction during shredding and washing (important for removal)
- Water temperature and washing time (impact appears to be limited)
- Use of detergents (for glue and dirt removal)
- Drying process (preventing the precipitation of adhesive residues)

The protocol integrates all steps of the washing process and is representative for industrial recycling. The cold-wash method remains part of the protocol; hot washing is optional. (In the Netherlands, PE and PP disposable units usually undergo a hot-wash process.)

Release and assessment of combinations

A new disposable unit does not need to be retested if an identical combination of main component, label and adhesive has already been successfully tested previously. Identical means that all critical parameters of each packaging component match.

Critical parameters for PE/PP disposable units currently in effect

Main component:
- Base material (PE or PP)
- Production technology (blow moulding, injection moulding, thermoforming)
- Material thickness of the label surface (indicated in ranges)

Label, sleeve of subcomponent:
- Base material of the bonding layer
- Material thickness (indicated in ranges)

Adhesive:
- Manufacturer and type designation
- Type of adhesive
- Application pattern (full or in a pattern)

6.5 Assessment framework for bonding with PE or PP main component

A disposable unit containing a PE/PP main component and bonded subcomponents must be tested according to the disposal protocol. Test results are recorded in the public **Label Release Monitor** on the KIDV website. It includes a search function that can be used to find combinations with different critical parameters.

Assessment framework for a PE and PP main component

Glued-on subcomponents e.g. labels, sleeves and closures. If the adhesive fails one of the following steps, it is classified as moderately recyclable by default:

Step 1 Use the specification to determine the composition of the main component, label and adhesive.
Step 2 Consult the Assessment Framework on the protocols page for the removal protocol for labels on rigid PE and PP packaging to check which critical parameters must be tested.
Step 3 Check on the KIDV protocol page, or with your label supplier, whether the combination of main component, label and adhesive used has been approved according to the KIDV protocol.
Step 4 If not, have the adhesive tested by the NTCP, or check the protocols page to see if alternative testing agencies are listed.
Step 5 If the test result is positive, change the answer on your checklist to *optimally recyclable*.

More information is available on the KIDV protocols page.

Additional research

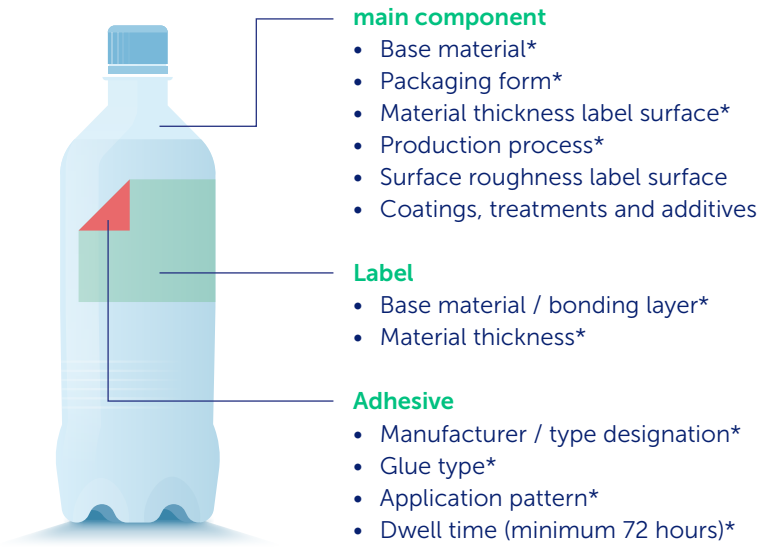
The KIDV, together with a consortium of supermarkets and brand owners, packaging manufacturers and research institutes, is conducting additional research into the removability of labels on rigid PE and PP main components. Additional parameters are examined to better determine whether they are critical for label removability:

- Surface roughness of the label surface.
- Material surface tension

Protocols are published for measuring these parameters.

Critical parameters for label removability

Figure 15. **Variables overview**



* Marked parameters must be displayed with the test results. Unmarked parameters are tested separately on behalf of the KIDV. Parameters that impact removability are marked as mandatory in the Recycle Check update.

More information is available on the KIDV protocols page.

6.6 Future developments

Internationally, there are many bodies that issue certificates for recyclable packaging. However, it is not always clear to what extent these protocols correspond to the Recycle Check protocol used by the KIDV. Therefore, it remains necessary to demonstrate the recyclability of packaging according to the protocol as indicated in the Recycle Check.

To avoid duplication of work and an unnecessary testing burden, the KIDV aims to further align its own protocols with those of other organisations in the future, such as RecyClass and CITEO, provided that these are representative of the Dutch situation. This harmonisation allows test procedures to be organised more efficiently. The most current agreements on this matter can be found on the protocols page of the KIDV website.

7. Additional sources of information

- KIDV Protocol overview
- KIDV Tools for Recycle Checks and Fee Modulation
- KIDV packaging glossary
- KIDV packaging policy and legislation
- Verpact Fee Modulation plastic 2.0
- Disposal guide

Checks and guidelines:

- RecyClass
  is a collaboration between recyclers and offers various tools to improve the recyclability of plastic packaging in the European market. In addition to an online tool, they publish test results and offer design for recycling guidelines.
- Ceflex
  Collaborative initiative representing the entire flexible packaging value chain.
- Circpack
  Veolia research institute for testing and optimising packaging solutions. The Veolia sorting facilities can be used for this purpose.
- Citeo
  French producer responsibility organisation.
- Cotrep
  French institute that develops design for recycling guidelines for plastic packaging.
- Cyclos-HTP
  German institute that can test and certify packaging materials, among other things.
- EPBP
  Formulates design for recycling guidelines for PET bottles.
- FH campus Wien
  Prepares annual recycle checks as well, but for the Austrian market.
- Fost Plus
  Belgian producer responsibility organisation.
- NTCP
  The National Test Centre for Circular Plastics operates a pilot sorting line plus washing facilities that can simulate sorting and washing processes. At the centre you can investigate how these processes and packaging concepts can be optimised.



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