Recycle Check

Packaging

2021 version

Netherlands Institute
for Sustainable Packaging

Colophon

KIDV Recycle Check for Glass Packaging version 2021

Netherlands Institute
for Sustainable Packaging

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This Recycle Check is updated when necessary. Please visit KIDV's website for the latest version. If you have any questions about the Recycle Check, please fill out the question form on our website. We will get back to you as soon as possible.

KIDV wishes to thank the branch organisations, producers and importers of packaged products and the sorters and recyclers of glass packaging for their input, which contributed to the realisation of this document.

KIDV has taken the greatest possible care in drawing up this document. Nevertheless, we would greatly appreciate it if you would let us know if the document is incomplete or incorrect in any way. KIDV assumes no liability for any damage resulting from or related in any way to the use of this document. KIDV also rejects any responsibility for claims made as a result of this Recycle Check.

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Reader's guide

The KIDV Recycle Check for Glass Packaging consists of a decision tree that helps to determine whether a packaging has good recyclability. It also explains why this is (not) the case.

Page 5 contains a brief introduction, followed by an overview of the conditions under which a packaging can be assessed using this Recycle Check.

Page 12 of this document contains the decision tree that helps you determine whether your packaging or disposable unit has good recyclability by answering a series of specific questions. You can jump to the explanation by clicking on the question.

The pages that follow provide an explanation for each question in the decision tree, along with a description of the current situation, background information and possible future perspectives. We recommend reading this explanation before answering the question in the decision tree.

Introduction

One of the things you as a company can do to package products in a sustainable manner is to improve the recyclability of your packaging. To assist you in this process, KIDV has developed a series of Recycle Checks. A Recycle Check consists of a decision tree with questions and background information, which you can use to determine whether a packaging has **good recyclability**.

This Recycle Check covers glass packaging. Other Recycle Checks are available for rigid plastic packaging, flexible plastic packaging, and paper and cardboard packaging. The Recycle Check for metal packaging is currently being developed.

The KIDV Recycle Checks concern packaging that come from household waste or similar streams, such as waste from the hospitality sector, offices, retail stores and service companies. Industrial waste that is not comparable to household waste is usually collected by waste management companies subject to separate agreements. In most cases, additional quality requirements apply in this stream. This Recycle Check therefore serves as a useful source of information for packaging that is disposed of in this stream after use, although additional requirements may apply. You can read more about packaging waste from businesses here (only available in Dutch). If glass packaging from industrial waste meets the requirements outlined in this Recycle Check, it is also deemed to have good recyclability.

The Recycle Check for Glass Packaging will be updated when necessary. Please visit KIDV's website for the latest version.

Definition

The purpose of the KIDV Recycle Checks is to help businesses make their packaging more circular. This is inspired by the vision of the Ellen MacArthur Foundation:

> *"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)*

KIDV has translated this into the following definition of packaging with good recyclability:

Packaging must meet four conditions to have good recyclability:
1. Packaging must be made of materials that can be collected or picked up by approved waste collectors.
2. Packaging 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. The reclaimed raw material has a clear composition and can be used to produce new packaging or products.

Producers of innovative materials must demonstrate that these materials are sufficiently collectable and sortable, compatible with existing industrial recycling processes or that sufficient quantities are available to develop new industrial recycling processes.

Based on: Ellen MacArthur Foundation 2015, Plastic Recyclers Europe 2018 and European Directive 94/eg/62.

The aforementioned definition was used in the creation of this Recycle Check and the decision tree (see page 12). The Recycle Check is used to determine whether a packaging has **good recyclability** according to this definition. Note that the decision tree does distinguish between packaging that has good recyclability and packaging that has limited recyclability or are even non-recyclable. The following categories are indicated using colour-coded boxes:

No glass container - These questions concern packaging that falls outside the scope of this Recycle Check (Glass Packaging).

No recyclability - These questions concern packaging that contains interfering materials. These are substances that interfere with the recycling process.

Limited recyclability - These questions concern packaging that has limited recyclability because it cannot always be sorted into the correct stream.

Adequate recyclability - These questions concern packaging for which a small step still has to be taken before it can be classified as having good recyclability. These packagings do end up with the recycler, but they negatively affect the quality of the recyclate or the effectiveness of the recycling process.

Good recyclability - These packagings have good recyclability according to the aforementioned definition used in the KIDV Recycle Check.

The Recycle Checks are based on the current system of collecting, sorting and recycling packaging materials as it exists in the Netherlands in 2021. The weighted average situation in the Netherlands as a whole is used: the Recycle Check is based on the techniques that are most commonly used by sorting and recycling facilities. Any exceptions, such as local situations and innovations, are mentioned where relevant, often under the header "future perspective." In drawing up this Recycle Check, the goal was to align as closely as possible with the recycle checks and guidelines used by other countries and international organisations, such as The European Container Glass Federation.

Multi-part packaging

A packaging may be disposed of in its entirety after use. There are also situations in which a packaging is disposed of in the form of individual components, sometimes even at different times. Depending on whether a packaging consists of one or more disposable units, it is possible to perform the Recycle Check for the packaging as a whole or for only one of its constituent components.

Disposable units

Example 1: bottle

A bottle with a cap and a label is disposed of all at once and therefore forms a single disposable unit.

Example 2: perfume packaging

A glass perfume bottle in a cardboard box, where the box is separated from the bottle of perfume before use. Ideally, the box and the bottle are disposed of as two separate units. The bottle forms a disposable unit that must be disposed of in the glass container. The box forms a disposable unit that must be disposed of as waste paper. This packaging therefore consists of two disposable units that are disposed of at different times and/or must be disposed of in different streams in order to be recycled.

It can sometimes be difficult to determine whether a packaging consists of one or more disposable units. The requirements for a packaging that consists of multiple disposable units are:

1. Consumers can easily separate the individual components of the packaging without the use of tools. Think of e.g. including a tear-away strip or edge;
2. The packaging contains clear instructions which indicate that the components of the packaging should be disposed of separately and how the user can separate the components. One solution is to use the Disposal Guide. If the contents of the packaging cannot be used without separating the different packaging components first, such instructions are not required.
3. Consumers generally separate the packaging components and dispose of them separately.

Compliance with the first two requirements is fairly easy to determine. Compliance with the third requirement can be demonstrated by studying users' behaviour in practice. If the contents of the packaging cannot be used without separating the different packaging components first, this is evident. Think of the tamper-evident seal on a jar of chocolate spread for example, which a consumer has to remove before being able consume the product inside. In other cases, e.g. a jar of vegetables with a cardboard promotional sleeve, a study can be conducted to determine whether consumers are disposing of the different packaging components separately. If that is not the case, the packaging is seen as a single disposable unit and the Recycle Check is performed for the packaging as a whole.

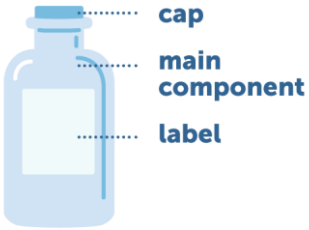
Main component of a disposable unit

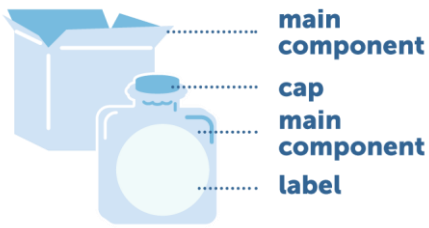
The main component of each disposable unit must be determined. The material the main component consists of determines which KIDV Recycle Check must be used for that specific packaging or disposable unit.

The main component is usually the largest component of the packaging and the material that encloses the actual product. When dealing with a glass bottle, for example, the bottle itself is the main component. The cap and the label are subcomponents.

Example 1: bottle

The main component is the bottle; the subcomponents are the cap and the label. The Recycle Check for Glass Packaging applies to packaging whose main component consists of glass.





Example 2: perfume packaging

A glass perfume bottle in a cardboard box. The glass bottle is the first disposable unit. The Recycle Check for Glass Packaging applies to this bottle. The bottle is the main component. The cap/atomiser and any stickers or labels are subcomponents.
The box is removed before using the perfume and it is therefore a separate disposable unit. The Recycle Check for Paper and Cardboard Packaging applies to the box. The box is the main component, any labels and adhesives (if applicable) are subcomponents.

Packaging that consists of multiple components and/or materials has a higher chance of not having good recyclability. In that case, the packaging's constituent components can be modified to improve the recyclability of the packaging as a whole. Another option would be to modify the collection, sorting and/or recycling technology being used in order to make the packaging recyclable.

Recycle Check for Glass Packaging

The decision tree on page 12 helps you determine whether or not a glass packaging has good recyclability. Per question, additional background information and an explanation are available. You can jump to the explanation by clicking on the question. Please read this information carefully before answering the question in the decision tree.

Below are a number of points of attention that you can also take into consideration, in addition to the recyclability of the glass packaging, to make the packaging more sustainable.

The environmental impact of chemicals and heavy metals in glass packaging

Chemicals and heavy metals can be added to glass to improve its properties or visual characteristics. One of the most common practices is adding lead to make crystal glass (see page 16). Other examples include the addition of substances such as fluorine (for opal glass), copper and cobalt (to make glass stronger or give it a certain colour).

These substances vaporise when incinerated, either in the waste processing facility or the glass oven itself. This vapour is harmful to the environment and must therefore be purified. When too many heavy metals end up in an oven, the effectiveness of the purification process is compromised and the harmful substances may be released into the natural environment. The substances can also harm the fireproof cladding on the inside of the oven.

The presence of chemicals and heavy metals sometimes has a negative impact on the lifespan of the glass ovens. However, these substances do not affect the recyclability of the glass itself. They are therefore not listed as interfering materials in this Recycle Check. The use of heavy metals in packaging is subject to certain limits (see the essential requirements, question 2 in the decision tree). This aspect should be taken into account to make packaging more sustainable and, if possible, minimise or avoid the use of these substances.

Diameter

Consumers can generally dispose of their glass packaging waste in glass containers. These containers usually have apertures with a diameter of 160 or 230 mm. If a bottle or jar cannot fit through this aperture, there is a high chance that the packaging will not end up in the correct waste stream. In that case, the packaging cannot be defined as recyclable according to the definition used by KIDV (see page 6).

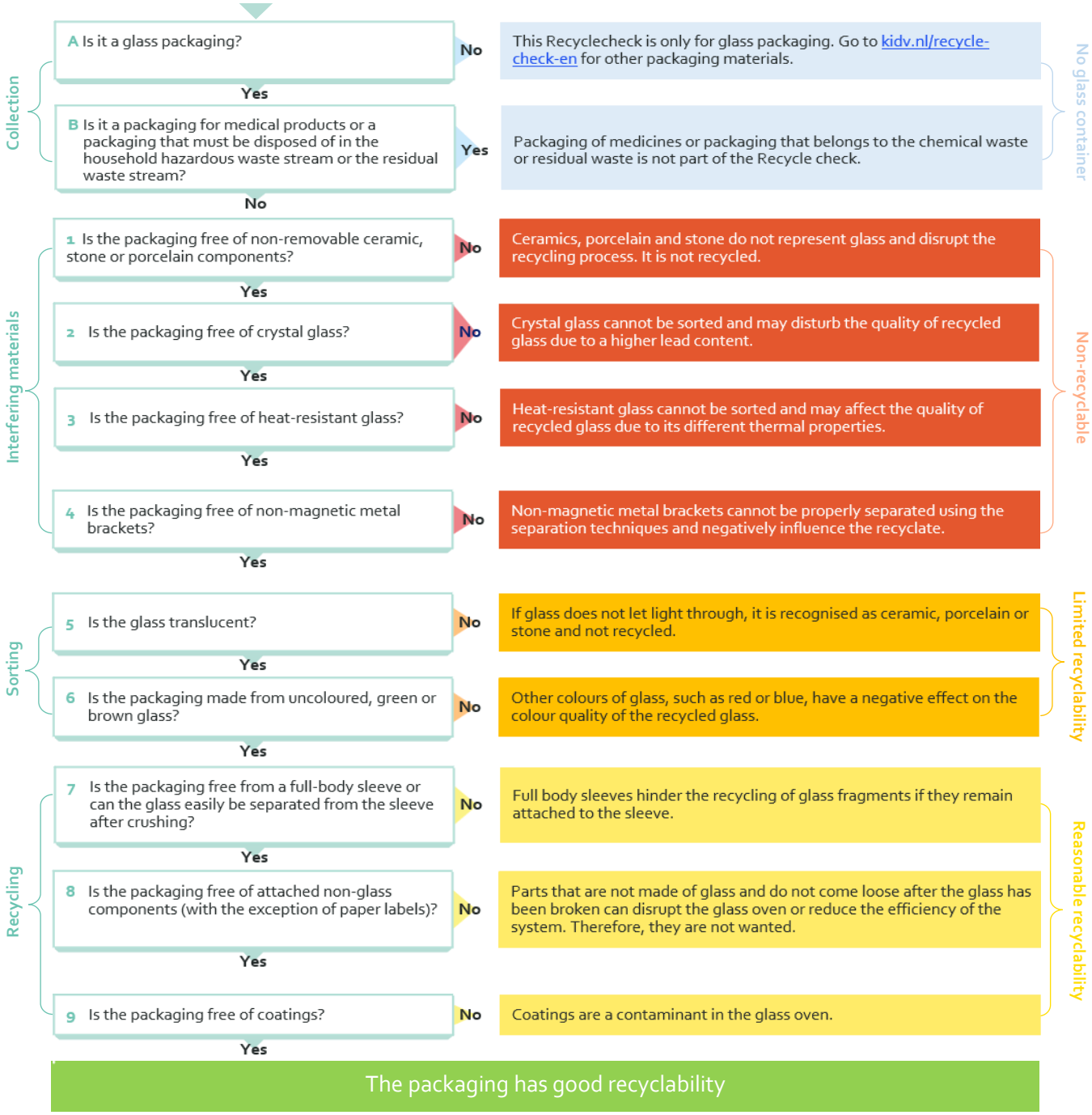
Coloured glass

Glass is produced in a range of colours. The most common colours are green, brown and uncoloured (transparent) glass. Depending on the processor, uncoloured glass may also be referred to as clear glass, white glass or flint. The commonly heard term "white glass" is sometimes used incorrectly: opaque white glass goes through a markedly different recycling process than transparent, uncoloured glass. This document therefore uses the term "uncoloured glass."

Caps, corks and lids

Consumers can dispose of the caps, corks and lids that come with glass packaging in the glass container alongside the glass itself, even though these components are not made of glass. Sorting facilities are designed to separate these components from the glass. The metal components are generally recycled. Materials such as plastic, paper and cork are generally incinerated with energy recovery.

Decision Tree Recycle Check for Glass Packaging



Explanation of the questions and answers in the decision tree

A Is it a glass packaging?

This Recycle Check is only intended for glass packaging.

Various types of glass packaging may end up as household waste. Think of beverage bottles for example, as well as jars and bottles for condiments or skincare products, such as deodorant rollers and perfume bottles. In general, consumers dispose of these types of packaging in the glass container, after which they are recycled. Caps, lids and labels may also be disposed of in the glass container alongside the glass packaging.

Glass objects such as tea and beverage glasses, oven trays and mirrors, as well as vases, (car) window panes and plexiglass (although technically not glass) are obviously not classified as packaging. Consumers are supposed to bring these objects to the municipal waste collection facility. They fall outside the scope of this Recycle Check.

Many consumers incorrectly believe that packaging made from ceramic, stone or porcelain can go in the glass container as well. Think, for example, of jugs for bitters or oven trays. However, these types of packaging and products belong in the residual waste stream and therefore fall outside the scope of this Recycle Check.

If you want to assess the recyclability of other types of packaging that are not made of glass, you can find our Recycle Checks for other packaging materials here.

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B Is it a packaging for medical products or a packaging that must be disposed of in the household hazardous waste stream or the residual waste stream?

Certain types of glass packaging fall outside the scope of this Recycle Check because they are classified as household hazardous waste or residual waste according to the Waste Separation Guide developed by Milieu Centraal, and consumers should therefore bring them to their local municipal waste collection facility. Think, for example, of packaging for medical products that is not processed together with the rest of the household waste stream. If your company wishes to have these types of glass packaging waste recycled, you can contact a glass recycler to discuss the possibilities.

Example
A glass bottle for face cream or a perfume bottle are not classified as household hazardous waste and can therefore be disposed of in the glass container, while a jar that contains some residual medical product, e.g. ointment, is seen as household hazardous waste.

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1 Is the packaging free of non-removable ceramic, stone or porcelain components?

Current situation
Ceramic, stone and porcelain, collectively referred to as CSP, are not glass and therefore behave differently than glass in a glass oven. The CSP fraction of the recycling of glass. The percentage of packaging that contains this type of combination of components is relatively small these days. However, it is still being used on a small scale. Think, for example, of the ceramic cap of a swing-top bottle.

Background
Contrary to most packaging materials, ceramic, stone and porcelain, once fired to give them their desired shape, are no longer plastically deformable.
Ceramic and porcelain are made from different compositions of clay and metal oxides and/or salts. The exact composition of these raw materials differs depending on the application. Contrary to glass, the materials cannot be melted down after being fired. If ceramic and porcelain residue are not intercepted during the waste separation process, they will interfere with the production and recycling of glass.

If ceramic, stone or porcelain are disposed of in the glass container and are not removed from the glass stream during sorting, the residues will negatively affect the quality of the new glass made from the glass recyclate. These residues, so-called inclusions, cause weak areas to form in glass packaging. As a result, the new glass may crack or break when subjected to stress, for example during the filling process in the factory or due to shocks during transport.

At the glass recycling facility, the glass packaging material is broken down, cleaned and separated from contaminants using a series of sorting steps. To determine whether the pieces of packaging material on the conveyor belts in the sorting facility are glass, their translucency is assessed. During this step, the CSP fraction is separated from the glass. Despite this sorting step, ceramic, stone or porcelain fragments in this stream, as individual pieces or as part of a glass packaging, may end up in the oven and they are therefore seen as interfering materials.
If the contaminants are not separated from the glass packaging during the crushing stage, there is a high risk that they will eventually reach the glass oven and end up in the new glass as inclusions.

Future perspective
No changes or new developments are expected in the near future.

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2 Is the packaging free of crystal glass?

Current situation
Crystal glass (also known as leaded glass) is unwanted in the recycling of packaging glass. The high concentration of lead reduces the melting temperature of the glass. Furthermore, lead affects the refractive index, shine and hardness of the glass. As a result, the glass behaves differently in the ovens when it is added to new glass for recycling.

The higher concentration of lead is also unwanted in the new glass. It may accumulate and exceed the legal maximum quantity of lead in packaging, as specified in article 2 of the Packaging Management Decree 2014 (only available in Dutch).

Background
An example of crystal glass packaging would be deluxe decanters for water or alcoholic beverages. When this glass ends up in the glass recycling stream, it is difficult to sort and acts as an interfering material during the rest of the recycling process.

As a result of the different melting point, refractive index and hardness of crystal glass, it is difficult to create a homogeneous mixture out of packaging glass and crystal glass. Weaknesses may form in the newly produced glass, which can cause it to break. This can result in safety issues in the glass factory. Crystal glass is therefore classified as an interfering material.

In the production of packaging glass, the average quantity of lead measured over a one-year period may not exceed 200 ppm. This is specified in European Directive 2001/171/EC, which is included in Dutch legislation in the form of the aforementioned Packaging Management Decree, article 2. To ensure that the quantity of lead in glass does not exceed this legal limit, crystal glass is avoided in glass recycling.

The glass is pulverised and samples are taken to determine whether the maximum legal quantity of lead is being exceeded. If the fraction contains any crystal glass, the batch will generally be rejected.

Future perspective
No changes or new developments are expected in the near future.

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3 Is the packaging free of heat-resistant glass?

Current situation

Heat-resistant glass, which has a significantly higher melting point than packaging glass, is made by adding borosilicate during the production of glass. Borosilicate is better able to withstand large temperature differences, making the glass suitable for applications such as oven trays and tea glasses. Heat-resistant glass disrupts the recycling process due to its abnormal melting behaviour and is therefore classified as an interfering material. As a result, the use of heat-resistant glass in packaging is not advised. Think, for example, of glass trays containing crème brûlée, which consumers bake in their oven at home.

Background

When heat-resistant glass is mixed with packaging glass during the glass recycling process, it is difficult to sort the stream. Due to the higher melting point of heat-resistant glass, it will not melt (completely) at the temperature at which packaging glass melts. This can result in weak areas in the newly produced glass, which can cause the new glass to break. This can result in safety issues in the glass factory. Heat-resistant glass is therefore classified as an interfering material.

Future perspective

No changes or new developments are expected in the near future.

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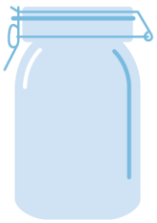
4 Is the packaging free of non-magnetic metal brackets?

Current situation



Non-magnetic metal components can be sorted during the sorting process using the eddy current technique. For this to work, it is important that the metal components are separated from the glass when it is broken down in the crusher, so they can be effectively removed from the glass fraction. Brackets are difficult to separate as a result of their shape, weight or the alloy they are commonly made of.

Background

All glass packagings, including those that contain non-glass components such as labels, metals and corks, are broken down and sent through the sorting facility on a conveyor belt. Various sorting techniques are used to remove unwanted components and parts from the glass stream.
Non-magnetic metals are detected using the eddy current technique. The electrical field generated by the eddy current gives non-magnetic metals a magnetic charge so they can be removed from the glass fraction with a magnet. If these non-magnetic metals are too heavy, such as brackets made from a non-magnetic alloy, the magnet cannot remove the metal and it remains behind in the glass fraction.
If the metals reach further stages of the production process of the new glass, they can negatively affect the quality of the new glass in various ways. The metals can get caught in the machines or cause leaks at the bottom of the glass oven. Furthermore, harmful substances may be released from the metals in the glass bath. These substances are vaporised and have a negative environmental impact if they end up in nature.

One example of non-magnetic metals that are added to glass packaging would the aluminium (screw) caps on wine bottles. However, these can easily be sorted[1] due to their light weight.
Magnetic metals, such as lids on jars of vegetables, can be sorted with a magnet and therefore pose no problem during the glass recycling process.

Future perspective

No changes or new developments are expected in the near future.

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[1] *To stimulate the collection of glass packaging, lids and caps are allowed in the glass container. Read more on page 11.*

5 Is the glass translucent?

Current situation

During the sorting process, the glass is sorted using optical waste separators to remove all ceramic, stone and porcelain from the stream. Opaque glass is incorrectly seen as an interfering material and removed from the stream alongside ceramic, stone or porcelain.

There are various reasons why glass may seem opaque:

- if the walls are too thick and/or the colour of the glass is too dark,
- if it has a non-transparent coating,
- if it has treated with a chemical process (e.g. chemical etching, also known as frosting).

Opaque glass is removed from the glass stream and therefore not recycled further. When opaque glass reaches further stages of the glass recycling process, it can negatively affect the colour quality of the new glass.

Background

Walls too thick and/or colour too dark

The optical scanners cannot recognise glass as such if its walls are too thick or if its colour is too dark. Think of e.g. black glass, very dark brown glass or purple glass. Similarly, the bottom of a heavy bottle (e.g. a champagne bottle) may be so thick as to be insufficiently translucent.

A coating

If the glass is insufficiently translucent because of its coating, the scanners will not recognise it as glass. Think, for example, of a beer bottle made to look like a jug by adding a special coating. Some types of coating do not affect the translucency of glass, although they do affect its recyclability. Read chapter 9 for more information.

Chemical processing

Certain chemicals can be used to change the appearance of glass. For example, acid can be used to create a frosted appearance by etching the surface of the glass. If such a treatment affects the translucency of the glass, it will no longer be optimally recyclable.

Future perspective

Research is being conducted to determine whether darkly coloured glass can be separated from the ceramic, stone and porcelain fraction by looking at the chemical composition of the material. That would make it possible to recover recyclable glass from the CSP fraction. It is unclear when this technique will be ready for practical application.

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6 Is the packaging made from uncoloured, green or brown glass?

Current situation
The Dutch glass recycling system is designed to process three colours: uncoloured, green and brown glass. Other colours must be blended and are therefore less desirable.

Background
A large percentage of recycled glass is used in the production of new glass. This recycled glass is sorted by colour and then melted down to make new glass. Despite the fact that used glass is first sorted by colour, colourants have to be added to the new glass to create the desired colour. Changing the colour of glass (recolouring) is a costly process. For that reason, the three most commonly used colours (uncoloured, green and brown glass) are used as much as possible. It is not profitable to collect differently coloured glass separately and melt it down in separate ovens. Instead, the other colour fractions are mixed in with the existing colours to a limited extent.

On average, packaging glass produced in the Netherlands consists of 25-92% recycled glass shards. The percentage depends on the colour of the new glass:

- Uncoloured glass: 25 – 60%
- Green glass: 85 – 92%
- Brown glass: 70 – 85%

Depending on the colour stability of the recycled glass, the exact percentages may be higher or lower. A higher percentage of glass shards can be used in the production of brown glass, because the brown colour is more stable and darker. It is easier to add blue or red glass without significantly affecting the colour of the new glass. For uncoloured glass, this margin is much smaller and contaminants are much easier to see, which can result in the entire batch being rejected.

If too much of a different colour ends up in a glass mixture, this can result in a colour deviation (a light-green or light-blue hue) in the new glass. According to the Recycle Check, this glass is then deemed to have "limited recyclability." The glass will have to go through a complex decolouring process to give it "good recyclability."

Differently coloured glass can be recycled in small quantities if it is carefully mixed in with the stream of glass recyclate that goes into the ovens. Due to its heavy colouring, black glass poses additional problems during this process. It is rarely suitable for recycling, because it is almost guaranteed to negatively affect the colour quality of the new glass.

Future perspective
The streams of differently coloured glass are not expected to become large enough to separately collect every colour (e.g. red or blue) and colour it in separate ovens. At the moment, the different colours are added to the streams of green and brown glass in small quantities for recycling, without this affecting the colour quality of the new green or brown glass.

Furthermore, research is being conducted to determine whether black glass can be separated from the ceramic, stone and porcelain fraction by looking at the chemical composition of the material. It is currently unclear when this technique will be ready for practical application.

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7 Is the packaging free from a full-body sleeve or can the glass easily be separated from the sleeve after crushing?

Current situation

In the glass container and/or at the sorting facility, glass is broken down into shards. If the glass is covered by a full-body sleeve, there is a significant chance that the glass will not break enough or remains enclosed in the sleeve. In the latter case, the glass is not recognised as such in the sorting facility and it will end up in the non-glass fraction together with the sleeve. This (part of the) glass will therefore not be recycled.

Making sure that the residual stream can be processed further is not a glass recycler's main responsibility. Metals can be sent off to be recycled further, but the other residual streams (e.g. plastic, paper, cork, ceramic, stone or porcelain) are sent to the incinerator.

Background

A full-body sleeve increases the odds that glass will not be sorted and recycled. This problem can be solved by making sure during the design process of the packaging that the glass can easily be separated from its sleeve and therefore will not remain attached to or enclosed in the sleeve during sorting. This can be done by leaving the underside of the sleeve open, by using an adhesive - if one is needed at all - that is easy to remove or by adding a perforated edge to the sleeve, which ensures it will tear open more easily during the glass crushing process.

Future perspective

No changes or new developments are expected in the near future.

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8 Is the packaging free of attached non-glass components (with the exception of paper labels)?

Current situation

This question can be divided into two options:

1. The non-glass components remain attached to the glass and end up in the oven, where they contaminate the glass bath and are therefore undesirable.
2. The non-glass components remain attached to glass shards, which means these shards are removed from the recycling process alongside non-glass components. This compromises the efficiency of the glass recycling process.

Example 1

A high-end bottle of liquor or an expensive bottle of perfume contains a decorative metal seal. This seal is not separated from the glass and ends up in the oven. The decorative seal is incinerated and leaves behind a layer of ash inside the oven, which disrupts the recycling process and contaminates the glass bath. Although this will not have a negative impact on the quality of the new glass, such contaminants are unwanted in the glass recycling process.

Example 2

A self-adhesive transparent plastic label remains attached to the glass. The NIR scanner recognises the plastic but not the glass that is still attached to the label, which is therefore sorted into the plastic stream. As a result, the recycler loses a percentage of the glass with good recyclability.

Background

During sorting, the glass is broken down into shards and cleaned using a dry washing process. In a rotating drum, the glass is subjected to friction to separate non-glass components such as labels from the glass. After "washing," the material ends up on a conveyor belt and goes through a number of sorting steps. If the non-glass components are not separated from the glass, the sorting process is obstructed.

Non-glass components can generally be separated from the glass stream using NIR scanners, optical scanners, cyclone shifters, magnets and the eddy current technique. If these components are detached from the glass, they can be separated. If they remain attached to the glass, however, they may end up in the glass oven or cause the glass to be removed from the glass stream alongside non-glass components.

Future perspective

No changes or new developments are expected in the near future.

Design advice

When designing a glass packaging, add as few non-glass components to the design as possible to minimise the risk of disrupting the recycling process. If non-glass components have to be added, make sure these components can easily be separated from the glass stream using eddy currents, magnets, a cyclone shifter or a NIR scanner. Confer with the glass recycler to identify the points of attention. Make sure that the non-glass component is separated from the glass and has sufficient volume to be sorted.

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9 Is the packaging free of coatings (with the exception of cold-end and hot-end coatings)?

Current situation
Coatings can alter the appearance of glass to such an extent that it is no longer recognised as such during the sorting process. Think of e.g. a coating to make a glass bottle look like a stone jug or to make the bottle less translucent. In this case, the glass will end up in the CSP fraction (ceramic, stone and porcelain) and will not be recycled further. These coatings are covered in question 5 of the decision tree.

Some coatings do not prevent the system from recognising glass as such. Think, for example, of a coating that is added to alter the colour of the glass. In that case, the glass will make it through the sorting process as intended, but the coating will contaminate the glass bath. This can have a negative environmental impact if the contaminants are vaporised and not properly purified.

Coatings that **do not** fall into these categories are cold-end-coatings and hot-end-coatings. These coatings are added to glass during the production process. They are designed to reinforce the glass and reduce the risk of breakage.

Background
If the coated glass ends up in the glass oven, the coatings, which are often made of plastics or using heavy metals, act as contaminants during the production of new glass. Heavy metals used to change the colour of glass, such as aluminium or cobalt, may affect the fire-proof characteristics of the oven or vaporise and possibly end up in the natural environment.

Future perspective
No changes or new developments are expected in the near future.

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Additional aspects of improving sustainability

Tips for sustainable packaging

By law, packaging is required to meet 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.

KIDV has drawn up seven tips that outline the key points of attention for more sustainable packaging. Recyclability is one of these aspects; it is covered in tip 4: *Create a clean material stream that has good recyclability.* Even during the design stage of a product-packaging combination, it is important to keep the phase during which the packaging becomes waste into account and make sure it is suitable for collection, sorting and recycling. It helps (tip 7) to inform consumers about how to properly dispose of the empty packaging, e.g. by adding logos from the Disposal Guide to the packaging. Tip 5 is about the use of recycled content, whereby you can contribute to the closing of the cycle.

You can download KIDV's seven tips for sustainable packaging here.

Due to the properties of glass, glass packaging is highly suitable for reuse, e.g. with the help of a deposit scheme. When developing your concept, you should consider the possibilities for reuse of your packaging.

Sustainable Packaging Compass

KIDV's Sustainable Packaging Compass consists of three complementary modules that illustrate the recyclability, circularity and environmental impact of a packaging. They not only indicate whether a packaging is recyclable, but also the extent to which it is circular. Furthermore, the tool offers an indication of the packaging's environmental impact.

Businesses can use this information to compare different (types of) packaging and assess their respective performance in relation to the various sustainability aspects. This helps them define targets for making packaging more sustainable and measure the effects of their packaging optimisation efforts. This tool can be found here. At the moment, the tool can only be used for rigid and flexible plastic packaging. KIDV is currently working to make the tool available for glass packaging as well.

Training programmes

Do you need help to get started on making your packaging portfolio, packaging or strategy more sustainable or have you already begun this process and could you use some fresh insights? KIDV offers training programmes that provide theoretical and practical insight into the world of sustainable packaging. This programme is based around KIDV's knowledge and tools, such as KIDV's Five perspectives on sustainable packaging® model and the Recycle Checks. The programme is complemented by relevant current themes and practical examples. You can use the acquired knowledge and skills to help you formulate a strategy to make your packaging more sustainable and to apply our practical tools in your own professional practice. More information can be found here.

The State of Sustainable Packaging

This KIDV publication offers a strategic perspective on the collaboration and innovations needed when it comes to sustainable packaging in the short, medium and long term. The State of Sustainable Packaging offers a strategic perspective on the necessary collaboration and innovations with regard to sustainable packaging. The publication identifies the social and economic bottlenecks that stand in the way of sustainable packaging. To tackle these bottlenecks, KIDV has developed a strategy with three innovation tracks that offer short-, medium- and long-term effects. These range from more and better recycling, which has already been achieved in some countries, to increased circularity and ultimately to intrinsic sustainability.

More information

If you have any questions about the Recycle Check or about making your packaging more sustainable, please contact KIDV. You can also find more information about making packaging more sustainable in the KIDV model 'Five perspectives on sustainable packaging'.

Glossary

Multi-coloured glass	A mixture of coloured glass shards.
Coating	An addition to the surface of the glass after shaping the packaging. A coating may be added to improve the strength of the glass (i.e. cold-end and hot-end coating) and/or to change its appearance (e.g. to change the translucency of the glass or add a colour).
Cold-end coating	This coating is always applied during the production of glass packaging. It makes the glass smoother, thereby reducing the risk of damage. The packagings will slide alongside each other and alongside the rails of packaging lines more easily. After going through the cooling oven, a compound is added to the glass at a temperature of 100 to 200°C using a spray or vapour deposition. This can be done using many different substances. These substances can be divided into two main categories: - Water-soluble substances (such as oleic acids). These will be effectively removed from the packaging after one or two rinsing cycles. - Non-water-soluble products (such as wax, paraffin and polyethylene) that are added using a water emulsion. The potential downside of these products is that the adhesive used to attach labels may, for example, not form as strong a bond.
Glass bath	The glass bath is the part of the oven where the glass is melted down.
Heat-resistant glass	Heat-resistant glass (also known as safety glass) is made by adding borosilicate to the glass. This changes the thermal properties of the glass and allows it to withstand greater temperature differences without cracking. Examples include heat-resistant laboratory glass, oven trays, stoves, the glass used in the doors of washing machines and microwave ovens and glass pan lids.
Hollow glass	Bottles, jars, bowls and glasses are examples of hollow glass, also known as packaging glass. Hollow glass generally comes from municipal waste collection, waste collection facilities, the food service sector and retailers.
Hot-end coating	This coating is always applied during the production of glass packaging (shortly after the packaging comes out of the mould, when it is still hot) and reduces the loss of strength that may occur during the production process. Tin or titanium oxide is added to the glass using vapour deposition at a temperature of circa 700°C, before the glass goes into the cooling oven. The tin or titanium oxide forms an unbreakable chemical bond with the glass. This bond is formed in areas with high surface tension, where microscopic damages have occurred.
CSP	Abbreviation of ceramic, stone or porcelain. A collective term used for interfering materials in the glass recycling process.
Crystal glass	Glass that contains a high concentration of lead. It is used to make decanters, wine glasses or TV glass. The addition of Pb_2O_3 (lead oxide) lowers the melting point of the glass and increases its refractive index, shine and hardness.
Opaque/opal glass	White, non-translucent glass. It is made by adding fluorine to the glass.

Optical separators/NIR scanners	When sorting waste streams, optical separators are used to distinguish between different materials. When separating glass shards from non-glass components, optical separators are used to examine the translucency of the material. These use Near Infra Red light (NIR, a part of the spectrum of light that is just barely invisible to the human eye). This technique is also commonly used to separate different types of plastic in a waste stream.
Flat glass	Flat glass, for example window panes, wired glass and insulation glass, car windows and mirrors, comes from greenhouses, buildings and cars, among other places. Flat glass is collected via recycling schemes, municipal waste collection facilities, construction companies, greenhouses, glaziers and specialised collectors in the automotive sector.
Eddy current technique	Eddy currents are electrical currents used to remove non-ferrous metals (e.g. aluminium) from a mixed stream of waste materials. Non-ferrous metals only became magnetic when an electrical eddy current is generated in the material. This technique is used as a sorting technique. Non-ferrous metals are pushed away by the eddy current and end up on a different sorting belt.
White glass	Transparent, uncoloured glass. It is also known as flint or clear glass.

More terms related to packaging can be found here.

Additional information sources

Basic knowledge about packaging and packaging techniques

- *Zakboek verpakken*
  Plato product consultants, prof. dr. ir. R. ten Klooster, et al.
  http://www.platopc.nl/zakboek/

Various other recycling guidelines (this is not an exhaustive list)

- European Federation of Glass Packaging Makers (FEVE)
  https://feve.org/
- France – CITEO
  Règles de recyclabilité TREE - Test de recyclabilité des emballages.
  https://tree.citeo.com/en-GB/Home/Index
- Italy – CONAI
  Glass annex
  https://www.conai.org/en/local-authorities/anci-conai-framework-agreement/glass-annex/
- Austria – FH Campus Wien
  Packaging Design Guideline
  https://circularanalytics.com/fileadmin/user_upload/FH-Campus-Wien_Circular-Packaging-Design-Guideline_V02.pdf

Other sources

- Specifications developed by Maltha Glas recycling
  http://www.maltha.nl/nl-nl/holglas-vlakglas/holglas.aspx
- Milieu Centraal – Waste Separation Guide
  What can be disposed of alongside glass?
  https://www.afvalscheidingswijzer.nl/
- Nederlandse Brouwers
  https://www.nederlandsebrouwers.nl/biersector/duurzaamheid-en-ketenbeheer/verpakkingen/statiegeld-retourflessen/
- Stichting Duurzaam Verpakkingsglas
  http://www.duurzaamglas.nl
- European Federation of Glass Recyclers
  http://www.ferver.eu/en/sorting-tips
- Ellen MacArthur Foundation (2015)
  https://www.ellenmacarthurfoundation.org/
- Plastic Recyclers Europe (2018)
  https://www.plasticsrecyclers.eu/
- European Directive 94/EG/62
  https://eur-lex.europa.eu/legal-content/NL/ALL/?uri=CELEX%3A31994L0062

- Recyclingplatform. (2020, 05 18).
  Recyclingplatform Recycling processen glas
  https://www.recyclingplatform.nl/recycling-processen/glas
- Netherlands Institute for Sustainable Packaging (KIDV). (2021).
  Dossier European laws and regulations for packaging.
  https://kidv.nl/wet-en-regelgeving