



Recyclability of Bottles with Sleeves

Issues and Solutions

A RECYCLABILITY BY DESIGN FACT SHEET

This fact sheet is produced to provide information on current topics within the plastics recycling industry. All information is based on current manufacturing and infrastructure within the UK and is produced with the support of RECOUP members and experts from the plastics industry.

Recyclability guidelines, such as RECOUP Recyclability by Design, have been instrumental in driving improvements in packaging quality. This includes recommendations on the use of sleeves and labels on PET bottles.

However, as one of RECOUP aims is to promote discussion and cooperation between stakeholders in the industry, it is encouraging to report that improvements have been made by both packaging manufacturers and the recycling industry to overcome some of the challenges to enable labels and sleeves to be used while not adversely affecting the recycling of clear PET bottles.



“Clean separation is a must for high-quality recycled PET that can be reused for bottles – thus closing the cycle and working towards a circular economy.”

Available Solutions

Follow Recyclability Guidelines:

RECOUP produce guidance documents providing solutions to improve recyclability. Design Guidelines for plastic packaging show that the preference for labelling a PET bottle is a label made from PP or PE. As not all sorting facilities have the most advanced detection equipment, the label should be small enough to allow the NIR to see and detect the PET bottle.

What are the issues for the recycling industry with sleeves on bottles?

Possible Issues with Detection:

Full-sleeved PET clear bottles need to be presented to the near infrared (NIR) detection equipment and be correctly identified as clear PET. Other issues at this stage may include dark colours or reflection from metallic or shiny surfaces.

“On PET sleeve/labels on PET bottles, it is not supported by RecyClass because sleeves are printed and not floatable, therefore PET sleeve flakes will enter the recyclate, coloring the recycled plastic and not allowing the food contact applications.”

RecyClass

Guidelines differ slightly on the % coverage of the sleeve (and by definition, % of clear area). RECOUP ‘Recyclability By Design’ recommends that the label should not cover more than 40% of the pack. The figure quoted varies from 40% to 60%. These are simply guidelines – the fact is, the more clear bottle visible, the better.

For a PET sleeve, if there is a clear area, rather than affecting the NIR signature (it detects the PET regardless of the printing in many cases), the optical scanner will identify the clear area and capture the bottle into the clear PET stream.

PET Bottles With Full Coloured Sleeves:

The real sorting hurdle comes when trying to use a colour sorting process for PET bottles that have full coloured sleeves. NIR sorting technology is unable to recognise whether the bottle behind the full sleeve is clear, blue, green, white

etc. In this scenario, the clear (natural) PET bottles would end up mixed in with the coloured PET stream. This not only lowers the overall quality of recycled PET flakes, limiting their suitability for high-grade applications, but is also a lost commercial opportunity as the natural PET would not be captured for resale as a single stream (TOMRA Recycling).

Possible Issues with Reprocessing:

At this stage, plastic is flaked. The flake is then separated by use of the 'float/sink' process, which uses the difference in density to separate polymers in a basin. Sleeves should float to the top, whilst heavier PET bottle flakes sink. So, for a PET bottle, the need is to avoid a full-length sleeve made of PET, as this is more difficult to separate from the bottle material by the float/sink process.

Improvements

"If a sleeve is required, it is best to always use natural PET bottles with either PE or PP sleeves rather than PET sleeves. If full PE or PP sleeves are used, TOMRA's technology is capable of recognising both the PET bottle and its sleeve at the same time.."

TOMRA Recycling

Improvements in Sleeve Materials

While PE and PP are the common label substrates used, as these materials would float out along with the caps, sleeve manufacturers such as CCL have produced PET sleeves which are a different density to the PET bottle, allowing easier separation during re-processing. The specific density allows the sleeve material to float to the surface, while the PET flakes from the bottles sink to the bottom, allowing their recovery and reusability while ensuring waste stream separation.

Sleeves also use inks designed to withstand and resist this separation process ("No-Bleeding" inks) without any risk of contaminating neither the washing step, nor the PET flakes.

CCL have recently released a white version of a shrink film with an SG<1 which has been approved in Europe as being able to be detected in recycling sorting processes where the appropriate technology has been installed.

From these new sleeve technologies, it is established that they can be handled correctly by a PET recycler. However, it should be emphasised that the first step is that these bottles need to be effectively sorted as PET in a MRF, in order to reach the bottle recycler.

“The latest near-infrared (NIR) sorting technology is capable of detecting which material is behind the sleeve by identifying the spectra of both the label and the bottle. As a result, it is possible to identify and sort them into the PET stream.”

TOMRA Recycling

A.I developments for detecting sleeved bottles

AI photo image recognition sorting technologies are on the rise. AI (Artificial Intelligence) equipment ‘sees’ the shape of a pack and identifies it, providing the item has been added to its database.

At the current rapid rate of progress, this has the potential to allay any concerns regarding correct sorting of the container type due to the type of plastic polymer, or full body sleeves.

For PET bottles, AI will recognise the bottle shape, and sort into the correct PET stream.



Figure 1: An image of AI technology in a MRF

Tear Strips

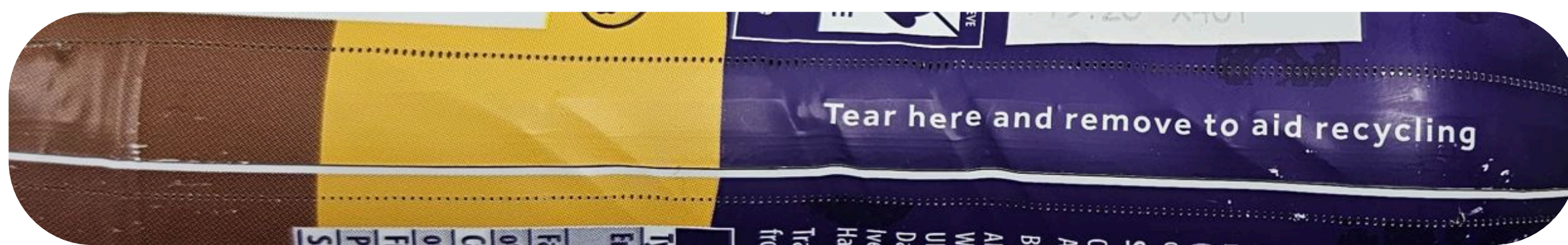


Figure 2: An image showing a tear strip on a bottle

RECOUP have stated a belief that It should not be the responsibility of the consumer to make packaging acceptable for recycling. Where sleeves are used, the instructions should be unambiguous in their delivery.

With the projects into UV tagging such as Holy Grail 2.0, you need the label attached to be able to see the tags and to help AI to identify the packaging as food grade or non-food grade. This is why tear strips won't be an issue when this comes into wider use as labels and sleeves removed from bottles hinder the DRS and AI sorting processes.

How feasible is relying on the consumer to remove the sleeves?

"We believe adding perforations to sleeves with instructions on how this allows effective recycling of a bottle is a good practice and should be readily encouraged."

CCL

**1 Metro Centre
Welbeck Way
Woodston
Peterborough
PE2 7UH**

**T | 01733 390021
E | enquiry@recoup.org
W | www.recoup.org**

RECOUP

**Registered in England & Wales Number: 02435729
VAT Registration Number: 546 5837 10
Registered Charity Number: 1072029
RECYCLING OF USED PLASTICS LIMITED**