QSE Group

Technical note: Recycled plastic – Version V8 – Finalized first edition release on 2024-07-19

Introduction

This document intends to provide guidance for the proper use of recycled materials in humanitarian products, how to address the common challenges of quality, safety and recycled content verification, and steps organisations should take. This technical note is based on information from participating members, exchanges with internal and external experts, and with the industry.

Background

The overall aim is to reduce the environmental impact of the current provision of humanitarian products to aid recipients. Many humanitarian products are manufactured from virgin fossil-based plastics, mainly polyethylene (PE), polypropylene (PP), and polyester (PET). Major products include polyester blankets, polypropylene/polyethylene buckets and jerrycans, polyethylene tarpaulins and tents, polyester or polyethylene mosquito nets, polypropylene floor mats, accounting for about 50'000 tons of plastic every year for the six QSE Group organizations together.

One possibility to reduce the environmental footprint of the plastic products is to replace part, or all, of the virgin plastic by recycled plastic. Life cycle assessments indicate this reduces Greenhouse Gas (GHG) emissions and reduces fossil resources depletion (avoiding fossil fuel extraction and manufacturing).

Recycled Plastic Definition

Recycled material is material that has been reprocessed from waste by means of a recycling process to incorporate into a product, substituting a primary raw material (also known as a 'secondary raw material'). ISO14021:2016 defines two types of recycled material: **Pre-consumer recyclate** (also known as Post-Industrial Recyclate [PIR]) and **Post-consumer material (PCR)**. PIR is made from waste arising from the manufacturing process before it becomes part of the final product for use, while PCR is made from products that have been used, become waste, and that has been collected, sorted, washed, and recycled. These definitions are also carried over into other norms such as EN45557 and the US Federal Trade Commission Green Guides.

Although both PIR and PCR were considered to be recycled material at the time of the writing of the ISO definition, emerging consensus is that only PCR has real environmental benefit. New legislation such as the EU Packaging and Packaging Waste Regulation (PPWR), therefore only consider PCR as sufficient for meeting the required targets.

Extra clarification note 1: ISO 14021 clarifies that PIR (pre-consumer) material excludes rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process (i.e. no extra recycling step before re-entry into the production process). However, this is very unlikely, and most internal scrap goes through an inhouse recycling step before re-entering the manufacturing process. Several countries have accepted that scrap that is recycled in-house is counted as PIR. This makes a perverse incentive for creating extra scrap to be recycled in-house, to then be counted as recycled material. This 'trick' is well-known within industry, especially when there is a financial incentive (e.g. for example PET bottles). In general, it should therefore be noted that PIR material often

should not cost more, but also may not face the quality and safety issues of 'real' post-consumer recycled materials.

Extra clarification note 2: All plastics degrade during their lifetime. They degrade faster when exposed to heat, UV-rays, physical forces, and acidity. This can be seen when looking at old plastic that will often become opaque and have a yellow tinge. This indicates a degradation of the molecular quality and often accompanied by some microplastic formation (leeching). As the input to the recycling process is already slightly degraded, most recycling processes are therefore not able to produce exactly the same quality as the original virgin plastic. PET (bottle recycling) is by far the best performer, while other plastics are more challenging to recycled at the same quality level. It is therefore common to distinguish between high-quality recycling, also known as closed-loop recycling where a product is recycled into the same product without major quality loss. The best example of this is bottle-to-bottle recycling, but it is also possible for others if sufficient care is placed on the sorting, washing and recycling of products. When the recyclate quality cannot allow closed-loop recycling, or is intentionally used for a product requiring a lower grade of the same plastic type, it is known as down-cycling (e.g. bottle-to-fibre recycling of flexible polyolefins used for rigid extrusion moulding).

Recycled Content Verification

Today, standard quality procedures include the laboratory control of the specification requirements, including a raw material check. However, it is challenging to certify the presence of recycled plastic in a product, and almost impossible to identify the origin and the proportion of recycled plastic.

To ensure truthfulness and avoid misleading claims it is important the recycled content is certified. There are two main strains of recycled content certification: product level accounting (with or without recyclate chain traceability), and mass-balance accounting.

- Mass balance accounting: the mass balance approach is widely used in the chemical industry. Since segregation of virgin and recycled feedstocks can be practically and economically challenging, the mass balance approach focuses on the total input versus total output of a factory or company. A company selling products with 30% recycled content must demonstrate that its inbound materials consisted of at least 30% recycled material. The actual recycled content in any particular product can in reality vary from 0-100%. The most widely used mass balance system is ISCC+.

- Product level accounting: requires demonstration that a particular product can be shown to actually be made from the stated % of recycled materials, by following an auditable paper trail from the product, back through the manufacturing to the raw materials used. This has been the basis for most plastic recycled content claims today. There are more and less stringent verification systems, however it is recommended that approaches are chosen that include recycled material traceability, such as PolyCert Europe or RecyClass recycled plastic certification. These systems not only verify the actual use of recycled content on the basis of audits, but also require the producer to demonstrate the authenticity of the recycled material by ensuring it comes from certified & audited recycling companies.

A third option is sometimes used: using tracer elements. Some products (e.g. PET) bottles are typical manufactured with additional compounds (2% isophthalic acid for PET bottles to improve clarity). After recycling, the material can be tested for the presence of this material, which allows the identification of the percentage of recycled content. A producer (or group of producers) of products could also decide to add such a tracer in a defined amount even when not needed for functional requirements. However, this is not a tamper-proof method. The tracer element can easily be added to any material during the manufacturing process, giving the appearance of recycled materials. Because of this

challenge, as of yet, no such system has taken off on a large scale, and it is mostly not accepted as a means to prove recycled content for regulatory compliance.

The QSE working group recently finalized a common factory audit tool which includes the recycled content verification. The factory assessment will determine and certify the use of recycled plastic in the product manufacturing. This new tool will be implemented in the second half of 2024 and be revised as required. Thorough assessment is required to avoid awarding suppliers on the base of recycled content while not real, creating unfair competition and dismissal of "good" suppliers from our market.

As for all other aspects of manufacturers' inspection and validation, the organization needs to ensure the factories' assessments are 100% trustful. In the standard internal procedures of the organizations, embedded personnel from the organization always accompany the inspectors to witness the application of the full assessment procedure.

Using Recycled Materials for food contact materials (FCMs)
When using recycled materials, extra consideration is required for products that come into contact with food (or drinks) during their production, processing, storage, preparation, serving and consumption. This includes products like packaging and containers, machinery, kitchenware, and tableware.

It is possible to use recycled plastic in food contact materials if they meet the requirements for food contact, as they *can* result in additional safety issues. If raw materials are used that are not food-grade, this can result in chemical contamination of the products that can later leech into the food and water, affecting human health. This can include heavy metals, phthalates, and other materials.

There are three main areas to address:

- For Food Contact Materials the raw materials used in production, including any recycled materials, should meet food-contact requirements. US FDA or EU (1935/2004, 10/2011 and 2022/1616) regulations can be applied. Materials meeting these requirements are known as food-grade. While food-grade recycled polyester (rPET) is widely available (mainly from PET bottle recycling), food grade options in other plastics are more limited or not at all available.

- Migration Testing: Food contact materials should pass migration testing, to test for the presence of substances of concern. This tests if defined substances of concern leech from the plastic into the food.

- When using recycled products, we also face the issue of the legacy chemicals that were included in the originally recycled product, or which formed during the use or recycling of the product. These include materials such a fire-retardants, plasticizers, UV-stabilisers, antioxidants, processing-aids, and polyfluoroalkyl substances (PFAS). They might have been knowingly added to a previous product, and some can also arise during the recycling process because of presence of other contaminates. These are known as Non-intentionally Added Substances (NIAS). It is recommended to consider NIAS Screening for Food Contact Materials when using recycled materials. This is available from the major international testing facilities and can be requested that suppliers conduct on their finished products, or on the inbound recycled material.

Quality and Design Implications

Using recycled plastics *can* have implications on the design and quality of the product. For example, as polyolefins (PP, PE) loose some strength and flexibility after recycling, it may be necessary to increase the thickness of the product marginally to compensate. This is known as 'Design for Recycled Materials'. Balances must be found between quality, sustainability and price dimensions. To ensure the quality requirements are maintained, producers are required to ensure that the products still meet the requirements established in technical documentation and demonstrated by way of compliance with specific tests. Such tests are often referred to in ISO norms, are included in the product specification, and can be tested by standard testing facilities on a random basis.

As an example, the recently released specification for the 'Eco Design Tarpaulin' are now being produced, and yet the major manufacturers have not reached the point where the recycled PE matches with the minimum requirements for the final product. This may require adjustments on the long run.

Recommendations for use of recycled materials

For use in EHIs, the use of recycled plastics is encouraged but not compulsory. In general, it is strongly encouraged to try to use recycled materials wherever possible. Recycled materials have a positive impact on the carbon footprint of a product, reduce fossil resource depletion and stimulate the market for collecting and recycling waste. However, it should only be done when it can be done safely.

The use of recycled materials will therefore vary by organisation and product. As high-quality recycled polyester (rPET) is more readily available, it is recommended that PET products include a high proportion of recycled materials. For other common plastics such as PP and PE, it is recommended to consider how suppliers can be stimulated to incorporate a proportion of recycled content. In all cases, organisations should ensure that suppliers report on the origin and quality of the recycled materials through full in-depth audits, adequately verify the proportion of recycled content, and apply the required design and safety measures depending on the product. It is paramount to avoid awarding suppliers on the base of recycled content while not real, creating unfair competition and dismissal of "good" suppliers from our market.
Organisations should also ensure that the proportion of recycled content and recycled content type (PCR vs PIR) is transparently indicated on the product, following best practice guidelines from US FDA Green Guides and EU Greenwashing legislation.

Finally, in addition to encouraging the appropriate use of recycled materials, to allow a full circular economy, organisations should also ensure that products are Designed-for-Recycling from the outset.