

# GUIDANCE ON QUALITY SORTING OF PLASTIC PACKAGING

## ESTABLISHING HIGHLY REFINED PACKAGING WASTE STREAMS

Plastic packaging represents the biggest portion of the 51.2 million tonnes<sup>1</sup> of European plastic demand and consequently the biggest portion of waste that is generated, as well as collected for recycling in Europe. As such, the industry must focus on increasing the value of plastics packaging waste and significantly improving the efficiency of its reprocessing, in order to recapture the true value of packaging and transform it into new high-quality products.



Increasing the amount and more importantly the quality of recycled output is directly affected by the quality of sorting practices, among other factors. Therefore, it is imperative to ensure that the quality of packaging materials entering the sorting facilities is optimised, that high-quality standards are set as to how this material is then treated, ultimately securing high-value input for recyclers. As stated in the Plastics Strategy, quality sorting is “essential to avoid introducing contaminants in the recycling streams and retain high safety standards for recycled materials.”<sup>2</sup> Fortunately, in Europe the groundwork is laid out as high-quality sorting practices already exist. The challenge is to create a system where all the complementing steps, such as packaging waste collection, setting of sorting standards and bales quality checks are optimised.

<sup>1</sup> PlasticsEurope (2018), “Plastics - the Facts 2018”; [https://www.plasticseurope.org/application/files/6315/4510/9658/Plastics\\_the\\_facts\\_2018\\_AF\\_web.pdf](https://www.plasticseurope.org/application/files/6315/4510/9658/Plastics_the_facts_2018_AF_web.pdf)

<sup>2</sup> European Commission Communication “A European Strategy for Plastics in a Circular Economy”, 16 January 2018, COM(2018)28 final; <http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf>

## Standardising high-quality sorting practices

In an optimal sorting centre, plastic packaging is automatically sorted through a series of consecutive steps, refining the streams. Contamination is separated out while the material is sorted according to polymer types, and optionally by colour or product types.

Figure 1 gives a simplified overview of how the basic sorting of plastic packaging should be conducted. Additional sorting steps are included in the process depending on the targeted concentration of the material. It is also important to note that the sorting process for plastic packaging differs from those of other plastic waste streams. Furthermore, automatization of a sorting process yields the highest quality of output material and is at the same time the most efficient approach to sorting.

Firstly, in a sorting centre, the separately collected packaging is screened. The importance of screens has been highlighted in the fact that polymer types of items larger than certain sizes (typically larger than an A4 page), were more easily recognised than those of smaller items. The screens would separate smaller items into the mixed waste fractions. Technological developments have since made polymer recognition much more effective and efficient, allowing for more concentrated targeted streams. Therefore, the size of a packaging has a decreasing impact on the final quality of the sorted waste.

Screened packaging is later carried through metal detection and eddy current machines, which remove any ferrous and non-ferrous metals contaminating the waste streams.

The material then passes through wind shifters, which separate light fractions from heavier ones and ballistic separators, which separate 2D fractions from 3D fractions. After these steps, the material is further refined using Near-Infrared (NIR) technology.

NIR technology separates the PE film from other films and plastics in the light and 2D fractions. The rigid plastics are separated into PP, PE, PET and PS streams. These fractions represent the most commonly used polymers for packaging applications. For instance, PE film is often used for wrapping of various goods, while detergents and other cleaning products are packaged in HDPE containers.

The material can go through more than one sorting operation or be further sorted by colours and product types, for instance, PET bottles can be separated from PET trays, while clear PE film can be separated from the coloured PE film. Certain applications such as food contact require very high purity levels and are guided by European quality standards; therefore, the collected material undergoes several sorting and decontamination steps both in the sorting facilities, as well as in recycling plants themselves.

Materials discharged during the sorting operation are either fed back to the system or discarded along with other contaminants.

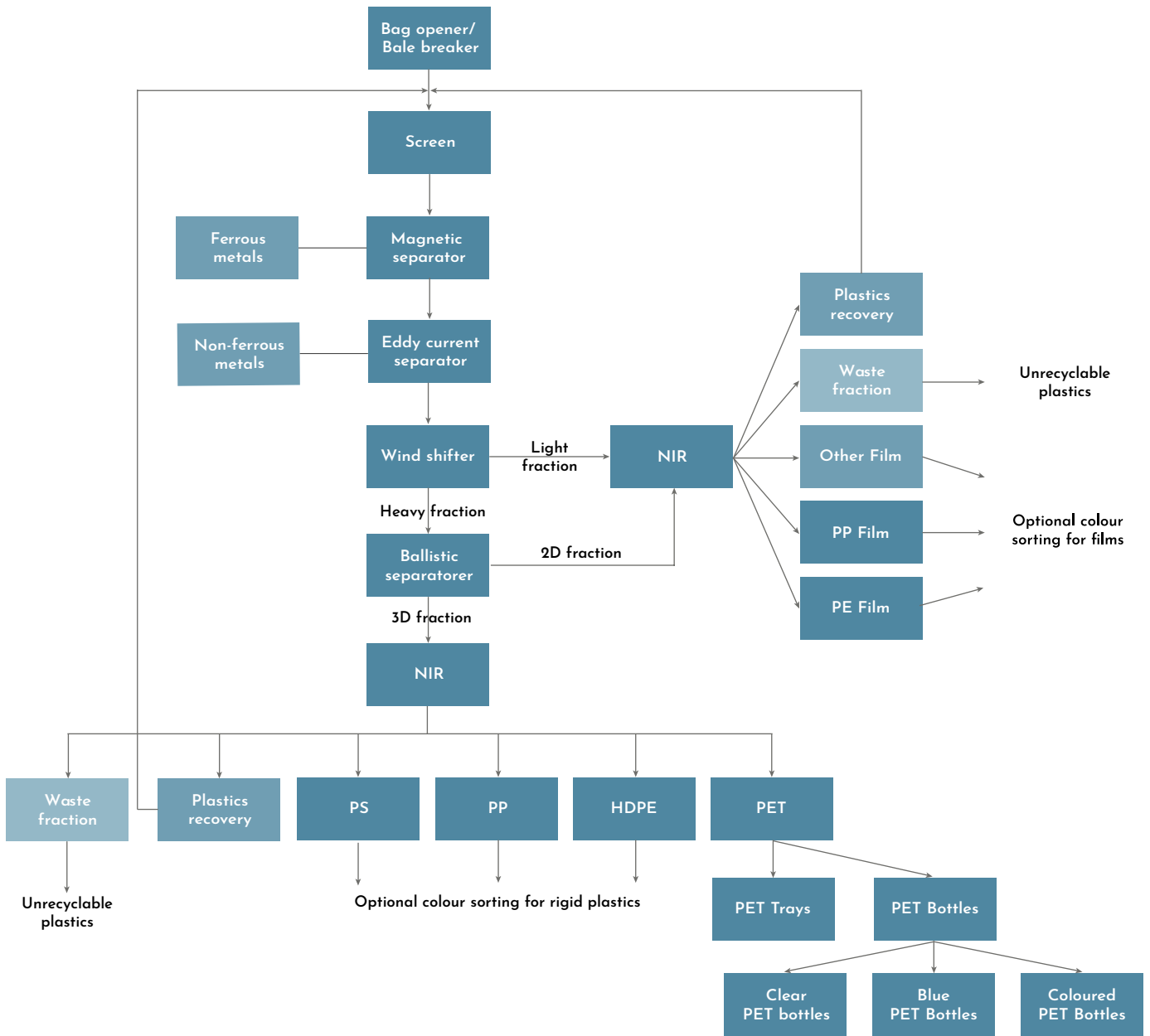


Figure 1: Packaging sorting flowchart<sup>3</sup>

As stated earlier the recycling performance is highly dependent on the quality of sorting output and the contamination that can be found in these materials. Therefore, retaining the value of products and avoiding contamination in recyclates across all the recycling processes in Europe calls for setting of standards for high-quality sorting for plastics packaging. Moreover, standardisation of these practices would reduce disparities in the sorting systems, allow for a secure and steady flow of materials for recyclers and ultimately higher volumes as well as quality of recyclates available on the European market.

<sup>3</sup> Packaging sorting flowchart is based on the expertise of TOMRA Sorting and Pellenc Selective Technologies

## Separate collection of plastic packaging waste

Quality of a sorting process can be disrupted by overly contaminated waste streams, coming from inefficient collection schemes. In line with that, increasing the quality of sorting systems and their standardisation needs to start from the restructuring of plastic packaging waste collection systems.

As is the case for sorting practices, collection schemes vary immensely across Europe, where often in one single Member State a multitude of different systems are applied.

Properly designed, recyclable plastic packaging retains high value at the end of its useful life and can be repurposed to produce new products. However, the established collection system significantly impacts the recycling performance of such packaging, since it directly impacts the level of contamination found in the flows entering the sorting centres and later the recycling facilities.



In a collection system where packaging is mixed with other waste, for example organic waste, contamination presence is significantly high. On the other hand, separately collected plastic packaging provides for much purer streams, increasing the efficiency and decreasing the cost of subsequent reprocessing steps.

Said differently, for packaging collected through mixed collection, sorting can be disrupted due to excessive contamination or additional sorting steps can be required, while the value of end-products is automatically lowered and therefore the range of applications the material could be used in is limited. Contrarily, for instance clear PET bottles collected from deposit schemes will increase the sorting efficiency, produce much higher recycling yields and at the same time allow for reprocessing into food-contact applications.

Establishing separate schemes for plastic packaging and therefore creating separate streams for mainstream plastic packaging types (PET, PE, PP and PS) will lower contamination levels, increase the efficiency and quality of sorting centres and secure the production of high-quality recyclates. Furthermore, establishing such schemes and harmonising them throughout the Member States will ensure that the collection targets of 55% for plastic packaging and the 90% collection target for single-use plastic bottles are achieved by the set dates, as stipulated respectively in the Packaging and Packaging Waste Directive and the Directive on the reduction of the impact of certain plastic products on the environment.

## Bales characterisation guidelines

Complementing the efforts of standardised sorting practices and improved separate collection for plastic packaging, bales characterisation guidelines<sup>4</sup> aim to provide a benchmark and increase transparency in the supply of collected waste. These guidelines can be used, both by the sorting centres as well as the recycling facilities, to indicate the quality of waste that a recycler will be receiving and in addition they can be used along with the specification data sheets to verify the reliability of suppliers.

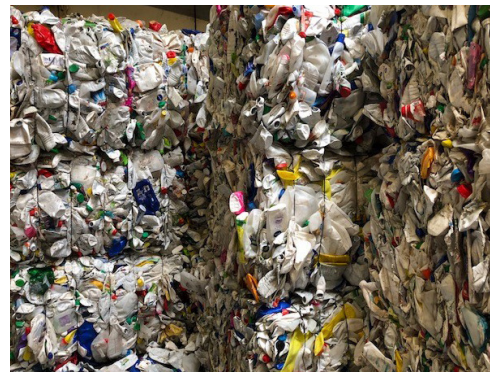
In parallel, the out-dated local standards on qualities of sorted plastics waste (baled waste) must be revised. In an environment where the infrastructure and technology of the recycling sector have immensely improved over the last decades, the bale specifications must reflect the same, aiming towards a European standard for the quality of sorted plastic waste.

<sup>4</sup> PRE released a set of bales quality guidelines to drive market transformation towards circularity; <https://plasticsrecyclers.eu/bales-characterization-guidelines>

Overall the bale quality guidelines and specifications can be used to signal steady and high-quality waste streams, which will aid the recyclers in establishing constant supplies for the production of high-quality recyclates. Furthermore, remaining disparities and fragmentation in collection and sorting systems in Europe can easily be identified with the application of such guidelines.



Clear PET bottles bale



HDPE containers bale

High-quality sorting of plastic packaging waste will lead to the increased effectiveness of the recycling processes and the production of high-quality recyclates. In turn, this transformation would generate a significant number of green jobs, lower the CO2 emissions and raw material consumption, protecting our environment and saving scarce natural resources – ensuring social, environmental and economic benefits for the industry and Europe as a whole.

It is therefore essential to promote the separate collection of plastic packaging waste, and at the same time create standards which will promote best practices in sorting and bales specifications for sorted plastic packaging waste. With these efforts, we can truly capture the value of our plastic waste and transform it into new high-quality products, produced in accordance with European high safety standards.

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INCREASED  
SEPARATE  
COLLECTION



STANDARDISED  
BEST SORTING  
PRACTICES



OPTIMISED  
BALE QUALITY  
SPECIFICATIONS



*making plastics circular*

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