RecyClass

RecyClass
Avenue de Broqueville 12
1150 Brussels, Brussels

Phone: +32 2 786 39 08
info@recyclass.eu
www.recyclass.eu

RECYCLASS TECHNICAL REVIEW

Brussels, 15 July 2024
Updated 16 May 2025

The RecyClass PET Technical Committee (TC) investigated the influence of the PET bottle colour shade on their sorting behaviour. This campaign was coordinated with the support of Returpack and Infinitum, respectively the Swedish and Norwegian Deposit Return Systems (DRSs). Besides, ALPLA, Polyrecycling, and Freudenberg Group supported with the delivery of samples directly picked from their PET recycling lines. After 6 months of investigation, the RecyClass PET Technical Committee successfully reached consensus on the initial set of recommendations for designing PET bottles according to their color shade, aiming to facilitate proper sorting.

Two main objectives were targeted with this test campaign:

1) Define a range of Lab* colour coordinates for PET bottles to be correctly sorted in the transparent clear, light blue or coloured streams.

2) Add data to the work started by Infinitum and Returpack to drive harmonisation in Europe for existing and future DRSs.

In this test campaign, 28 different PET bottles were analysed using a Konica Minolta CM-5 at Norner. Among the 28 samples tested, 18 bottles collected at PET recyclers plants were analysed, each of them corresponding to a different Stock Keeping Unit (SKU). In addition to this, 10 of these SKUs were collected at retailers' level, to compare the colour characteristics of the PET bottle after production and at reception in the PET recycling plant. From the 18 bottles collected by recyclers, 4 were picked in the clear transparent stream, 9 in the light blue transparent stream and 5 in the coloured transparent stream (see Annex I). All samples were collected within a general collection system in Austria, Italy, Poland or Switzerland. Samples were then analysed in Norner according to the method presented in Annex II.

Regarding the results, as expected, the bottles with the darkest shades of blue showed a* and b* parameters values up to -14 and -21 respectively, while all the clear transparent PET bottles had values between -1 and 0 for a* and -2 and 2 for b* (see Annex III). One of the main observations was the confirmation that clear and light blue bottles collected as product or as waste exhibited similar results when analysed after cleaning, meaning that measurements could be done at the producer or recycler level. Only few dark blue bottles showed more extreme a* and b* values when collected in the waste

stream, with a ΔE[1] value between 4 and 6. Besides, it was confirmed that the thickness of the PET bottle is not playing an important role in the colour sorting. Most of the dark blue PET bottles were about 150 μm thick, while clear transparent bottles showed thickness between 160 and 300 μm, thus proving that thicker bottles were not considered as more coloured. Regarding the L* parameter, clear transparent bottles were reported with values above 93, while light blue bottles obtained results between 90 and 95, and dark blue bottles below 91. Therefore, a trend could easily be observed, with a decrease of L* value with darker shade of PET bottles. Note that current recommendations by Returpack and Infinitum for the colour of PET bottles matched well RecyClass results, in particular when looking to the Lab* values for clear transparent PET bottles.

While this test campaign is only showing a very small amount of data compared to the number of PET bottles present on the market, the RecyClass PET TC considered that these results are representative of the market, and are confirming previous findings and data collected from Returpack and Infinitum. It is important to keep in mind that while RecyClass collaborated with DRSs on this test campaign, analysed samples were coming from general collection. Based on this, the RecyClass PET TC decided to endorse Infinitum definitions for clear transparent and light blue transparent PET bottles, as the range of colour for the light blue fraction was broader compared to Returpack definition. Therefore, the following recommendations should be followed:

Table 1. Lab* parameters for clear transparent and light blue transparent PET bottles.

Lab* parameters	Clear transparent stream		Light blue transparent stream	
	Min	Max	Min	Max
L*	93	-	89	-
a*	- 0.7	2.0	- 4.0	2.0
b*	- 2.0	2.0	- 3.0	2.0

The RecyClass PET Technical Committee would also like to clarify that these colour definitions for the PET streams are developed in the context where DRS are observing a decrease in the quality of their streams, due to an increase of the yellowing and amount of particles in PET bottles. This leads to less bottles available for the clear transparent stream and an increase of coloured bottles, which can be

---

[1] $\Delta E = \sqrt{(a*1-a*0)^2+(b*1-b*0)^2+(L*1-L*0)^2}$

detrimental for the circularity of PET bottles. The RecyClass PET TC will therefore continue to investigate the origin of the yellowing and particles present in the rPET.

The RecyClass PET TC also highlights that the current recommendations on colour are not here to restrain the use of recycled content in PET bottles. These recommendations are mainly used to understand which Design for Recycling Guidelines apply depending on the colour of the PET bottle. No penalty can be applied during a recyclability certification based on the colour definitions here reported.

RecyClass
Avenue de Broqueville 12
1150 Brussels, Brussels

Phone : +32 2 786 39 08
info@recyclass.eu
www.recyclass.eu

RecyClass

RecyClass
Avenue de Broqueville 12
1150 Brussels, Brussels

Phone: +32 2 786 39 08
info@recyclass.eu
www.recyclass.eu
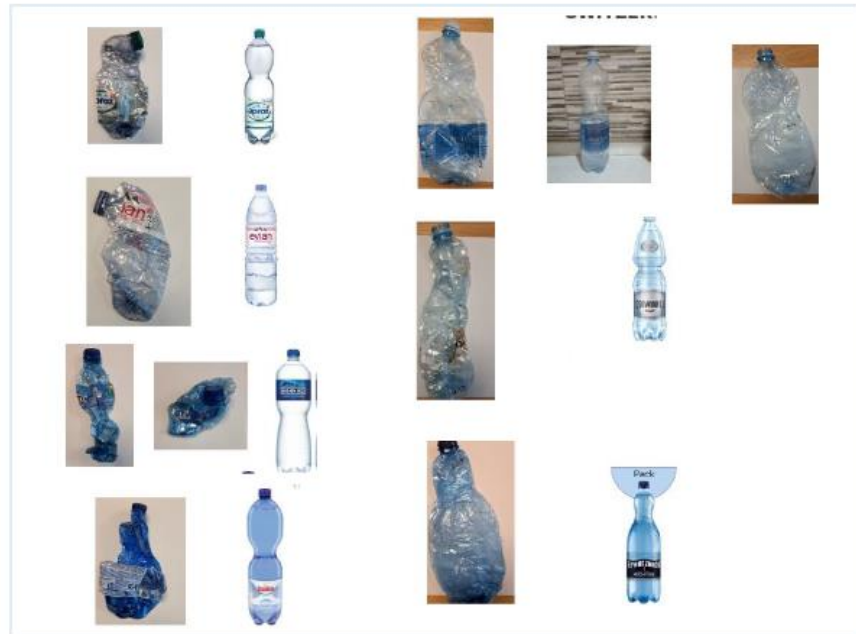
Annex I

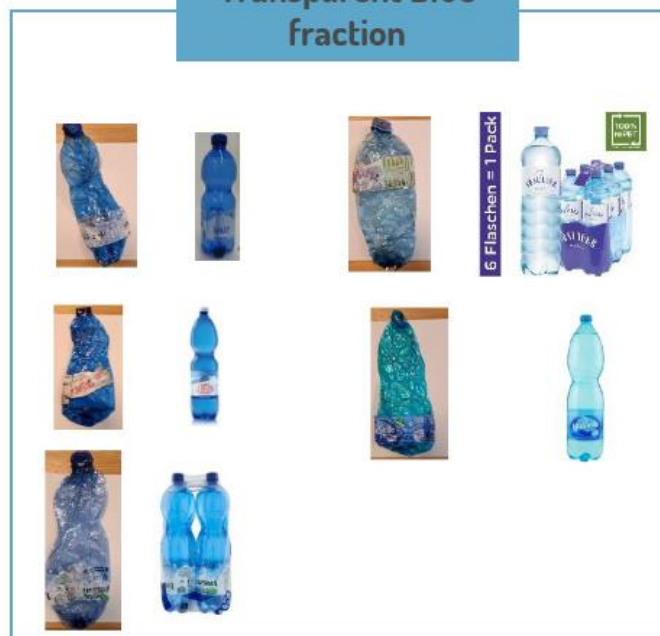*Figure 1:* PET bottles tested for the test campaign

Instructions:

1. Cut out a piece of the bottle from the middle section approx. 5 x 5 cm. Choose a place on the bottle without decor and as flat as possible. If needed, clean off any remaining residues from beverage or adhesive. For samples coming from the waste stream, wash them with mild solvent (water, acetone) to remove dust or product residues.
2. Measure the wall thickness of the piece
3. Clamp the sample in the transmission holder so it covers the ball opening, with the bend against the opening
4. Measure the L*, a*, b* values using a Konica Minolta CM-5, with the following settings: D65 light, 10°, transmittance mode di:0° (SCI)

RecyClass

RecyClass
Avenue de Broqueville 12
1150 Brussels, Brussels

Phone : +32 2 786 39 08
info@recyclass.eu
www.recyclass.eu