

CHI-C8-SEPPO

Label and Adhesive Separation Test for PO-based Packaging

Version 2.0 / 18. June 2022

The CHI test method developed by cyclos-HTP for the washing of PO-based packaging with labels and adhesive. The results can be used to assess the recycling compatibility of adhesives or pressure-sensitive labels. The testing procedure comprises the following steps:

1. Materials and Equipment

- 1.1. PO sample with pressure-sensitive label (PO or paper) and adhesive application
- 1.2. Stirring equipment and heater with capability of precise heating (example, see Fig 1)
- 1.3. Sieve with pore size < 2 mm.
- 1.4. Air drying oven, capable of heating up to 100°C.
- 1.5. Desiccator.
- 1.6. Optional for evaluation of adhesive solubility: Balance with an accuracy of 0.001 g.

2. Preparation of the samples

- 2.1. Grind the packaging sample (label/adhesive/PO) with a grinder into flakes, with an edge length of approx. 10-15 mm. The grinded samples are kept for photographic documentation as test reference.
- 2.2. Weighing: In the sample the total area of the labels should be $\geq 200 \text{ cm}^2$ per litre (= A); the weight of the entire packaging sample incl. body and label should be $\geq 100 \text{ g}$ per litre to get a high stock density.
- 2.3. Measure the quantity of the water in accordance with the quantity of the sample and heat it to 40°C without sample.

3. Test procedure for plastic-based labels

- 3.1. The batch with the sample is stirred for 15 minutes at 40°C with high shear forces; the speed is adjusted to 600 ppm, so that the flakes undergo a certain amount of shear; after 15 min the stirrer is switched off to check if the labels have detached from the PO body.
- 3.2. Carefully wash the skimmed off labels and the flakes under running water; observe whether all label pieces have been detached from the PO. In case of PS-based labels, all label flakes should sink and all PO flakes should swim in the washing liquid.
- 3.3. In case that the label pieces have not detached from the PO, the test for this sample is stopped and repeated if necessary; if the result is confirmed, **the test is considered as failed** for the sample tested.
- 3.4. The PO flakes and the labels are separated, separately sieved, rinsed twice with approx. 200 ml of clear water and after draining transferred to a plate.
- 3.5. The PO body flakes and the plastic-based labels are dried in a pre-heated oven at 80°C for 60 minutes and then cooled in the desiccator.
- 3.6. The flakes and labels are documented photographically; any optical changes compared to the original sample (2.1) are documented.
- 3.7. By demand, the solubility of the adhesive in the washing water can be evaluated with an accurate mass balance. Therefore, the sample weight and the weight of each fraction after washing and drying has to be measured.

4. Test procedure for paper labels

- 4.1. The batch with the sample is stirred at 40°C for 15 minutes with high shear forces; the speed is adjusted to 600 ppm, so that the flakes undergo a certain amount of shear; after 15 min the stirrer machine is switched off to check if the paper labels have detached from the PO flakes and are defibrillated.

- 4.2. Wash under running water carefully the flakes from the paper fibres; observe whether all paper label pieces have been defibrillated. If this is not the case, the test should be stopped immediately, and repeated if necessary; if the result is confirmed, **the test is considered as failed** for the sample tested.
- 4.3. The PO flakes are sieved, rinsed twice with approx. 200 ml of clear water and after draining transferred to a plate.
- 4.4. The PO flakes are dried in a pre-heated oven at 80°C for 60 minutes; and then cooled in the desiccator
- 4.5. The flakes and labels are documented photographically; any optical changes compared to the original sample (2.1) or remaining paper fibres are documented for the final assessment.
- 4.6. By demand, the solubility of the adhesive in the washing water can be evaluated with an accurate mass balance. Therefore, the sample weight before and after washing and drying must be measured.

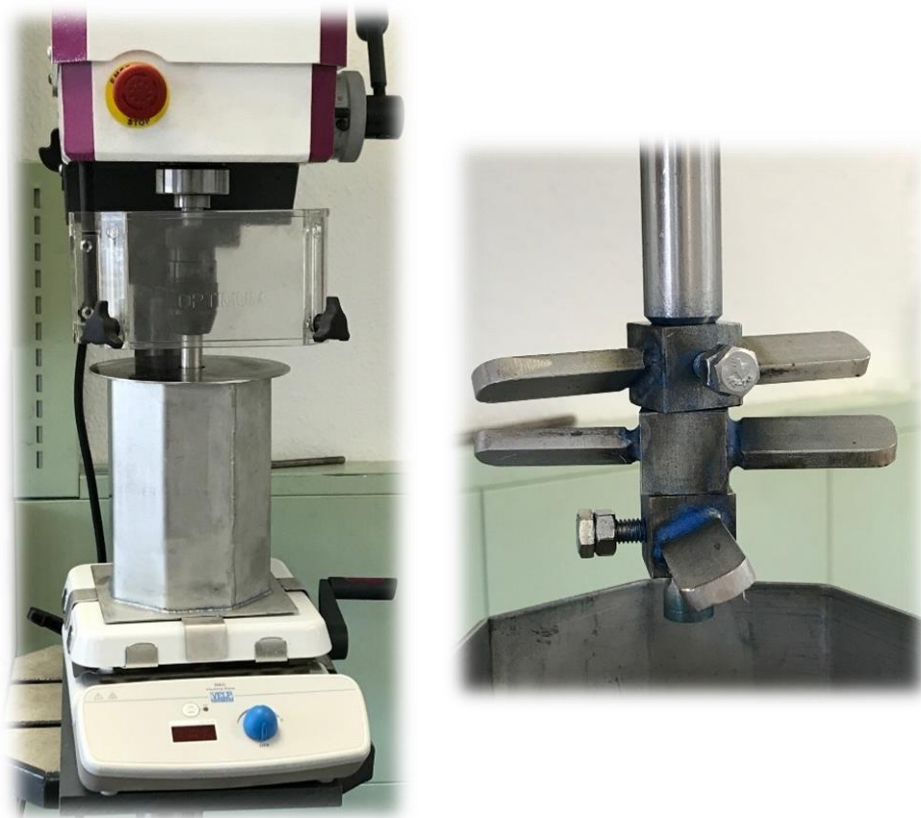


Figure 1: Attrition cell and stirrer - equipment for washing tests

Version history:

<i>Version No.</i>	<i>Date</i>	<i>Reason/Content of revision</i>
1.0	Nov 2020	First version of test method
1.1	Jun 2021	Updated parameters and test equipment
2.0	Jun 2022	Optimised procedure and new evaluation criteria