



## CHI-C5-SEP

# Disintegration and Density Separation Test for Plastic-based Packaging

Version 1.1

The density criterion considers the fact that float-sink sorting is the central process step to produce high-quality recyclate within plastics reprocessing. In the recycling of polyolefins only the fraction with a density of less than 0.995 g/cm<sup>3</sup> is used to produce PO (PE, PP) recyclates.

This CHI test method was developed by cyclos-HTP for polyolefin-based (PE or PP) packaging and includes the following steps (Principle of the test method is shown in the flow chart on page 2):

### 1. Materials and Equipment

- Polyolefin-containing packaging sample with unknown composition and density
- Scale with accuracy of 0.01g
- Beaker with a volume of 1L
- Magnetic stirrer with heating device and thermometer
- Circulating air dryer

### 2. Disintegration

- Grind the samples to flakes on a lab granulator (10 mm screen) or manually with a knife or scissors and document results.
- Weigh test sample and report as "A"

### 3. Density separation (Float-Sink test)

- Fill a beaker with 700 ml of tap water
- Measure and record the water temperature and density with a hydrometer. Under standard conditions for polyolefins<sup>A</sup> the test should be carried-out with a specific density of 0.995 g/cm<sup>3</sup> which relates to a range of the water temperature between 30 and 34°C<sup>B</sup>.
- Stir the test sample in water with a magnetic stirrer for 2 minutes at about 500 rpm.
- Stop the magnetic stirrer and let the sample rest for 2 minutes; ensure that no bubbles are present at the floating particles, by demand one drop of liquid soap can be added.
- Remove floating particles with a sieve and record.
- Filter and record sinking particles.
- Dry floating particles in a circulating air dryer at 80°C for 2 hours.
- Weigh floating particles and report as "B".

### 4. Evaluation of results

Calculate the efficiency of the float-sink separation "SEP<sub>f</sub>" according to the formula:

$$SEP_f = \frac{B}{A} \times 100\%$$

### Version history:

Version No.	Date	Reason/Content of revision
1.0	Jan 2018	First version of test method
1.1	Sep 2021	Supplementary information on the test conditions

<sup>A</sup> According to the Minimum Standard of the ZSVR; Version of Aug 31, 2021

<sup>B</sup> NIST Standard Reference Database 69: NIST Chemistry WebBook, Thermophysical Properties of Fluid Systems, Iso-baric Properties for Water, 2008