

CHI-C9-CPSEP

Compression Test for separation of packaging components

Version 1.0 / 21 December 2023

This CHI test method was developed by cyclos-HTP for the evaluation and assessment of packaging with multiple components (e.g. cup with cardboard sleeve), regarding the separation behaviour after compression during transport in a collection and sorting process. The separation under mechanical stress is relevant for determining whether the packaging components to be analysed are present separately in the sorting process and can therefore be evaluated separately or have to be evaluated as total packaging to determine recyclability.

The test includes the following steps:

1. Materials and Equipment

- a. Bag press equipped with pressure force control, capable to apply a pressing force up to 3 t and a compaction up to 90 % (see Figure 1)
- b. approx. 12 cm cavity between the bottom of the bag press and the lower stamp position
- c. Min. 50 pieces of an empty packaging test sample to be evaluated
- d. Mix of typical lightweight packaging to be considered

2. Test procedure

Of each kind of packaging sample has to be tested in random positions comparable to an empty state in the waste stream. The compression behaviour is determined with a volume reduction in a ratio of 5:1

1. Obtain test candidate samples of sufficient quantity (min. 50 pieces)
 - 1.1. All closures, attachments and labels should be included for a real-life test
2. Adjust the pressure regulator to "0"
3. Place test sample into several bags (ca. 5 bags á 35 l) and mix the test samples in the bags with typical lightweight packaging in a ratio of approx. 40:60
4. Open compression device and place bags inside up to a height of 60 cm to achieve a volume reduction in a ratio of 5:1
 - 4.1. If necessary, fill up with further lightweight packaging articles
5. Close device
6. Apply pressure to the test samples until the stamp reaches the lower position
7. Wait for system pressure to equalize (approx. 30 seconds)
8. Relieve pressure and open device
9. Remove the test sample
10. Allow test articles to sit 30 minutes before evaluation

3. Evaluation after compression test

The separation behaviour of each sample is determined after the test and compared with the state before the test. (see Figure 2)

The following conditions are considered for the assessment of the evaluation criteria:

- completely separated packaging components
- partly separated components
- not separated components

Evaluation criteria:

- Are the components of the sample completely separated after the test?
- If no separation is observed within 30 minutes after the pressure was applied and relieved, the packaging components has to be checked for their separation behaviour in further relevant sorting steps
- Check up to 5 belt transfers at a conveyor belt speed of 3.0 m/s
- If no separation is observed after 5 belt transfers, the packaging components can be considered as “in-separable”

Separation behaviour	Result
≥ 80%	separation test passed; complete separability ✓
< 80%	separation test failed, no separation of components ✗



Figure 1: Bag press



Figure 2: Evaluation of the sample conditions before and after the test (examples)

Version history:

Version No.	Date	Reason/Content of revision
1.0	Dez 2023	Development of test method