

CHI-C9-CPFB

Compression Test for fibre-based packaging

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This CHI test method was developed by cyclos-HTP for the evaluation and assessment of fibre-based packaging, regarding the size and shape after compression during transport and storage in a collection, sorting and recycling process. The 3D/2D factor is relevant for process steps, e.g., in a MRF (material recovery facility) where the three-dimensional shape is a factor for the sorting behaviour.

The test includes the following steps (Principle of the test method is shown in the flow chart in the appendix):

1. Materials and Equipment

- a. Pneumatic press equipped with plates (min 25 x 25 cm) and pressure force control, capable to apply at least 100 kPa (see Figure 1)
- b. Min 20 pieces of an empty packaging test sample to be evaluated
- c. The geometrical dimensions of the samples are measured before the test

2. Test procedure

1. Obtain test candidate samples of sufficient quantity
 - 1.1. All closures, attachments and labels should be included for a real-life test
 - 1.2. Loosen but don't remove closures
2. Adjust the pressure regulator to "0"
3. Open compression device and place 1 test sample between the plates
 - 3.1. Each kind of sample has to be tested in different positions that are defined for the packaging
4. Close device and manually apply mechanical pressure to the test sample
5. Squeeze device jaws and slide bottom pipe clamp tight
6. Adjust pressure regulator to 10 psi
7. Apply pressure to the device and sample
8. Wait for system pressure to equalize (min. 30 seconds)
9. Relieve pressure and open device
10. Remove the test sample
11. Allow test articles to sit 30 minutes before evaluation

3. Evaluation after compression test

Of each kind of packaging sample has to be tested in different positions that are relevant for the packaging in an empty state in the waste stream. For instance, a container with a bottom and sides must be tested in a standing and lying position.

The geometrical dimensions of each sample are measured after the test and compared with the dimensions before the test. (see Figure 2)

The following factors are calculated for the assessment of the evaluation criteria
(Sample geometry: h_0 = height before test; h_E = height after test; w = width; d = depth)

Compression factor:
$$CF = \frac{(h_E - h_0)}{h_0}$$

3D/2D factor:
$$3D/2D = \frac{h_E}{\sqrt{w \times d}}$$

Evaluation criteria:

- Is the sample 2-dimensional after the test (relatively to the original sample)?
- If no *significant* dimension change is observed within 30 minutes after the pressure was applied and relieved, the fibre-based packaging can be regarded as “compressible”
- Assessment according to the relevant criteria in the sorting process like the separation between 2D and 3D articles



Figure 1: Example for the test equipment



Figure 2: Evaluation of the compressed height after the test (examples)

Version history:

Version No.	Date	Reason/Content of revision
1.0	Jul 2021	First version of test method
1.1	Feb 2022	Updated test parameters and evaluation criteria