

CHI-C8-BFPE

Preparation and Application Test of PE-based Blown-Films

Version 2.0

This CHI test method was developed by cyclos-HTP for application tests of LDPE-based recyclates for blown-films and includes the following steps (Principle of the test method is shown in the flow chart in the appendix):

Evaluation of PE-based recyclates for blown film applications

- The tests can be carried-out on a lab scale blown film line capable to produce films of 30-40 μm with min 150 mm film bubble diameter with at least 2 m/min film speed.
- The prepared recycling blends should be degassed and dried by demand.
- Blown film extrusion without blending of 25% virgin LDPE and 25% LLDPE.
- The PE grades should be suitable for blown film applications ($\text{MFR} \leq 1.2 \text{ g}/10 \text{ min}$) without slip and anti-block additives to prevent sealing failures.

Parameter settings of blown film extrusion

Parameter	Unit	Suitable parameter settings
Extruder Temperatures	[°C]	Extruder zones: 180 / 200 / 210 / 220 // Die: 220°C
Output	[kg/h]	min. 1 kg/h
Melt Temperature	[°C]	210 – 230°C (measured)
Melt Pressure	[bar]	50 – 150 bar (depends on equipment)
Film Speed	[m/min]	min. 2 m/min
Film Thickness	[μm]	30 – 40 μm
Film Diameter	[mm]	min. 150 mm

Test of mechanical properties of the obtained film samples

- Tensile test according to DIN ISO 527 in machine and cross direction
- Dart Drop Test according to DIN ISO 7765-2

Parameter	Unit
Tear resistance (Ts) MD	[N/mm]
Tear resistance (Ts) CD	[N/mm]
Tensile modulus (E-Mod) MD	[MPa]
Tensile modulus (E-Mod) CD	[MPa]
Tensile strength (σ_M) MD	[MPa]
Tensile strength (σ_M) CD	[MPa]
Elongation at break (ϵ_{IB}) MD	[%]
Elongation at break (ϵ_{IB}) CD	[%]
Dart Impact Strength	[MPa]

Film sealing test

- The obtained blown film samples are sealed vertical to the web direction with a heating jaw sealing device.
- Variation of heating temperature between 100 and 130°C and sealing time between 0.5 and 2.0 seconds to find the characteristic sealing parameter window for each sample

- Optional a sealed seam testing can be carried out with 15 mm width and 200 mm/min test speed according to DIN 55529.

Seam tightness test

- The one-side sealed film tubes are filled with 1 kg of water and hung on the open side so that the seam is under load (see Figure 1). A soaking paper can be placed under the sample for the indication of water drops due to leakages
- It is observed if any water is leaking through the seam within 15 minutes.
- The test is repeated twice with different sealed samples (3 samples per film variation).
- The test is passed if at least 2 of 3 samples show no leaks.

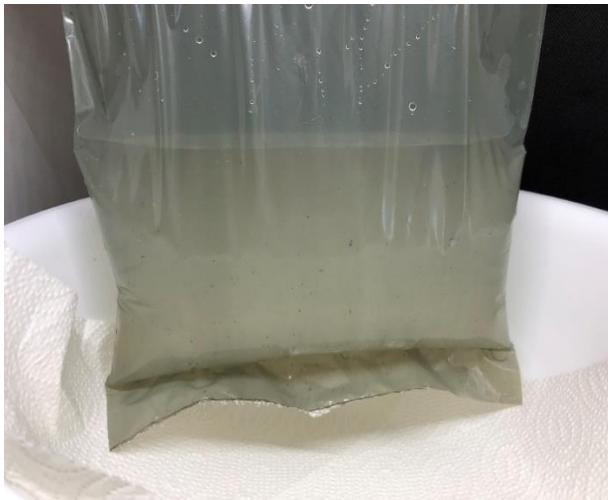


Figure 1: Seam tightness test setup