Sustainability Data Sheet:
Polyethylene (PE)

plastribution
experts in sustainable materials.

Introduction

Polyethylene (PE) is the most widely used polymer in the flexible & rigid packaging industry, including injection moulded articles, and offers an excellent set of properties for these applications, including strength, rigidity, sealability and barrier to water. It is manufactured in a range of densities & melt flows and either as a homopolymer or copolymer.

Typical properties

Density: 910 – 960 kg/m^3 (LDPE, LLDPE, HDPE)

Melt index: 0.05 – 50 g/10min (@ 2.16kg, 190°C)

Melting point: 105 – 130°C

Dart drop impact resistance (flexible extruded film): 30 – 1100 g/25µm

Notched Izod impact strength (rigid moulding / extrusion): 3.5 – 45 kJ/m^2

Flexural modulus (rigid moulding / extrusion): 260 – 1200 MPa

Carbon footprint data (NB: cradle-to-gate)

Material	kg CO_2 equivalents (CO_2e) per kg of resin	Typical density (g/cm^3)	Ref
LDPE	2.06	0.920	2
LLDPE	1.82	0.918	2
HDPE	1.90	0.955	2
EVA	2.11	0.930	1
rLDPE	1.01	0.920	1
rHDPE	1.10	0.955	1
Paper	2.42	1.200	1
Glass	4.40	2.500	1

Recycling

Polyethylene is 100% recyclable and can be recycled several times over. Film containing high percentages of EVA copolymer (such as stretch hoods) may not be collected for recycling.

Biodegradability & compostability

Polyethylene is neither biodegradable* nor compostable.

Bio-sourced

Polyethylene is manufactured from ethylene which is mainly obtained from petroleum or natural gas and therefore not routinely biosourced**.

Material solutions for sustainability

Fillers can be used to reduce the amount of virgin polymer (and therefore the carbon footprint) in an end-product. They can also enhance mechanical properties. Examples are minerals such as calcium carbonate & talc or natural fibres such as wood fibre. Use of mineral fillers can help to reduce processing energy requirements and moulding cycle times.

*An additive masterbatch can be added to polyethylene to transform the polymer such that it becomes biodegradable without forming microplastics. The technology works in both flexible films and rigid articles of wall thickness less than 1.2mm. NB: this technology is separate from oxy-degradables.

**Some suppliers are starting to offer polyethylene manufactured using wholly or partially bio-sourced ethylene. A mass balance approach may be used whereby biosourced feedstock is allocated to polymer production.

Recycled grades of polyethylene are available, either from post-industrial or post-consumer waste, although use may be limited due to colour & food contact status. Quality is very variable so polymer modifiers can be added to improve their performance.

Designing for sustainability

Downgauge flexible film or reduce rigid wall thickness by using performance materials such as metallocene-catalysed polyethylene (mPE) to reduce overall virgin material usage. In moulding, mPE also offers better clarity and organoleptics as well as higher strength.

Reduce or ideally eliminate the use of colours, particularly carbon black, to improve recyclability.

Select the correct grade for the job, e.g., a high stiffness/high impact grade to allow downgauging and/or increase service life.

To view the full sustainability data sheet for polyethylene, scan the QR code to the right with your smartphone

Or visit: www.plb.ltd/sus-data-sheet/pe

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