Design for Recycling (D4R)

Polyco D4R Guidelines

LDPE / LLDPE

Low-density Polyethylene (LDPE) and Linear Low-density Polyethylene (LLDPE) Packaging

Why Design Products for Recyclability?

As a packaging designer, you play a key role in creating packaging that is good for the product, good for people, and good for the planet.

These Design for Recycling (D4R) guidelines have been created to help you to make the best decisions when choosing how to design packaging that keeps the planet in mind. Designing packaging that can be easily recycled keeps that packaging out of landfill and out of the environment. Recyclable packaging re-enters the recycling value chain and can be used again and again, protecting and preserving the natural world.

These guidelines show you which materials are best to use, which materials should be avoided, and what quality criteria to factor in to ensure that your packaging can continue to be recycled in the highest grade possible.

Designing packaging for recyclability does not mean that you have to sacrifice quality or performance. By using these guidelines you will see that you can achieve high quality packaging and recyclability at the same time.

Low-density Polyethylene (LDPE) and Linear Low-density Polyethylene (LLDPE) Packaging

BASIC PRINCIPLES

Ideally:

- Natural or clear colour.
- Minimum printing.
- No labels or attachments.
- Mono-material and mono-layer.

Avoid:

- Additives that can impact negatively on the subsequent recyclate quality in durable applications.
- Nylon or PET seals and closing devices.

Contents

1 LDPE & LLDPE Extruded Film, Bags, Shrink Wrap and Stretch Wrap 04

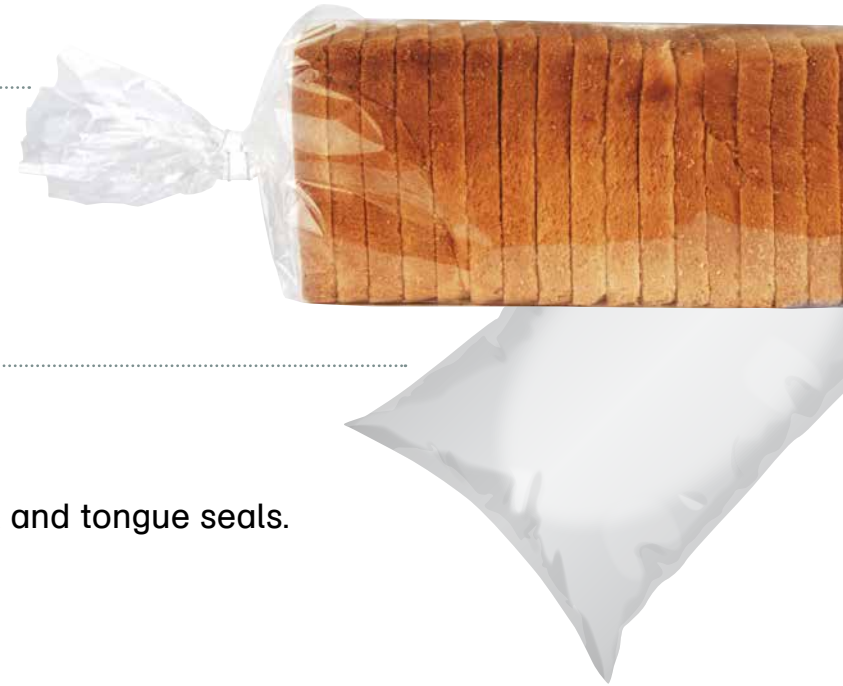
2 LDPE & LLDPE Extruded Tubes 06

3 LDPE & LLDPE Injection Moulded Lids, Caps and Closures 08

1 LDPE/LLDPE Extruded Film, Bags, Shrink Wrap and Stretch Wrap

BASIC PRINCIPLES

Implementing these basic design principles will ensure that LDPE & LLDPE film, bags, shrink wrap and stretch wrap are designed to be recycled.



Ideally:

- Polymer should be clear films.
- Mono-layer or mono-material.
- Minimum printing.

Avoid:

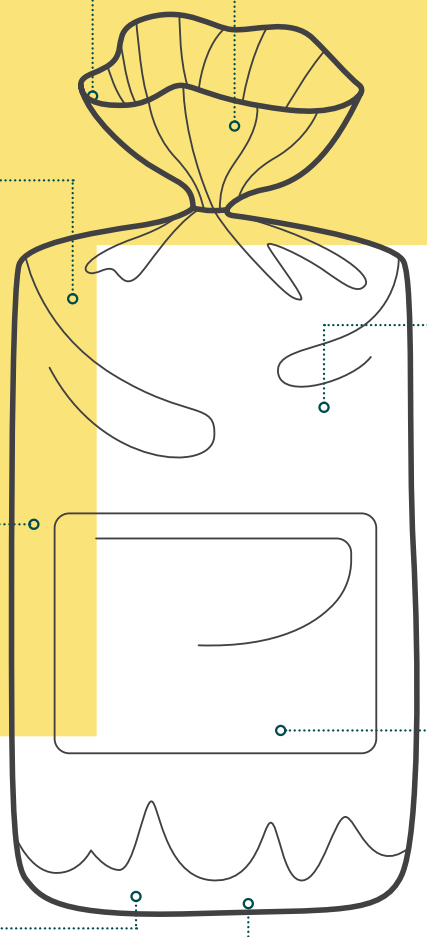
- Heavy, multi-layer printing.
- PP laminated labels.
- Weld-on closing systems, zips, or hook and tongue seals.
- Weld-on dispensing spouts.

QUALITY CRITERIA

Know what to factor in to ensure that your packaging can continue to be recycled in the highest grade possible.

- Clear films are very popular for recycling.
- Coloured and/or printed films are less popular for recycling.
- Recycled content needs to be contaminant-free, i.e. no biodegradable, compostable or oxo-biodegradable additives and no PP film.
- Recycled LDPE cannot be used in direct contact with food.
- Very thin and small films offer little value to waste pickers and are often overlooked for collection.
- LDPE and LLDPE are recycled together and recyclate is often a blend of the materials.
- HDPE films as well as HDPE/LDPE/LLDPE film blends are recycled with LDPE/LLDPE films.

LDPE/LLDPE Film and Bags*



COLOUR
- Natural or White
- Any other colour

SIZE
- Large, A5 or bigger
- Hand-size to A5
- Small packs, bits and pieces

MULTI-LAYERS and LAMINATES
- Different LLDPE and LDPE layers
- E/VAL, Surlyn® or HDPE layers
- PP layers, not to exceed 5%
- PET and/or Nylon layers

FASTENING, CLOSING or SEALING DEVICE
- LDPE or LLDPE weld-on handles
- Integral zip seal strips of different colour
- PET or PA hook and tongue sealing strips

LABEL or STICKERS
- Paper with water-soluble glue
- Any other labels, less than 10% of surface area
- Large, laminated labels with non-water-soluble adhesives

PRINTING
- No printing other than legal markings
- Minimal printing in lighter colours
- Printing in darker colours; reverse printed

MATERIAL
- Clear, smokey or umgeni recycled content
- Coloured recycled content
- Recycled content containing non-LDPE/LLDPE content

ADDITIVES
- Fillers, e.g. $CaCO_3$ (overall film density to remain less than 1 g/cc)
- Oxo-biodegradable additives

KEY:
- popular for recycling and will be widely collected and processed
- widely recycled; less popular
- not recycled

* Generic example and represents all LDPE and LLDPE film, bags and wrap

2 LDPE/LLDPE Extruded Tubes

BASIC PRINCIPLES

Implementing these basic design principles will ensure that LDPE & LLDPE tubes are designed to be recycled.

Ideally:

- Mono material.

Avoid:

- Big, heavy PP closures.

Notes:

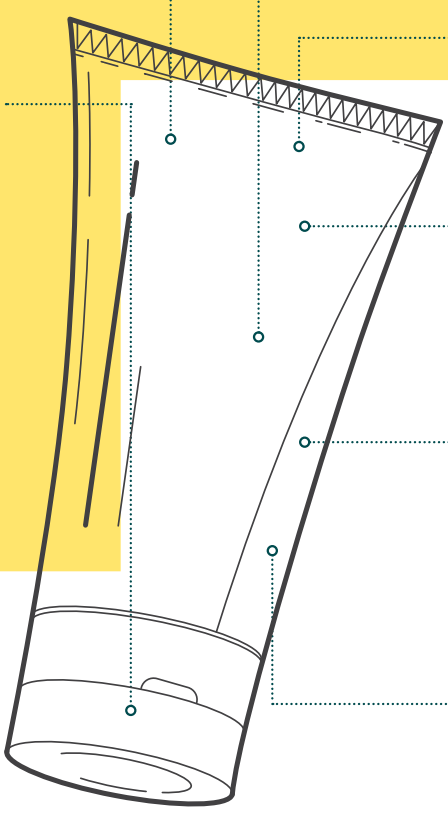
- Very small packaging items will only be “picked” up by waste collectors if part of a separation at source initiative, they are not desirable.
- Large quantities of residual content discourages collection and recycling.
- Easily confused with tubes made from other material.

QUALITY CRITERIA

Know what to factor in to ensure that your packaging can continue to be recycled in the highest grade possible.

- Natural, white or cream coloured products give a light-coloured recyclate.
- Light-coloured recyclate can be used for light-coloured, or pigmented, products.
- Printing cancels the light colour and results in dark grey or black recyclate, which is less desirable.
- Dark recyclate can only be used for black products.
- The colour and the strength of the polymer deteriorate with every recycling cycle.
- Only extrusion grade to be used for tubes.
- Co-extrusion tube manufacturing can accommodate recycled content layers sandwiched between virgin layers.
- Ensure legible and correct material identification codes are used as LDPE/LLDPE tubes are easily confused with HDPE, PP and multi-layer tubes.

LDPE/LLDPE Tube*



COLOUR
- Natural or White
- Any other colour

CAP / CLOSURE
- HDPE same colour
- PP, HDPE different colour
- Metal

CAP LINERS
- PE-E
- Paper, Board, PS-E, PP-E

DISPENSERS OR NOZZLES
- HDPE mono-material (same colour)
- LDPE, PP and HDPE (different colour) components
- Containing metal components

LABEL
- Paper with water-soluble glue
- PP (IML or other)

PRINTING
- Direct printing on tube

CONTENTS
- Non-water-soluble residue, e.g. silicon, enamel paints, etc

MULTI-LAYER
- HDPE layers
- E/VAL barrier layer

ADDITIVES
- Fillers, e.g. $CaCO_3$ (overall container density to remain less than 1 g/cc)
- Oxo-biodegradable additives

KEY:
- popular for recycling and will be widely collected and processed
- widely recycled; less popular
- not recycled

* Generic example and represents all LDPE and LLDPE tubes

3 LDPE/LLDPE Injection Moulded Lids, Caps and Closures

(push-on, peel-off or snap-on)

BASIC PRINCIPLES

Implementing these basic design principles will ensure that LDPE & LLDPE lids, caps and closures are designed to be recycled.

Ideally:

- Polymer should be natural or white.

Avoid:

- Additives such as biodegradable, compostable or oxo-biodegradable.
- Including nylon or PET seals.

Notes:

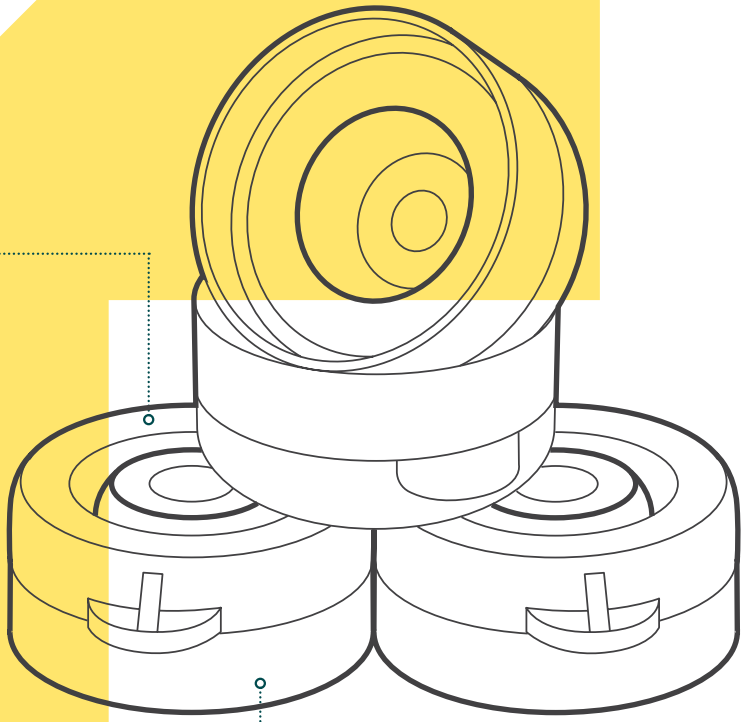
- LDPE/LLDPE push-on, peel-off and snap-on caps and lids are recycled with HDPE or PP closures without hampering the HDPE or PP recycling processes.
- Very small packaging items will only be “picked” up by waste collectors if part of a separation at source initiative, they are not desirable.
- Tamper-proof strips need to remain with the cap to ensure that it gets captured in the waste stream. Once removed, it will be too small to be collected.

QUALITY CRITERIA

Know what to factor in to ensure that your packaging can continue to be recycled in the highest grade possible.

- Peel-off lids are often used to seal steel cans and tins and requires ongoing flex and strength in general. Recycled content needs to be limited to ensure long-term performance.
- Push-on caps and closures are typically used for edible oil and pharmaceutical dispensing bottles and will get collected with the PET bottles.
- Once separated from the main can, bottle or tin, the LDPE lid, cap or closure will only get collected where a formal waste collection system is in place.

LDPE Lids, Caps and Closures*



RECYCLED CONTENT

- Natural or white recycled content
- Grey or darker coloured recycled content
- Recycled content non-LDPE contamination

COLOUR

- Natural or White
- Any other colour

ADDITIVES

- Fillers, e.g. $CaCO_3$ (overall container density to remain less than 1 g/cc)
- Oxo-biodegrad-able additives

KEY:

- popular for recycling and will be widely collected and processed
- widely recycled; less popular
- not recycled

* Generic example and represents all LDPE and LLDPE push-on, peel-off and snap-on caps and closures

Polyco (the Polyolefin Responsibility Organisation NPC) is focused on making waste a valuable resource that works for our economy. We aim to grow the collection and recycling of polyolefin plastic packaging in South Africa and to promote the responsible use and reuse of this plastic packaging. Our mission is to reduce the amount of plastic packaging going to landfill and to end plastic waste in the environment. Polyco does this by collaborating with multiple stakeholders, by investing in recycling innovation and infrastructure in South Africa, and by educating both the industry and the consumer about recycling.

We hope you have found these Design for Recycling Guidelines helpful. If you have any comments or queries please contact us.

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