RIGID HDPE PACKAGING

Introduction

This Quickstart is intended to be used alongside APCO's *Sustainable Packaging Guidelines* (SPGs) by providing a quick guide to design strategies that improve the recyclability of rigid high density polyethylene (HDPE) packaging in Australia. In accordance with the waste hierarchy and our transition to a circular economy, options for elimination, reuse or reduction should be explored first.

HDPE is the most frequently used plastic in packaging in Australia. It has low to very low rates of reuse, recovery and recycled content and plenty of room for improvement. The two greatest opportunities for HDPE are to:

1. Stop the use of colour pigments for packaging, which will improve the separation and reprocessing of HDPE for use in food grade recycled content.
2. Increase the availability of Australian sourced food grade recycled HDPE, which will encourage the use of recycled content in food and non-food packaging in Australia.

These two measures will assist in the necessary step changes to improve collection and reprocessing of HDPE in Australia.

Australian HDPE packaging: actual and targets

| HDPE RIGID	2017-18	2025
Recovery rate	38.4 %	70%
Recycled content	2 %	20 %

NOTE: This Quickstart is intended to be general guidance only, and the information is based on industry knowledge at the time of publication. Key principles regarding use of pigments and multiple materials impact the recyclability of all HDPE packaging, both business-to-business and business-to-consumer. To classify recyclability of consumer packaging through kerbside recycling in Australia/ New Zealand, please refer to the Packaging Recyclability Evaluation Portal (PREP). For further guidance, use the links to resources at the end of this document. Refer to local state and territory jurisdictions to determine recyclability of eligible beverage containers through container deposit schemes.

Tips for 'best practice' design for recycling

Use mono-materials to maximise recyclability
Use only one polymer for all components if possible. HDPE is a durable material, and various forms of the polyethylene (PE) family can be combined for compatible packaging, caps, lids and labels. Aim to improve package recyclability by meeting PREP design requirements.
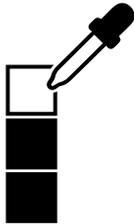
Minimise colours or select preferred colours
Use unpigmented material, as this has the highest value for recycling. If colour is required, consider light translucent or opaque colours. Minimise dark colours and avoid optical brighteners. Optical brighteners are not identifiable until very late in the recycling process and can cause unacceptable fluorescence in the next product/packaging made from recycled HDPE.

Ensure compatability of closures for recycling
Use compatible materials and aim for unpigmented or light coloured resins. The robust and diverse characteristics of PE allows all components to be made from PE, including low density PE (LDPE), medium density PE (MDPE) and high density PE (HDPE). This means it is easy to eliminate or minimise non-PE components.

Ensure compatability of labels for recycling
Polyolefin labels (including PE and PP) are preferred whether in pressure sensitive adhesive, wrap around, shrink sleeve or in-mould formats. Keep label surface area to less than 40% of the package to enable higher sorting and recycling rates. It is important to work with your label suppliers to ensure the label adhesive will enable easy release during the wash stage of reprocessing.

Incorporate recycled content
Use the maximum percentage of recycled content to help create and support sustainable end markets for recycled HDPE, and assist Australia to meet the target of 20% recycled content in HDPE by 2025. Please ensure food grade quality recycled HDPE is specified for food packaging.

Include labelling for recycling
Use the Australasian Recycling Label (ARL) to educate consumers on how to correctly recycle each component of the packaging.

Guide to selecting materials

COMPONENT	PREFERRED	RECYCLABLE WITH REDUCED VALUE	AVOID (NOT COMPATIBLE)
Bottle/ container material and surface/ barrier layers	PE resin – HDPE. Single monomer PE with layers including HDPE, MDPE, LDPE, and linear LDPE (LLDPE)	Barrier layer - EVOH is moisture sensitive and so is often trapped between HDPE layers. Use of EVOH at a low percentage with PE.	Mineral fillers that change polymer density – they can contaminate the finished recycled material. Degradability additives – reduce durability of the recycled resin. Barriers or coatings that are made from materials other than PE or EVOH – they can be difficult and costly to separate.
Bottle/ container colour	Unpigmented HDPE - is the most recyclable as it has the greatest value and opportunity for remanufacture into new packaging.	Transparent tinted HDPE - contaminates unpigmented HDPE recycling and should be minimised. White and light pigmented opaque HDPE - is recyclable but has a smaller market than unpigmented HDPE.	Carbon black and dark pigment colours – they are difficult to detect and sort through material recovery facility (MRF) infrared scanners.
Closure (e.g. cap, lid, trigger) material	PE plastics. Colour - clear unpigmented resin. Liner-less closure.	PE plastics. Colour - coloured transparent, or white or light colour opaque PE. If using non-PE based attachments, such as PET or PP, ensure they have a density that allows for easy separation in the recycling process.	Dark coloured caps or lids (of any material, transparent or opaque). PVC/Nylon/Silicone - contaminate high value plastics in sorting systems. Metal parts or metal foils – they can damage screens and can cause equipment failure and downtime in MRFs. Wadding, padding, ties, cables, etc.
Label/sleeve material (adhesive label)	Labels of polyolefin plastic (including forms of PE) are most preferred, particularly in sleeve format. Label covering <40% of container surface area to facilitate optical sorting at the MRF.	Unpigmented HDPE with large labels covering >60% of the package's surface area prevent effective sorting and increase losses. Avoid dark coloured labels (including carbon black) that confuse optical sorting and increase losses. Non-PE labels of PP at <1g/cm^3, or PET, PS, PLA at >1g/cm^3 so they are removed in the reprocessor's wash.	Paper, PVC, polystyrene (PS), metalised and PLA and degradable additive labels - contaminate reprocessing. Full sleeves (almost 100% coverage) - result in poor sorting at MRFs.
Label/sleeve inks	Non-washable, non-toxic (aqueous, plant-based etc.).	Use light colours to minimise loss of value of plastic. Inks, bonding agents and lacquers negatively impact recyclability and can restrict recycling for food packaging.	Toxic or hazardous inks. Inks that bleed. Large print areas and dark colours. Metallic and mineral inks.

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Label/sleeve adhesives	Minimal adhesive coverage. Adhesives to be non-toxic, washable and the package free of residues under caustic wash conditions pH >12 and <40°C.	Pressure sensitive label adhesives to be dispersible in caustic wash conditions pH ≥12 and ≥70°C. Ensure the selection of adhesive will assist the removal process of the label.	Large areas of glue and non-water soluble/ dispersible adhesives - can clog up recycling equipment and may contaminate recycled resin.
Direct print	Use laser marked, non-toxic inks for date stamp, especially on natural HDPE.	On coloured HDPE, minimise direct printing as it reduces recycling and value.	On natural HDPE avoid any other direct printing other than date stamp.

More information

- To find out more information about PREP:
  > PREP Design Pty Ltd (2020), available at: *https://prep.org.au/*
- For more on design and recyclability of both clear and coloured rigid HDPE packaging composition, labels, inks etc.:
  > EU RecyClass TM Guidance (2020), available at: *https://recyclass.eu/recyclass/design-for-recycling-guidelines/*
- For a comprehensive guide on compatible design for plastics recycling from the United States:
  > Association of Plastic Recyclers (2018), available at: *https://plasticsrecycling.org/images/pdf/design-guide/Full_APR_Design_Guide.pdf*
- For notes on European Union REACH legislation relating to chemical pigments and inks, food packaging inks, environmental footprint of inks, recycled plastics and inks etc:
  > European Printing Ink Association (2018), available at: *http://eupia.wikafi.be/index.php?id=3*
- For an overview guide on HDPE packaging including life cycle impacts:
  > SRU and Helen Lewis Research (2013), *Design smart material guide: rigid plastic packaging*