

RIGID PP PACKAGING

Introduction

This Quickstart is intended to be used alongside APCO's *Sustainable Packaging Guidelines* (SPGs) by providing a quick high-level guide to design strategies that improve the recyclability of rigid polypropylene (PP) 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.

PP is the third most used plastic in packaging in Australia, however it has very low rates of reuse, recovery and recycled content. The three greatest opportunities for PP are increasing reuse, ceasing use of non-recyclable pigments and printing ink, and increasing recycled content. These three measures will assist in the necessary step changes to improve collection and reprocessing of PP in Australia.

Australian PP packaging: actual and targets

PP RIGID	2017-18	2025
Recovery rate	11%	70%
Recycled content	3%	20 %

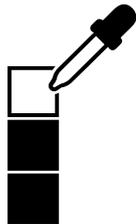
NOTE: This Quickstart is intended to be general guidance only, and the information is based on industry knowledge at the time of publication. Key principles regarding use of pigments and multiple materials impact the recyclability of all PP packaging, both business-to-business and business-to-consumer. 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 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. PP is highly versatile and can easily be used in all components including the primary pack, caps, lids and labels. Aim to improve recyclability by meeting PREP design requirements.



MINIMISE COLOURS OR SELECT PREFERRED COLOURS

Use clear unpigmented material as this has the highest value for recycling. Avoid additives in PP particularly dark colours and optical brighteners, and avoid inks that are toxic or bleed in reprocessing which prevent recycling.



ENSURE COMPATABILITY OF CLOSURES FOR RECYCLING

Use compatible materials and aim for unpigmented or light coloured resins. The versatility of PP allows all components to be made from PP. This means it is easy to eliminate or minimise composite and non-recyclable materials that contaminate PP recycling or end up in landfill.



ENSURE COMPATABILITY OF LABELS FOR RECYCLING

Use labels that cover minimal surface area to help facilitate accurate optical sorting at MRFs. PP labels are preferred whether in pressure sensitive adhesive, wrap around, shrink sleeve or in-mould formats. Select light coloured recyclable inks that maximise PP recovery rates.



INCORPORATE RECYCLED CONTENT

Use the maximum percentage of recycled content to help create and support sustainable end markets for recycled PP, and assist Australia to meet the target of 20% recycled content in PP by 2025.



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 FOR RECYCLING)
Bottle/ container material and surface/ barrier layers	Single monomer PP and no coatings.	Barrier layer - EVOH is moisture sensitive and so is often trapped between PP layers. EVOH coatings are not separable in recycling, so use should be minimal.	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 PP or EVOH – they can be difficult and costly to separate.
Bottle/ container colour	Unpigmented PP - clear PP is easiest to recycle, provides greatest value and opportunity for remanufacture into new packaging.	Clear transparent PP with printing covering <30% of package surface. White and light pigmented opaque PP - is technically recyclable but has a smaller market.	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	Clear, unpigmented PP resin. Closures without a liner are best.	Coloured transparent PP or HDPE attachments. White and light coloured opaque PP.	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 PP, including oriented PP (OPP) and biaxially oriented (BOPP) are most preferred, particularly in sleeve format. Label covering <40% of container surface area to facilitate optical sorting at the MRF.	Labels covering more than 40% of the package's surface area – impacts effective sorting and increases losses. Avoid dark coloured labels (including carbon black) that reduce optical sorting and increase losses. PE, PET, PLA labels are tolerated but not preferred and require densities >1g/cm ³ so they are easily separated in the recycling process.	Paper, PVC, polystyrene (PS), metalised, PLA and degradable additive labels - contaminate reprocessing. Full sleeves (almost 100% coverage) - result in poor sorting at MRFs.
Label/sleeve inks (adhesive and direct print in- mould)	Non-washable, non-toxic (aqueous, plant-based etc.).	Minimise colour prints <30% of package surface and use light colours. Inks, bonding agents and lacquers negatively impact value, recyclability and can restrict recycling for food packaging.	Toxic or hazardous inks. Inks that bleed. Large print areas >30% and dark colours. Metallic and mineral inks.

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

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 PP packaging composition, labels, inks etc:
 - > EU RecyClass TM Guidance (2020), available at: <https://recyclclass.eu/recyclclass/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 PP packaging including life cycle impacts:
 - > SRU and Helen Lewis Research (2013), *Design smart material guide: rigid plastic packaging*

Disclaimer: This document has been developed by the Australian Packaging Covenant Organisation (APCO) with consultation from packaging manufacturers and experts in the waste and recycling industry. The document is intended to be general guidance only and the information contained within has been developed based on current knowledge at the time of publication.

Some information may not be relevant to all packaging types. For specific guidance on individual packaging items and to classify recyclability through kerbside recycling in Australia and New Zealand, please refer to the Packaging Recyclability Evaluation Portal (PREP). PREP is a living and dynamic platform that can be edited or expanded in consultation with a Technical Advisory Committee, as market and infrastructure adapt.

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