



# **RECYCLING GUIDE FOR MANUFACTURERS MARKETING IN ALUMINIUM CONTAINERS**

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## 1. Introduction

Aluminium has several beneficial qualities that make it to be one of the most commonly used

packaging materials. It is 100% recyclable and uses only 5% of the energy used to make the original product<sup>1</sup>.

To maximise recyclability and ensure the consistency in aluminium products recovered from suppliers, this specification aims to:

- Provide fillers information about the recyclability of aluminium
- Ensure the design and the materials used in aluminium beverage containers are accepted by Australian recyclers.

These guidelines are a benchmark for buyers and suppliers within the Australian recycling industry. ACOR welcomes feedback on all specifications at any time to ensure they reflect the current industry practice. Individual buyers and sellers can use it as a workbook or a reference for trading and negotiation. It is not compulsory for buyers and sellers to comply with the standards. However, buyers and sellers are strongly encouraged to work together and reach an agreement regarding terms and conditions.

## 2. **Benefits of these Guidelines**

Companies are able to gain a number of benefits by adopting these guidelines in product design, manufacturing and recycling. The benefits include:

- Improving design for recyclability
- Transparent packaging stewardship and alignment with company sustainability objectives
- Supply chain alignment between packaging manufacturers and recyclers in order to maximise aluminium recyclability.

## 3. **How to use these Guidelines**

These guidelines can be used as:

- An in- house working document that provides information for packaging designers,

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<sup>1</sup> Australian Aluminium Council (2010), <http://aluminium.org.au/packaging>

manufacturers and brand owners in making decisions to improve recyclability.

- A benchmark for product designers, manufacturers and suppliers with information that aluminium beverage containers produced are accepted by the recycling industry.

#### 4. Glossary of Terms

- **Alloy (n.):** a substance that is composed by a mixture of metals;  
**(v.):** to mix metals.
- **Alumina:** an oxide of aluminium
- **Anneal:** to strength and reduce the brittleness of aluminium and alloys through heating and cooling processes.
- **Flux:** a chemical cleaning or purifying agent, such as limestone and dolomite, which is used in extractive metallurgy or metal joining.
- **Ingot:** an ingot is up to 11 tonnes in weight, over 500 mm thick, over 1600mm wide and over 4500mm long.

#### 5. What is Aluminium

Aluminium (chemical symbol 'Al') is the world's most abundant metallic element and the third most abundant of all elements. Since aluminium is chemically unstable, it cannot be found in its metallic form in nature. However, it can be found in various forms in most rocks, soils, and gemstones, such as topaz and garnet. Under acidic conditions, aluminium changes in soluble form and released from rocks and soils.

Aluminium used in packaging is an alloy which consists of aluminium metal and magnesium. Scrap aluminium and hardening agents are added for recycled aluminium. A vast majority of aluminium used in packaging is used as beverage containers. Apart from packaging, aluminium is also used widely in other applications such as transportation, construction, electrical transmission lines, etc.

##### 1. Chemical Characteristics

- Chemically unstable and reactive
- Light silvery- white metallic element; and,
- Corrosion resistance due to a thin surface layer of aluminium oxide that is formed when exposed to air.

## 2. **Physical Characteristics**

- Ductile and malleable
- Good reflector of light
- Strong and light weight; and,
- Good thermal and electrical conductor.

## 3. **Aluminium Packaging Applications**

- Beverage cans
- Foils
- Aerosol cans
- Containers; and,
- Cosmetics packaging.

## 6. **Aluminium Recovery and Recycling Process**

Aluminium containers are 100% recyclable. In Australia, the majority of recycled aluminium packaging is recovered from kerbside recovery systems and resource recovery companies. It is estimated that there are over two billion aluminium cans recycled every year. As a packaging material, aluminium is commonly used as beverage containers and semi-rigid food containers (e.g. pie dishes, TV, takeaway containers, and meals on wheels).

Recycling aluminium also brings significant economic, environmental and social benefits.

### 1. **Economic Benefits**

- Reduce the cost of fuel in transport due to the low ratio of weight to capacity of aluminium containers.
- Reduce the cost of transportation as aluminium beverage containers can be packed more tightly than other materials.
- Reduce total energy cost.

### 2. **Environmental Benefits**

- Uses only 5% of the energy used to make the original product<sup>2</sup>.
- The emission output is 96% lower than the original product<sup>3</sup>.

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<sup>2</sup> Australian Aluminium Council (2010), <http://aluminium.org.au/packaging>

- Reduce waste to landfill.

### 3. **Social Benefits**

- Income for community groups and individuals in some jurisdictions through the payment for empty aluminium cans for recycling in container deposit schemes.

## 7. **Recovery and Recycling Process**

The recovery and recycling process of used aluminium containers (UACs) involves five key steps:

1. Collection
2. Sorting and washing
3. Re- melting
4. Casting and rolling
5. End market

### 1. **Collection**

The majority of UACs are collected from households and businesses through kerbside recovery programs and transported to a Material Recycling Facility (MRF) for sorting. Only aerosol cans derived from the domestic waste stream should be handled by MRFs. ACOR recommends that aerosol cans collected from the commercial waste stream should be directed to specialist recycling facilities. Local councils that collect aerosol cans co- mingled with other recyclables must ensure their MRF/ contractor is capable of handling them.

### 2. **Sorting and Washing**

The collected UACs are separated from other non- UAC materials. Contaminants such as plastic bags are removed by hand. Fans and magnets are used to separate paper

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<sup>3</sup> US EPA (2011),  
[http://www.epa.gov/region10/pdf/climate/wccmmf/Reducing\\_GHGs\\_through\\_Recycling\\_and\\_Composting.pdf](http://www.epa.gov/region10/pdf/climate/wccmmf/Reducing_GHGs_through_Recycling_and_Composting.pdf)

and steel materials respectively. Optical beams, combined with compressed air jets are also used to separate plastic and glass in some MRFs. Once the cans and containers are sorted, they are crushed into bales for transportation to reprocessing facilities. Re-processors generally do not want to handle aerosol cans separately and prefer to handle them in small numbers mixed with other cans. Generally, aerosol cans should not be segregated from the steel and aluminium recyclate stream. If they are segregated and processed separately, the quantity of flammable gas or liquid increases the potential hazard.

### 3. **Re- melting**

The bales are loaded into the furnace and heated to about 700- 750°C to produce molten aluminium.

### 4. **Casting and Rolling**

The molten aluminium is casted into ingots that can be in various shapes. The ingots are either used directly in production (e.g. gear boxes and engine blocks) or rolled into aluminium sheets, plate, or thin foils. The rolling process changes the characteristics of aluminium, making it more brittle or ductile.

### 5. **End Market**

The aluminium sheets are used to produce items such as new beverage cans, food containers, roof guttering, and house siding.



## 8. Contaminants

### 1. Explosion Hazards

The aluminium scrap **MUST** be free of contaminants that may cause explosion, especially when charged into molten aluminium.

Contaminants that are prohibited during reprocessing, include, but are not limited to the following:

- Heavy grease and oils
- Residual chemical, such as nitrate and sulphate and other oxidising materials
- Corroded and oxidised materials
- Water and other volatile substances either in solid or liquid form
- Salt fluxes
- Glass or plastic bottles, pressurised aerosol cans, butane lighters, or any other



sealed containers.

## 2. **Health Risks**

Aerosol cans are compatible with aluminium recycling process. However, they are not often included in dedicated recycling programs due to safety issues. Aluminium aerosol cans present a potential hazard in the compacting and bailing process at a MRF if they are still pressurised. If aerosol cans are accepted for recycling, a close consultation should be undertaken with the company or organisation that will collect and process the material. Advice on how the materials should be presented and stored should be given in order to minimise health and safety risks and optimise the benefits of recycling.

Apart from the potential explosion, substances that may be harmful to employees' health are also prohibited in the remelting process, including, but not limited to the following:

- Substances that have had prior exposure to, or contaminant of radiation, detected by radiation meters.
- Tramp contamination by polychlorinated biphenyls (PCBs)
- Alloyed, plated or free selenium, cadmium, lead, mercury, arsenic, beryllium or antimony.

## 3. **Other Contaminants**

Baled UAC should be free of any other non- UAC materials which cause any safety hazard.

These contaminants include:

- Steel and other ferrous metals
- Lead and other metals
- Paper and cardboard
- Plastics
- Glass
- Wood
- Dirt
- Food wastes
- Sand
- Electronics and batteries
- Construction wastes

## 9. **Guidance for Aluminium Can Packaging Design and Recovery**

As aluminium cans are 100% recyclable, it is suggested that packaging designers and manufacturers label all aluminium cans, including food containers, drink cans and aerosol cans for recycling.

Further information for packaging design is available in the UK WRAP Packaging and Recyclability Guidelines:

<http://www.wrap.org.uk/sites/files/wrap/Packaging%20and%20Recyclability%20Nov%2009%20PRAG.pdf>.