ACOR
AUSTRALIAN COUNCIL OF RECYCLERS INC
the voice of the recycling industry

Recycling Guide for Beverage and Food Manufacturers Marketing in Aluminium





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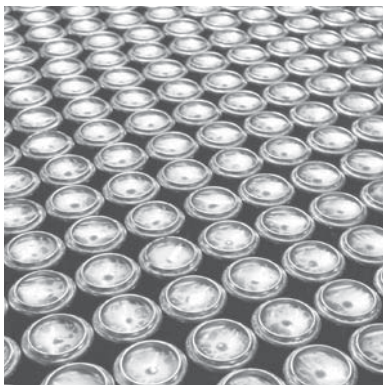

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Introduction

A major reason for the success of aluminium as a packaging material has been its 100% recyclability.

This booklet is designed to:

- Provide fillers with a guide to the recyclability of aluminium
- Ensure that used aluminium beverage containers that are recovered by kerbside collection programs, Australia wide, are able to be recycled.

This booklet should be treated as a working document that will need updating from time to time. The publishers welcome the input of companies, which can provide additional information to ensure that package designers and fillers are aware of the latest aluminium technology and available products.

The booklet identifies and lists accessories and other contaminates of the aluminium recycling process; provides reasons why a specific product contaminates the aluminium recycling process and, where possible, suggests alternative products that can be recycled via the aluminium process.

Common Abbreviations

alloy	Noun – a substance that is mainly a mixture of metals. Verb – to mix metals.
alumina	An oxide of aluminium.
anneal	To heat aluminium and alloys at a temperature which is sufficient either to fully or to partially soften the metal in readiness for rolling. Annealing helps to strengthen the metal.
atomic number	The number of positive charges carried by the nucleus of an atom.
bauxite	A rock, the principal ore of aluminium, consisting mainly of aluminium oxide.
flux	A substance mixed with a metal etc to help fusion.
ingot	An ingot is up to 11 tonnes in weight, just over 500mm thick, over 1600mm wide and over 4500mm long.
overburden	Unwanted material overlying aluminium ore.
reduction cell	Smelting cell or pot.
valency	The combining power of an atom.

What is Aluminium

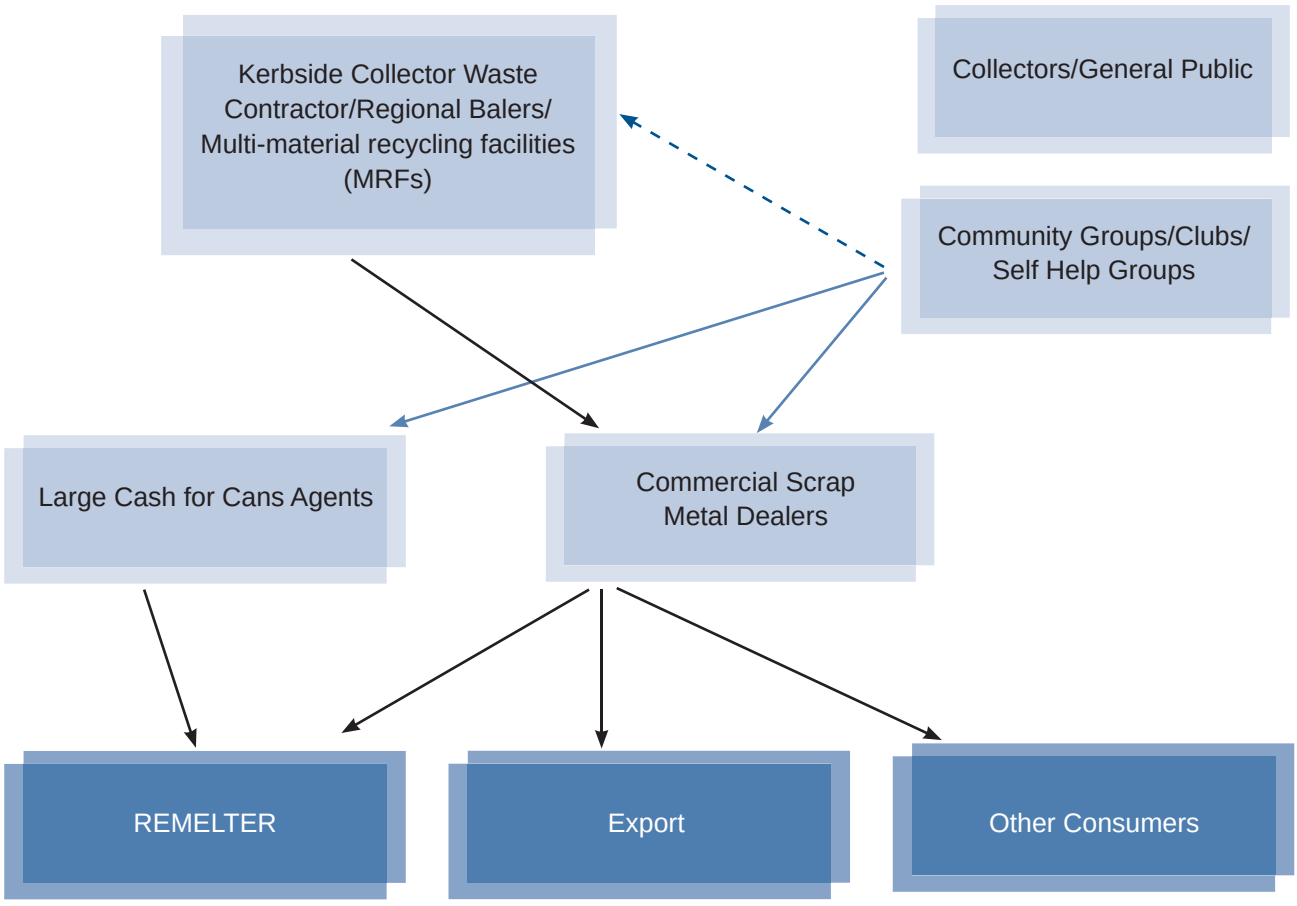
Aluminium is the most common metallic element on earth, making up about 8% of the earth's crust, concentrated in the outer 16 km. Only oxygen and silicon are more abundant. Evolution of life and human civilisation has developed in an aluminium rich environment. It is the most widely used nonferrous metal today. Aluminium never occurs in its metallic form in nature. It occurs in various forms in most rocks and soils and is also present in gemstones like topaz and garnet. It can be found in vegetation and in all of the earth's water. Aluminium is also present in all clays, so it has been a constituent of cooking vessels since earliest civilisations.

The naturally occurring forms of aluminium are usually stable and do not interact with the biological processes of living organisms. Under acidic conditions aluminium may be released from rocks and soils in a soluble form, which is more available for uptake, by plants and animals. However, uptake of this soluble form is limited by the presence of natural agents such as silicates and fluorides.

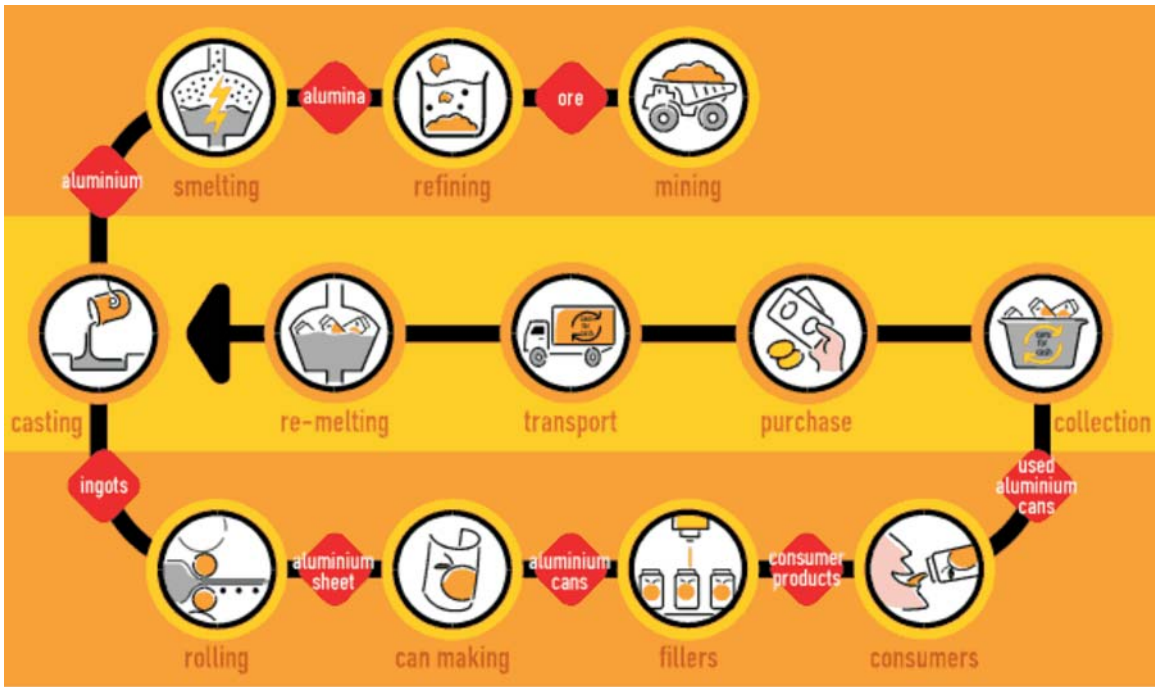
Chemistry of Aluminium

- is a light silvery-white metallic element
- has the chemical symbol Al
- has an atomic number of 13
- has a valency of three
- is resistant to corrosion - it is very reactive but forms a tough layer of oxide when exposed to air, preventing further corrosion
- is strong when alloyed even with small amounts of silicon and iron
- is ductile and lightly malleable
- is an excellent conductor of heat and electricity

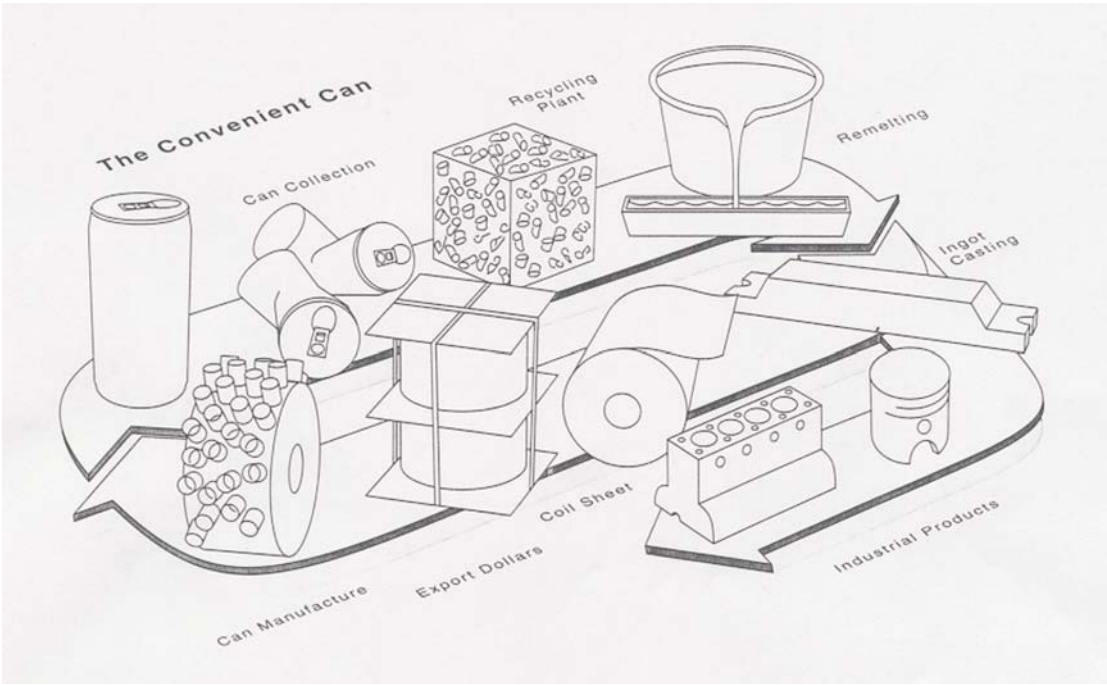
Recovery and Recycling Flow Charts



Recycling Process



Open Loop Recycling



Markets for Recovered Aluminium Resources

Packaging	aluminium beverage containers, semi-rigid food containers (eg pie dishes, TV/ takeaway containers, meals on wheels)
Automobile industry	engine parts, body sheet, truck refrigeration and panelling, general van panelling
Building products	glazing bead feed, wine tank insulation, roller shutter slat, ceiling systems, cool room panelling, TV antenna tubing, gutters and downpipes, awning supports
Export	various regions worldwide for wide range of secondary resources

Aluminium Recovery Processes

- Kerbside recovery systems
- Resource Recovery businesses and companies

Aluminium and the Environment

The Australian aluminium industry has long been at the forefront of world environmental excellence in all aspects of its operations - from rehabilitation of its bauxite mines to emission control at the smelters. Since the industry started in Australia, recycling has been recognised as a way of saving energy and reducing pollution. Australian aluminium producers were among the first to recognise the secondary use of aluminium during the 1940s, and by the 1970s had established an extensive network of aluminium scrap collection points around the country. Recycling aluminium represents a 95% saving of energy needed to produce aluminium from bauxite.

Aluminium Recycling

Energy Efficiency

Aluminium makes a major contribution towards meeting one of the world's most pressing needs – the conservation of energy. Some established facts:

- The lightness and strength of aluminium alloys is essential for fuel-efficient aircraft, passenger cars and a wide range of other road and rail vehicles. These same properties are also making it an increasingly attractive material for marine construction.
- Under refrigeration, aluminium beverage cans cool quickly and stay cooler than those made of any other material and pack more tightly. Energy consumption is lower and there is more refrigerated product for the same amount of energy.
- The low ratio of weight to capacity of aluminium containers results in reduced energy costs in transport.
- The superior thermal conductivity of aluminium means lower energy costs for industrial and commercial heating and makes it widely accepted for heat exchange and in the production of solar heating plants.

- On a weight for mass basis, aluminium has twice the conductivity of copper, and is the preferred material for most overhead power transmission and distribution systems in the western world.
- Aluminium's high corrosion resistance extends the life of products and equipment and reduces maintenance costs.

Aluminium is completely recyclable.
This means:

- Valuable raw material is conserved. Aluminium Cans can be remelted and turned into cans over and over again.
- Energy and resources are saved. Recycling provides aluminium at just 5 per cent of the energy needed to produce it from the raw material.
- Fewer overseas imports are needed, reduced local industry costs allow competitive pricing to develop export markets.
- Can recycling centres throughout Australia have provided many new jobs for people to handle, transport, process and melt down the thousands of tonnes of reclaimed aluminium.
- Payment for empty cans for recycling reduces litter, provides revenue for individuals and community groups.
- Because the value of aluminium cans for recycling is now widely recognised, cans are now responsible for less than 2 per cent of litter. Recycling also reduces the cost of public waste disposal.
- Flattened, compacted used cans are economically transported compared with other recyclable waste.

Contamination

All collected aluminium scrap must be free of contaminants capable of causing an explosion hazard when charged into molten aluminium. In particular:

- Heavy grease and oils
- Residual chemicals such as nitrate and sulphate and other oxidising materials
- Corroded and oxidised material
- Water and other volatile substances whether in solid or liquid form
- Salt fluxes
- Bottles (glass or plastic), pressure packs, butane lighters or any other sealed containers.

Furthermore, these materials must be free of contaminants capable of representing a health risk to employees in the remelting process. Integral, internal and superficial contamination of scrap as defined or as described below is unacceptable:

- Prior exposure to, or containment of, radioactive substances detectable by radiation meters.
- Tramp contamination by polychlorinated biphenyls (PCBs).
- Alloyed, plated or free selenium, cadmium, lead, mercury, arsenic, beryllium or antimony.

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