

Food and Beverage Cartons

DESIGN GUIDANCE
FOR RECYCLABILITY
2023



OBJECTIVE & PURPOSE OF GUIDE



In 2009, the leading food and beverage carton manufacturers joined forces to form the Carton Council of North America with the mission to increase the recycling of food and beverage cartons. The Carton Council began working with recycling stakeholders — including municipal recycling officials, materials recovery facility (MRF) operators, end markets and others in the recycling value chain — to strengthen the infrastructure for carton recycling in the U.S. Now, through this united effort, the Carton Council remains committed to building a sustainable infrastructure for carton recycling nationwide and works toward the continual goal of adding access to carton recycling throughout the country.

Cartons are made mainly from paperboard whose raw material, wood fiber, is a natural and renewable resource, sourced from sustainably managed forests.

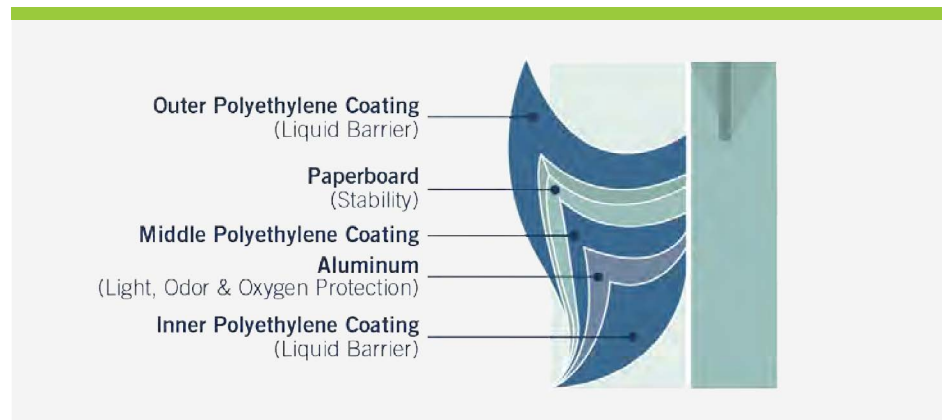
This guide is designed to enhance the understanding of what food and beverage cartons are and their recyclability. It details how cartons are recycled, as well as the design factors that influence the successful recycling of cartons.

We hope this guide will be valuable to the recycling value chain, brand owners, packaging designers and engineers, and all who share a desire to foster sustainable packaging.

DEFINING FOOD AND BEVERAGE CARTONS

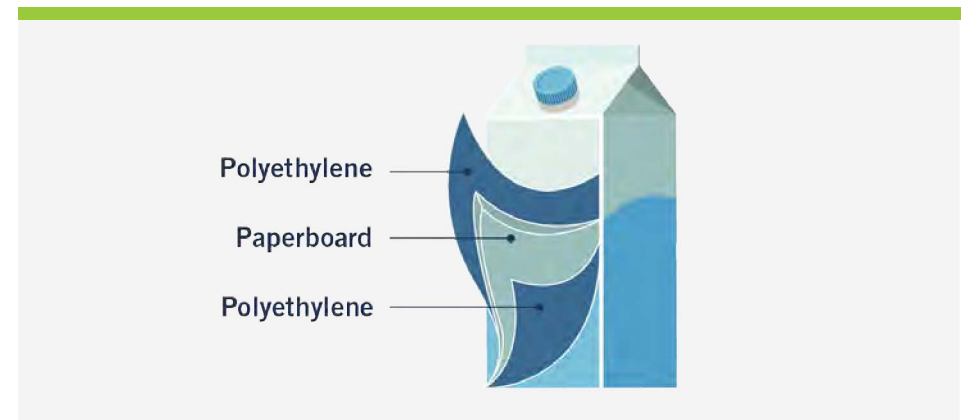
There are two types of food and beverage cartons: aseptic and gable top. Referring to either type by one of the carton manufacturers' names is inaccurate and is advised against. Some recyclers call them aseptics but we recommend against that because it can lead to further confusion as there are other types of aseptic packaging. Further details about each type generally include:

ASEPTIC OR SHELF STABLE CARTONS



Comprised on average of approximately 74% paperboard, 22% low density polyethylene (LDPE) and 4% aluminum. They can be found on grocery store shelves and are used to package food and beverages like soup, water, juice, milk, beans, wine and nutritional shakes. The thin layer of aluminum enables contents to be stored at room temperature for long periods of time.

GABLE TOP OR REFRIGERATED CARTONS



Contain approximately 80% paperboard and 20% low density polyethylene (LDPE). These type of cartons are found in the chilled section of the grocery store and are used to package things like milk, juice, cream and other beverages. Some cartons can contain nylon and/or ethylene-vinyl alcohol copolymer (EVOH) for extra product protection.

In 2011, the Institute of Scrap Recycling Industries (ISRI) established the designation for Paper Stock Industries (PSI) Grade #52 for post consumer aseptic and gable top cartons. This grade specification provides the recycling industry with the information they need to produce an ISRI grade of recycled cartons that is targeted for specific end markets. It is important to note that for this specific grade, adding other containers with a different structure of materials to carton bales is a deviation from what constitutes PSI Grade #52 and compromises the ability of recyclers, particularly whole carton recyclers, to use this grade. Cartons can be collected and recycled in mixed paper grades, or they can be separated into Grade #52 to increase the yield from the fiber while allowing for the polyethylene and aluminum portion of the carton to be captured for further recycling.



To be considered a carton, the material used must include wood fiber (in most cases bleached fiber), and two layers of LDPE as the polymer. In the case of aseptic cartons there can also be a very thin layer of aluminum.

TIPS FOR DESIGNING RECYCLABLE FOOD AND BEVERAGE CARTONS

THE FOLLOWING ARE ATTRIBUTES THAT MAKE CARTONS ACCEPTABLE IN THE RECYCLING STREAM:

- ✓ Shapes and forms like the examples to the right
- ✓ Low density polyethylene coating on inside and outside of container
- ✓ Bleached paperboard versus unbleached paperboard (some unbleached is permitted)
- ✓ Laminated foils versus stamped or metalized foils
- ✓ Water soluble, ultraviolet, electron beam inks, and dyes can all be used



Items that are **NOT** considered a food and beverage carton

Frozen Food Boxes



Health and Beauty Boxes



Takeout Containers



Egg Cartons



Dry Food Boxes



Ice Cream Containers

Carton Recycling Process



STEP 1

STEP 2

STEP 3

STEP 4

STEP 5

RECYCLE

After contents are consumed, cartons are emptied and put into a recycling container.

COLLECTION

A truck takes the cartons and other recyclable materials to a materials recovery facility (MRF) where recyclables are sorted into separate materials.

SORT

Cartons are sorted either by themselves into Grade #52 or into mixed paper.

CONNECT

MRFs connect with brokers or mills to send their cartons to one of two types of end markets: paper mills or a manufacturing facility, where cartons are turned into new products.

MANUFACTURE

Option 1: At paper mills, the fiber is extracted in a hydropulper and used to make paper products, such as tissues, paper towels and writing paper. Poly and poly-aluminum can be recovered.

Option 2: At a full carton recycling facility, cartons are shredded and then heat pressed together to make sustainable building materials, such as wallboard, roof cover board and ceiling tiles.

DESIGNING FOR PROPER COLLECTION

RECYCLING AND COLLECTION



IT TAKES FOUR EASY STEPS FOR CONSUMERS TO
RECYCLE THEIR CARTONS AT HOME AND AT SCHOOLS:

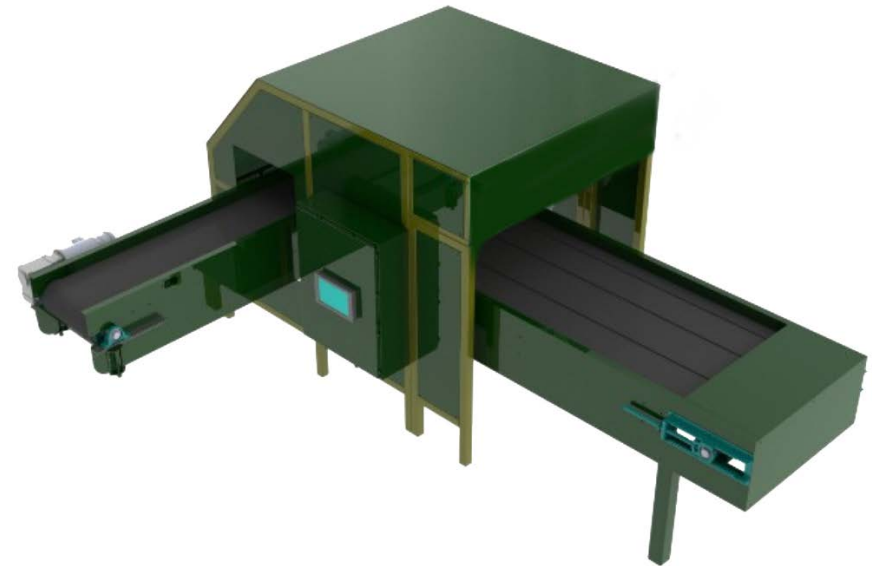
- 1 Empty contents
- 2 Replace cap
- 3 Do not flatten or crush cartons
- 4 Throw in recycling bin



Design tip: In order for consumers to easily recycle their cartons, they should be designed so the contents can be easily emptied and the carton maintains its shape. Caps need to be easily removable with the ability to be put back on.

HOW CARTON DESIGN PLAYS INTO OPTIMAL SORTING AND BALING

SORTING AND BALING CARTONS AT MRFS



At MRFs, food and beverage cartons are sorted from other materials into Grade #52 or into the mixed paper bale depending on the facility. The Carton Council recommends facilities sort and bale cartons by themselves into what is referred to as Grade #52 post consumer aseptic and gable top cartons.

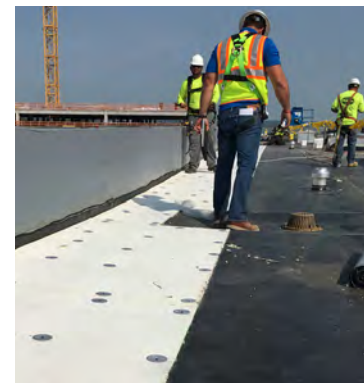
There are two methods for sorting Grade #52 cartons: manually and automated. Cartons are sorted based on the following characteristics: composition of fiber and LDPE, shape, graphics and products.



Design tip: The shape, along with an interior and exterior layer of LDPE coating on the carton, is essential for technology to identify the cartons for proper sorting.

CREATING NEW PRODUCTS

ASEPTIC AND GABLE TOP FOOD AND BEVERAGE CARTONS ARE USED TO CREATE NEW PRODUCTS



Paper Mills — The long fibers found in cartons are especially valuable to paper mills. The fiber is extracted and separated in a machine called a hydropulper, which resembles a giant kitchen blender. The global recycling industry continues to upgrade hydro-pulping technology. Today, select paper mills can handle polycoated materials from Grade #52 cartons, as well as mixed paper and other grades of paper.

THE BENEFITS INCLUDE:

- Cartons yield high quality long bleached fiber.

- Cartons can be used in recycled pulp for many paper based products.
- Cartons can be recycled into tissue and toweling.

Full Carton Recycler — In this process the entire carton, caps and all, is used to make building materials. The cartons are shredded and a giant “panini” press fuses the cartons together into big sheets of roofing, flooring and wallboard material. This process uses no water, or hazardous chemicals — only cartons. The building materials are strong, durable and resistant to mold and moisture due to the characteristics of carton materials.

THE BENEFITS INCLUDE:

- 100% of the carton is integrated into the building materials.
- The fiber provides the strength for the boards.

- The polymers melt at a specific temperature and create an adhesive that binds board together without needing any glues, harsh chemicals, or even water.
- Cartons naturally provide superior performance against moisture and mold and are resistant to hail.



Design tip: This is why cartons need to be fiber based, predominantly bleached, in between layers of polymers. This makes them ideal feedstock for paper mills to manufacture new paper products and for full carton recyclers to utilize the entire carton.

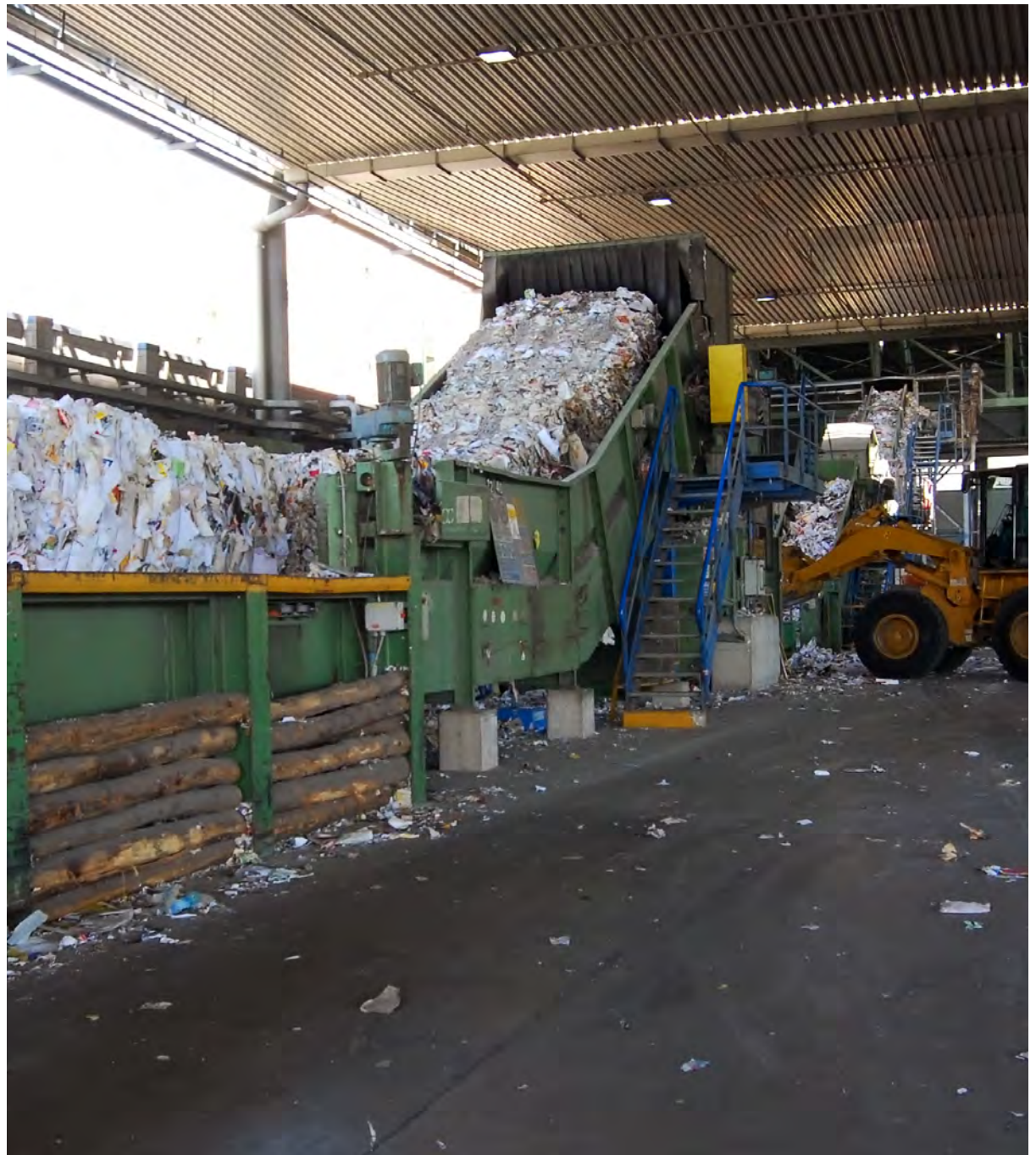
WHY FOOD AND BEVERAGE CARTONS ARE VALUABLE

Aseptic and gable top cartons are a beneficial commodity to the recycling value chain. The long and strong fiber in cartons is valued by the tissue and toweling industry as well as the packaging industry. Additionally, the construction of cartons makes them an ideal input for those companies producing sustainable building and construction materials.

When designed correctly, cartons foster sustainable packaging and a circular economy. They provide for an extended shelf life — over six months in some cases — helping to reduce food waste. They have a low product-to-package ratio, using the least amount of material possible, making them an efficient package. And they are light and compact, which combined with their shape makes them easy to stack, store and transport efficiently.

The following design steps are key to incorporate in order to ensure recyclability:

- 1** Size and shape
- 2** Stiffness
- 3** Type of fiber
- 4** Type of polymer



FOOD AND BEVERAGE CARTON DESIGN TIP SUMMARY



DEFINING FOOD AND BEVERAGE CARTONS:

To be considered a carton, the material used must include wood fiber (in most cases bleached fiber), and two layers of LDPE as the polymer. In the case of aseptic cartons, there can also be a very thin layer of aluminum.



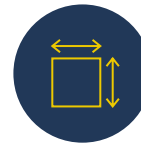
DESIGNING FOR PROPER COLLECTION:

In order for consumers to easily recycle their cartons, they should be designed so the contents can be easily emptied and the carton maintains its shape. Caps need to be easily removable with the ability to be put back on. When designing a carton, consider the most common carton shapes shown in the graphic.



DESIGNING FOR PROPER SORTATION:

The shape along with an interior and exterior layer of LDPE coating on the carton is essential for technology to identify the cartons for proper sorting.



DESIGN FOR RECYCLING:

In order for consumers to easily recycle their cartons they need to be designed so the contents can easily be emptied and the carton maintains its shape. Caps need to be easily removable with the ability to be put back on. Cartons need to be fiber based (in most cases, bleached fiber), in between the layers of polymers. This makes them ideal feedstock for paper mills to manufacture new paper products or for full carton recyclers to utilize the entire carton.





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