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Sustainable Packaging Specification Recommendations for Automotive Expendable Packaging

Guidance Document

Version 1.0

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Established Scope: The Suppliers Partnership for the Environment (SP) provides a forum for global automotive manufacturers and their suppliers to work together toward a shared vision of an automotive industry with positive environmental impact.

SP's Sustainable Packaging Work Group was established as a platform for companies from across the automotive value chain to collaborate to minimize automotive packaging waste and address barriers to packaging recyclability and/or reuse.

The purpose of this guidance document is to provide straightforward industry-supported guidance to help automakers and their suppliers identify opportunities to source sustainable packaging designs for use in automotive service parts operations, international shipments, and backup packaging.

This document builds on and is designed to align with established [sustainable packaging guidelines for automotive manufacturing operations](#).

Acknowledgements: This guidance document was produced through a collaborative process by the Suppliers Partnership for the Environment (SP) Sustainable Packaging Work Group, co-chaired by Bridget Grewal of Magna International and Matt Marshall of Toyota Motor North America. The document included input and review from work group members representing automakers, tiered suppliers, packaging suppliers and recyclers.

Disclaimer: This document is intended to provide information for automakers, their suppliers and the general public on sustainable packaging design opportunities. The information included in this document is based on the professional judgment of the individual authors and reviewers and may be used at a company's discretion. SP and its member companies make no warranty, expressed or implied, and assume no liability for any form of damage that may result from the application of the information contained in this document.

Next Steps: Going forward, the SP Sustainable Packaging Work Group intends to build on learnings from this process to promote further alignment on sustainable packaging practices within the automotive industry and identify targeted opportunities to improve packaging sustainability in support of industry sustainability goals. The guidance document will continue to be reviewed on a regular basis.

Contact: Please submit any feedback on this guidance or suggestions for future improvements to info@supplierspartnership.org.

I. Introduction

Following are recommendations that are intended to help automotive original equipment manufacturers (OEMs) and their suppliers identify opportunities to source sustainable packaging designs for use in expendable packaging applications.

Expendable packaging is most commonly used in service parts operations in the automotive industry. Service parts are defined as replacement parts manufactured to OEM specifications which are procured or released by the OEM for service part applications. Expendable packaging could also be used for international shipping and as backup for returnable packaging, when needed.

This document builds on and is designed to align with established SP [sustainable packaging guidelines for automotive manufacturing operations](#).

These recommendations focus on opportunities to minimize automotive packaging waste and address barriers to recyclability in the design phase. Detailed guidance on sustainable management of packaging waste streams at the site level is outside the scope of this document.

Please note, additional recommendations and design alterations can vary, based on business goal alignment, package material availability, and reuse as well as recycling infrastructure issues based on geographic location. Companies should be aware of national and local regulations that may dictate packaging selections in certain instances, such as hazardous materials regulations which are outside the scope of this document.

It is recommended that specifications are entered into sourcing packages and other product sourcing documents as needed, typically described as Statement of Requirements (SORs) or Terms and Conditions to influence conformance.

In order to assure conformance to a sustainable packaging system, an internal monitoring program should be in place to track, measure and formally approve package design conformance by environmental or sustainability team personnel.

II. Sustainable Packaging Specification Recommendations

1. **When building business cases for packaging design and logistics, include and communicate to procurement / supply chain managers a total enterprise financial scope that considers all corporate goals and strategies including health, safety, and the environment.**
 - a. In order to continually improve the life cycle management of containers and packages entering automotive service parts operations, enlist the participation of environmental / sustainability professionals located at the first point of package use and at the destination point after first use during the packaging design phase so local considerations can be incorporated into package designs.
 - b. A packaging bill of materials (BOM) including information on all materials used within the finished pack should be defined during the packaging design process. This information may be used by packaging engineers and environmental professionals to evaluate the recyclability and sustainability of the materials incorporated in the package.
 - c. The cost to dispose of non-recyclable packaging materials, including labor, handling and transportation, should be included in the total business case for packaging design.
 - d. It is recommended that each of the following functions be included throughout the packaging design and decision-making process.
 - i. Packaging Engineer
 - ii. Site Manager
 - iii. Health & Safety
 - iv. Design Engineering
 - v. Sustainability
 - vi. Material Handling
 - e. It is recommended that companies investigate opportunities to reduce the amount of packaging used in service organizations by eliminating the double handling and re-packaging of service parts where practicable.
 - i. For example, end packaging used to supply a dealer may be prepared by a tier 1 supplier and shipped to a service center for distribution rather than having a tier 1 supplier ship product in bulk packaging and a depot then repackage those products in dealer-ready packaging.
 - f. It is recommended that the packaging engineer, or the individual responsible for the final sign off on the packaging design, review the following recommendations to assess conformance with industry best practice for sustainable packaging design.

2. Combination packaging (specifically incorporating multiple materials) should be avoided whenever possible. When unavoidable, materials should be able to be segregated without requiring significant time or force.

- a. For example, combination packaging materials such as polypropylene foam laminated to polyethylene film may be used to protect a Class A surface such as a bumper. Such combination materials are generally not viably recyclable.
- b. Up to 5% contamination of non-conformance materials may be allowable for recycling, assuming those contaminants do not create risk of damage for the recycler.
- c. Consider opportunities to reduce the use of two-sided synthetic flash spun high density polyethylene fiber, and brushed nylon, or use alternate coatings to improve recyclability.

3. It is recommended to specify the use of natural kraft (brown) paper for paper cushioning and void fill applications wherever possible. Natural kraft (brown) paper is generally viably recyclable through established paper recycling streams.

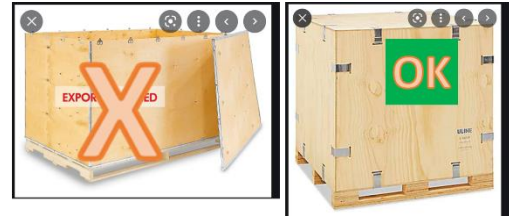


- a. Standard natural kraft (brown) paper designs typically do not include special additives or coatings. Seek to minimize the addition of special coatings or additives wherever possible, as such materials can impact viable recyclability of the product.
- b. Consider opportunities to reduce the use of combination-paper packaging materials, such as fiberglass-reinforced paper, to improve recyclability.
- c. Paper materials sourced for use in automotive industry packaging should be sustainably sourced with documentation of Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC) or an equivalent certification.

4. Natural solid wood with no adhesives should be specified for use in wood packaging applications, including pallets, crates, and dunnage, whenever possible.

- a. Natural solid wood is generally viably recyclable. The addition of formaldehyde, adhesives, and/or other additives in wood products can create a challenge in recycling or composting the materials and should be avoided where possible. ISPM 15 heat treatment does not affect recyclability.
- b. All wood products sourced for use in automotive industry packaging should be sustainably sourced with documentation of Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC) or an equivalent certification and be compliant with the Lacey Act.

- 5. Wooden crates, even for small batch shipping use, should be designed with ease of disassembly for reuse and/or shredding for recyclability in mind. Often, wooden crates are assembled using plate steel and bolts that unnecessarily make recycling very laborious and costly.**



- a. It is recommended that manufacturers provide contact information for suppliers and end users of wooden crates at program launch to support responsible management at end of life. Wooden crate manufacturers may have the ability and desire to reclaim their products for refurbishment or recycling but may not have visibility to the end user.
- 6. Use of OSB (Oriented Strand Board) pallet planks and risers will likely limit recycling options and should only be used if local rules and international issues prohibit alternatives.**
- a. Consider the use of viably recyclable alternatives, such as triple wall corrugated board sleeve packs, corrugated plastic sleeve packs, or sustainably sourced natural solid wood.
- 7. HDPE polybags, LDPE polybags, bubble wrap and other plastic films should be baled and placed into a recyclable film program, wherever possible.**
- a. Consideration should be given to the use of paper bags and cushioning materials as an alternative to plastic films where feasible. Paper bags and cushioning materials can generally be viably recycled together with existing paper recycling streams at a site.
 - b. It is recommended to separate HDPE and LDPE material streams to improve recyclability.
 - c. When preparing materials for recycling, baled material is preferred for storage and transportation whenever possible. Material may also be collected and sent offsite to a central baling location where available.
 - d. Clean films tend to have higher value for recycling and higher potential for recycled materials to go back into similar packaging applications.
 - e. Dirty films (e.g., those with oily residues from parts) are typically acceptable for recycling into other industries. Dirty materials should be segregated where possible to avoid contaminating an otherwise clean bale.
 - f. Both printed and unprinted polybags are generally viably recyclable. It is recommended to bale printed vs. unprinted materials separately to improve recycling value.
 - g. Other non-conforming materials (e.g. plastic banding, labels, adhesives, etc.) should be separated from the film recycling stream to the extent possible and should represent no more than 5% of the bale.
 - h. Consideration should be given to sourcing HDPE and LDPE polybags / films using recycled or bio-based content where possible to improve overall sustainability of materials.
 - i. These materials can also be reused internally, or sent to non-profits, small local businesses as well as sent back to the supplier for reuse if clean and in good condition.

8. Avoid using foams in packages that include spacers and dunnage, if possible, as most foams (polystyrene, polyurethane and other thermoset products) are difficult to recycle.

- I. Governmental regulations and environmental NGO plastic standards may discourage or disallow the use of certain single-use foam packaging materials, such as expanded polystyrene (EPS), in certain regions. As the volume of such materials in use continues to decrease, the economics of viably recycling the materials has become increasingly challenging.
- II. Where Class A product protection is required and added protection is necessary in the form of inserts, non-crosslinked and recyclable foams should be specified. This may prevent the use of additional plastic bags and other secondary coverings used to prevent scratching and damage during transport.

9. If a foam packaging product is sourced, expanded polypropylene (EPP) may be more recyclable than other foam options.

- a. EPP foam containers are commonly used for products in need of surface protection and nesting within the container and are used as a returnable container option over a product's entire life cycle.
- b. Reuse options for EPP foam formed containers are limited outside of the original packaging application. EPP foam second use options can include densification and resin creation for new products.
- c. The recyclability of EPP is a matter of supply and demand. Usually purchased as spot buys rather than contracts. Specifications to recycle include melt flow and ethylene content.
- d. It is recommended to source EPP foams with recycled content where possible.
- e. It is recommended that manufacturers provide contact information for suppliers and end users of EPP foams at program launch to support recycling of foams at end of the program. EPP manufacturers may have the ability and desire to reclaim their products for recycling but may not have visibility to the end user.



10. Avoid using metal brackets and wood to reinforce corrugated or chipboard boxes. Oftentimes corrugated brackets and spacers can reinforce boxes where needed.

- a. Use glued joints and avoid metal staples whenever possible to improve recyclability.
- b. When using a corner support system, any water-based glue is generally acceptable to secure to the package. Metal or Velcro attachments should be avoided where possible. There are designs now in place where slits are made in the sleeve in order to slide in a corner support where no other attachments are needed.
- c. When securing a sleeve to a wood pallet, avoid nailing or stapling to the pallet. Consider the use of recyclable plastic stretch film or recyclable plastic banding instead where possible. Designs with internal corrugated pallets may also be considered to eliminate the need for stapling.
- d. Material must be dry for recycling. Baled is the preferred method of handling and shipping to achieve the best volume for shipping. Printed and unprinted materials are both acceptable for recycling. Note: It is recommended to consult your waste service provider for the current regional market index pricing for OCC.
 - i. If a facility generates over two tons of cardboard waste weekly and has dock availability, consider a compactor for OCC only. Consider opting for a 40-yard compactor box when producing around four tons/week.
 - ii. If a facility consistently generates over 1 ton of cardboard waste weekly and there is available space (preferably dockside for trailer/van loading) it is recommended that a vertical baler be considered. These balers typically range from 60 to 72 inches in manufacturing environments. Consider the dimensions of boxes being baled when choosing baler sizes.
 - iii. If a facility generates over 20 tons of OCC waste weekly, strongly consider using horizontal balers for efficient waste handling. These balers can be manual or auto-tie and/or equipped with a conveyor system.
- e. Corrugated and chipboard boxes sourced for use in automotive industry packaging should be sustainably sourced with documentation of Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC) or an equivalent certification.
- f. Consult the following table for additional recommendations to minimize waste in the design of corrugated boxes.



Sleeve designed with removable wood support



Double wall corrugated container with internal corrugated pallet

III. Corrugated Box Design Opportunities

Design Recommendation	Description
Optimize the flute type for packaging design need based on the individual part to minimize paper use.	<p>Investigate opportunities to optimize flute type for packaging design need based on individual part to minimize paper use vs. using a general flute type for all automotive materials.</p> <p>For example, changing from C-flute to B-flute requires 7% less paper. Smaller flute sizes also require less volume and weigh less for shipment (thus reducing shipping costs).</p>
Downgrade amount of paper in box – reduce liner and/or medium weights to minimize paper use without impacting performance of the box.	Avoid overpackaging the product and consider opportunities to use less paper to manufacture the box where possible.
Change from white to kraft (brown) liners where possible.	Kraft (brown) liners are less expensive than white liners. White liners also require additional processing steps vs. kraft (brown) liners. Consider use of white liners only where necessary.
Eliminate or reduce use of special coatings where possible.	Avoid use of special coatings on the box where possible. If a special coating is deemed necessary, sustainable and recyclable coatings should be specified wherever possible. Avoid use of laminates.
Eliminate use of wax applications	Eliminate use of wax coated board to improve recyclability.
Eliminate string or tape reinforcement	Eliminate external and internal reinforcement tape – box should be designed without need for reinforcements.
Recommend specifying moisture-resistant adhesive (MRA)	MRA will keep the container strength consistent between summer and winter. MRA will not impact recyclability of the box.
Improve palletization methods	Column stacking is better for box strength than cross-stacking. Less paper may be required if it is column-stacked.
Eliminate pallet overhang	Pallet overhang reduces box strength. Less paper may be required in the box if overhang is eliminated. Eliminating overhang reduces risk of part damage.

Design Recommendation	Description
Reorient length, width, depth orientations to minimize flap overlapping and reduce board required	The most economical regular slotted container (RSC) to enclose a given volume is one where the length equals twice the width or more. The closer one can come to these proportions, the more economical the box will generally be.
Use glue vs. staples for sealing bulk boxes	For heavy products, sealing the box with glue often provides a more “sturdy” box. Less paper may be required in the box if it is sealed with glue. Staples reduce the recyclability of the box.
Use lower relative humidity storage and/or distribution network	For every 5% increase in relative humidity, box strength is reduced 4-8%. Less paper may be required in the box if it can be stored or distributed in a less humid environment. ISTA 3E testing protocol requires humidity to be taken into account.
Change from stretch wrap to banding to unitize loads where needed.	Banding can be used instead of stretch-wrapping to unitize loads where needed. The use of polyethylene banding is preferred where possible to improve recyclability. The use of metal banding should be avoided. Also, avoid using metal clips on plastic banding.
Ensure incoming pallets are not damaged	The compression strength of a unit load is less on damaged pallets compared to undamaged pallets. Less paper may be required in the box, and an incoming inspection program can be implemented.
Use less cushioning or interior packaging materials	Minimize the use of interior packaging materials to only those truly required for part protection. Refer to the above Sustainable Packaging Guidelines for more information.
Make the product more load-bearing	Less paper may be required in the box if the product can be made more load-bearing.
Consolidate box sizes where possible.	Consolidating box sizes can help in reducing storage and handling costs at the plant. When reviewing box sizes, seek to use the minimal amount of material and ensure the outside dimensions of the box cube out a standard pallet.
Increase number of items or weight/box	Package more items or weight in the box, reducing the amount of packaging material required to cover the product.

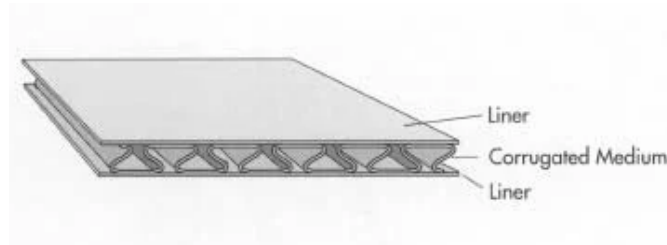
Design Recommendation	Description
Create design to ensure optimum stackability	The width of the box should never be less than one half of the length.
Optimize the orientation of the product in the box	Denser packaging reduces the amount of material needed.
Minimize headspace	Smaller blank sizes reduces the materials needed.
Reduce pallet under hang for production packaging	Optimize box size so that there is greater utilization of the pallet, storage and transportation systems.
Change board grade or box design to eliminate trim waste at the converter or corrugator	Optimize utilized space on sheet of corrugated board width to minimize waste at the corrugator. At the converter, consider both the width and length. This should be done when reviewing the blank.

Appendix: Corrugated Terms and Definitions¹

Corrugated fiberboard or “combined board” has two main components: the liner and the medium. Both are made of a special kind of heavy paper called containerboard.

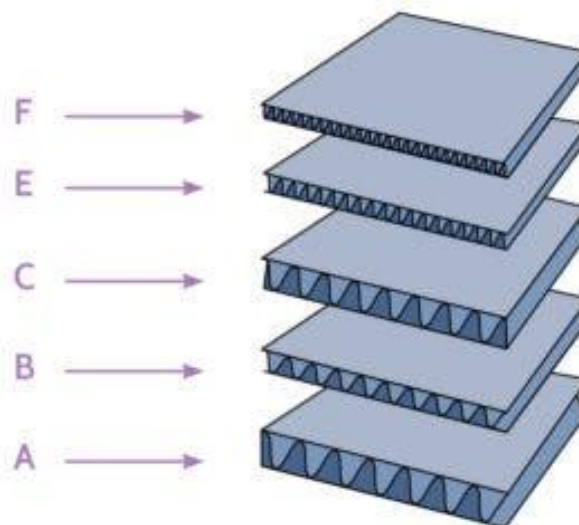
Linerboard is the flat material, typically on the outer surfaces of the board but also on the inside for some structures, that adheres to the medium.

Medium is the paper that is formed into arches (or “flutes”) on the single facer and glued between the linerboard facings.



Flutes come in several basic designations. Flutes with the same designation have similar size, but may have various flute profiles and number of flutes per foot within a given designation. The following are examples of industry standard flutes but should not be considered as an exhaustive list.

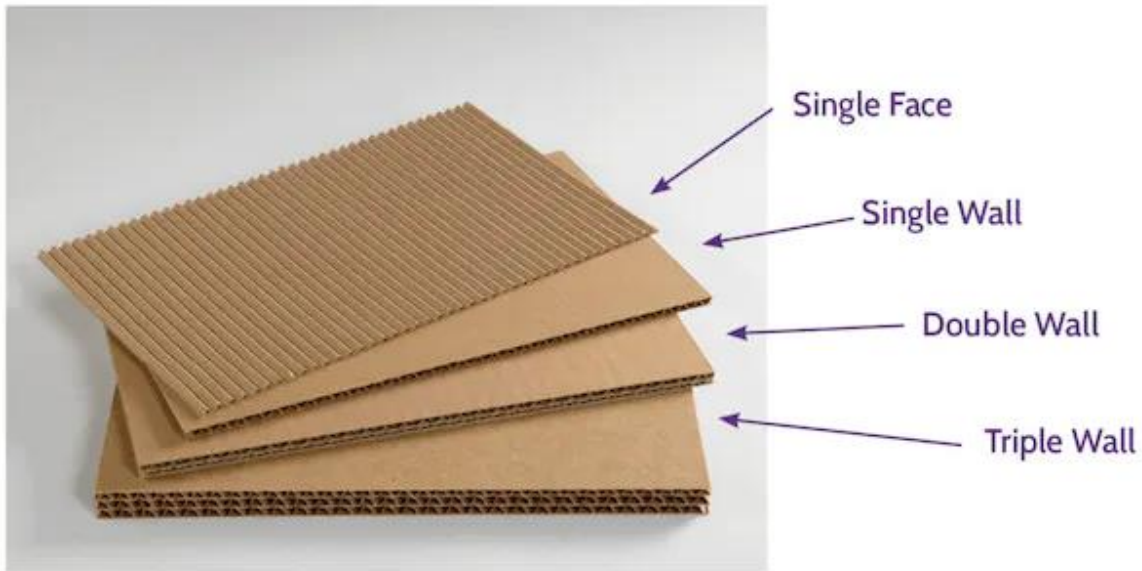
- **A flute:** has about 33 flutes per foot.
- **B flute:** has about 47 flutes per foot.
- **C flute:** has about 38 flutes per foot.
- **E flute:** has about 90 flutes per foot.
- **F flute:** has about 125 flutes per foot.



¹ Source: [“What is Corrugated”, Fibre Box Association](#)

There are four basic types of **combined board** that are most commonly created from linerboard and medium using the variety of flute structures:

- **Single Face:** One corrugated medium is glued to one flat sheet of linerboard.
- **Single Wall:** The corrugated medium is glued between two sheets of linerboard. Also known as Double Face.
- **Double Wall:** Three sheets of linerboard with two mediums in between.
- **Triple Wall:** Four sheets of linerboard with three mediums in between.



There are a variety of **standard box styles** that can be identified in three ways: by a descriptive name, by an acronym based on that name, or by an international code number.

A few examples of box styles are included below.



Acknowledgements

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SP sustainable packaging work group members contributing to the development and review of this guidance document included:

- Absortech
- Action Wood 360
- Aicello
- Armor Protective Packaging
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- Decade Products
- Doug Brown Packaging Products
- ERA Environmental
- ExpandOS
- Ford Motor Company
- General Motors
- Goodpack
- Green Current Solutions
- Green Processing Company
- Honda Development & Mfg. America
- Indigo Packaging
- iPAK
- Labelmaster
- JSP
- Magna International
- MPS Group
- Mustang Innovation
- ORBIS Corporation
- P2 Packaging
- Pratt Industries
- Primex
- Real Quality Services
- RecycleMax
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- Worldwide Foam

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