VDA Verband der Automobilindustrie

Recommendation

Packaging Materials and Concepts

VDA 4560
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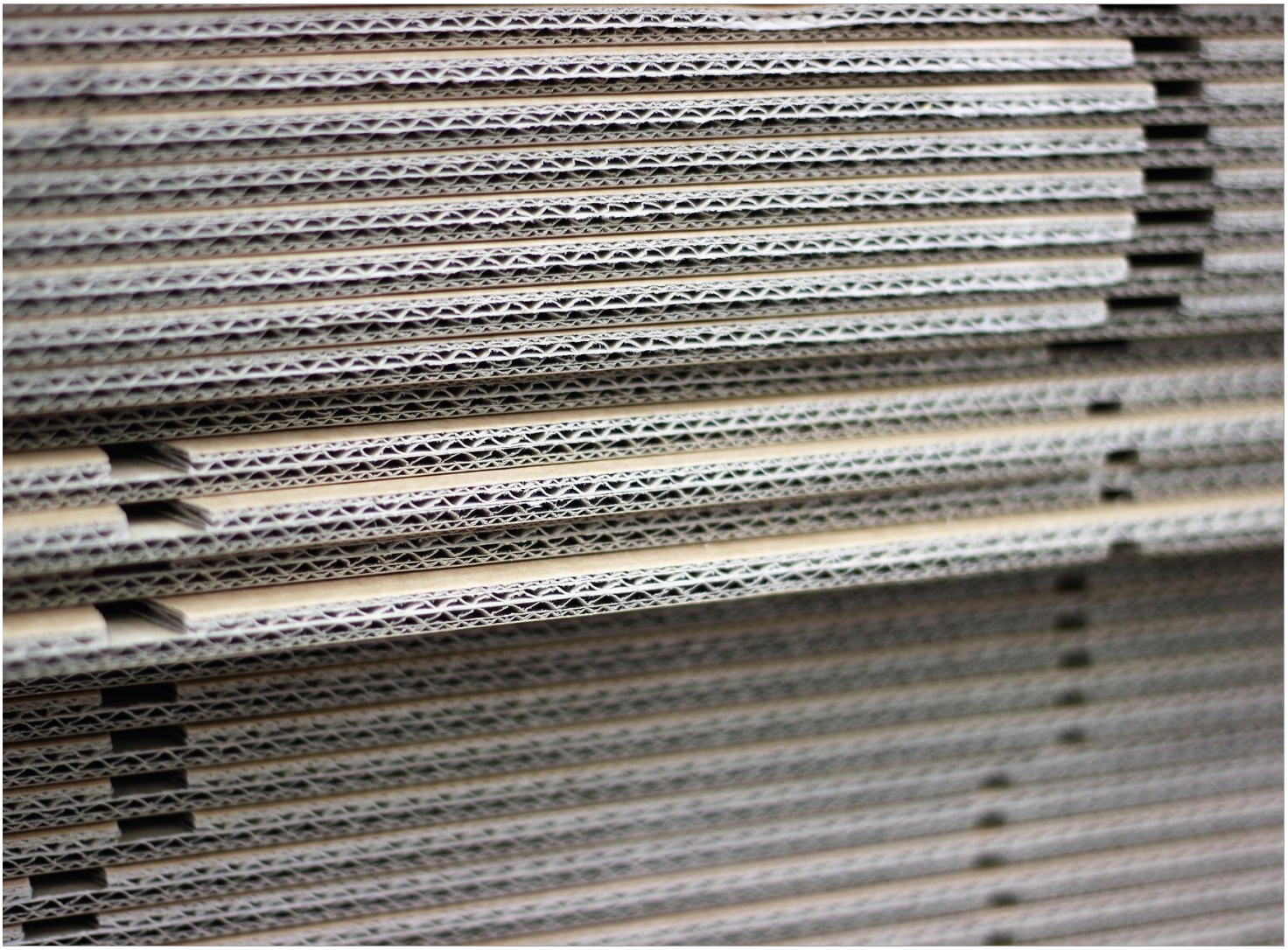

The automotive industry faces the urgent task of improving sustainability and environmental protection. With this recommendation, the German Association of the Automotive Industry (VDA) supports sustainable packaging design. The recommendation serves as a guideline for environmentally friendly packaging solutions and prepares the industry for future legal requirements.
To foster mutual understanding of the opportunities and challenges of the circular economy, packaging solutions must be examined along the entire supply chain, from packaging manufacturers to suppliers, manufacturers and recyclers.
The goal is to use materials more efficiently, reduce waste and promote recycling, thereby minimising the environmental impact of packaging. Ultimately, the circular economy should be further established and promoted.

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Acronym	Meaning
ABS	Acrylonitrile Butadiene Styrene
a-PET	Amorphous Polyethylene Terephthalate
EPE	Expanded Polyethylene (foamed)
EPP	Expanded Polypropylene (foamed)
EPS	Expanded Polystyrene
ESD	Electrostatic Discharge
g-PET	Glycol-Modified Polyethylene Terephthalate
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
KLT	Small Load Carrier
LCA	Life Cycle Assessment
PA	Polyamide
PCR	Post-Consumer Recyclate
PE	Polyethylene
PE-EL	Electrically Conductive Polyethylene
PE-HD	High-Density Polyethylene
PE-LD	Low-Density Polyethylene
PET	Polyethylene Terephthalate
PP	Polypropylene
PPK	Paper, Cardboard, Carton
PPWR	Packaging and Packaging Waste Regulation (EU Packaging Directive)
PS	Polystyrene
PUR	Polyurethane
PVC	Polyvinyl chloride
rPET	Recycled Polyethylene Terephthalate
TPU	Thermoplastic Polyurethane
VCI	Volatile Corrosion Inhibitor

1 Introduction

1.1 Background and objective

The automotive industry faces the urgent task of improving sustainability and environmental protection.
With this recommendation, the German Association of the Automotive Industry (VDA) supports sustainable packaging design. The recommendation serves as a guideline for environmentally friendly packaging solutions and prepares the industry for future legal requirements.
To foster mutual understanding of the opportunities and challenges of the circular economy, packaging solutions must be examined along the entire supply chain, from packaging manufacturers to suppliers, manufacturers and recyclers.
The goal is to use materials more efficiently, reduce waste and promote recycling, thereby minimising the environmental impact of packaging. Ultimately, the circular economy should be further established and promoted.

This recommendation describes the target state of sustainable packaging concepts. The target state should be achieved by 2030 at the latest (in line with the EU Packaging Directive). To this end, possible transitions should be implemented immediately. Packaging solutions that are tool-dependent or process-specific should be adapted as part of new projects, re-procurement, or new procurement.

1.2 Scope of the recommendation

The recommendations for packaging materials and concepts aim to improve the sorting and recyclability of transport packaging in the automotive sector. Both single-use and reusable packaging are considered, as well as approaches for ESD (electrostatic discharge) and corrosion protection packaging.
The recommendations are intended to help meet the increasing regulatory requirements for packaging and advance the circular economy.

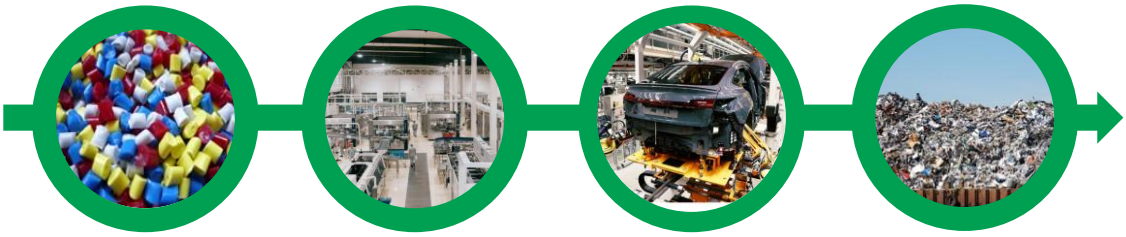
Not covered in this recommendation are:

- Optimisation of packaging depending on the planned transport route
- Optimisation of packaging for hazardous goods
- Caps/plugs are typically the responsibility of product development and are not considered in this recommendation. Future consideration is required to meet regulatory requirements.

The recommendation can also be used for packaging that goes beyond the described scope (e.g., consumer logistics packaging in the automotive aftermarket). However, these use cases are not described in detail.

1.3 Target audience

To ensure sustainable packaging solutions, all parties along the supply chain must be considered in the design, production, use and recycling of packaging.



Raw material/ packaging manufactur-

- Container design/ Development of single-use packaging
- Material expertise (types of plastic, recycled content, etc.)
- Availability

Supplier

- Packaging requirements of the component, manufacturing process
- Responsibility for single-use packaging

Commercial customers

- Packaging requirements based on component and manufacturing processes
- Process of unpacking, separating and disposing
- Responsibility for reusable packaging

Waste management/recycler

- Recycling processes and disruptive factors
- Separation and sorting of components
- Demand for recycled materials

2 Ecological design of packaging

The ecological design of packaging has a significant impact on the environment, from production to disposal. Therefore, it is crucial to develop sustainable, circular solutions that minimise the ecological footprint while remaining functional and attractive. The following aspects should be considered in particular:

Reduction of transport emissions

Reuse and repurposing

Information and labelling

Reduction of packaging material

Ensuring recycling and recyclability

3 Reducing transport emissions

Packaging in the automotive value chain has a direct impact on transport and its emissions. Therefore, transport means, distances, requirements and infrastructure in the destination country should be considered during the design and use of packaging.

1. **Optimise filling level**
   - Avoiding empty spaces and excessive filler material
   - Optimise the ratio of the component to the packaging material.

2. **Optimise transport volume**
   - Ensure packaging is stackable.
   - Optimise dimensions to maximise the use of transport vehicle volume.
   - Use volume-reduced containers (foldable, nestable, etc.) to reduce empty transport trips.

3. **Lightweight construction**
   - Consideration of weight-reduced alternatives
   - Use lightweight and only necessary materials (without compromising the functionality of the packaging).

4 Reuse and repurposing

The use of reusable and repurposable packaging can be economically and ecologically beneficial under certain conditions. The following aspects should be considered:

1. **Reusable packaging**
   - Use reusable packaging concepts wherever ecologically sensible (the VDA Recommendation 4500 - Carbon Accounting of Transport Packaging should be used to assess ecological trade-offs).
   - Consider eco-design principles in the development of load carriers.

2. **Avoid repackaging**
   - Avoid unnecessary repackaging processes to reduce waste.
   - Evaluate repackaging processes between two single-use concepts to determine if a direct packaging solution can be implemented.

3. **Repurposing "obsolete" material**
   - Obsolete containers or their components can be repurposed for subsequent projects through retrofitting and repair.
   - Single-use materials can be reused (while adhering to quality standards).

4.1 EcoDesign principles

1. Durability	**2. Repairability**	**3. Resource efficiency**
Reduction of the environmental impact per unit by extending the life cycle.	Extension of the life cycle despite a defect in the load carrier through repair.	Reduction of resource input with unchanged benefit/ Increase in benefit with unchanged use of resources.
4. Low level of hazardous substances	**5. Renewable raw materials**	**6. Circularity**
Minimization or avoidance of hazardous substances in load carrier development.	Reduction of environmental impact through the use of renewable raw materials in load carrier development.	Returning raw materials from load carriers to their respective raw material cycles.

Table 1: Ecodesign principles

4.2 EcoDesign for load carriers

The following EcoDesign criteria are based on the EU Regulation (2024/1781) EcoDesign for Sustainable Products Regulation (ESPR).

1. The load carrier is made of recyclable materials (see Chapter 5.1).

2. The load carrier consists of a single material (monomaterial) or its individual components are made of the same material. This includes components attached to the container (see Chapter 5.3.2).
   If components of different materials are necessary, they must be manually separable.

3. The material type, including ESD capability, must be clearly labelled on the load carrier and recorded systematically. If different materials are used for components, these must be clearly labelled on the respective component, visually distinguishable (e.g., colour-coded) and systematically recorded for waste disposal (see Chapter 8).

4. The maintenance process should be planned based on the requirements of the container (e.g., planning of inspection/maintenance intervals, monitoring of usage duration/intensity).

5. The repair process for the container should be planned in advance (including instructions, spare parts, personnel, tools).

6. Where possible, modular load carriers with standardised components, standardised form/force-fit connections, etc., should be used.

7. Containers should be as standardised as possible to promote cross-component usage. Avoiding component-specific fixtures can be achieved, for example, through compartments/pockets or minimising the contact points of the component in the load carrier.

5 Ensuring recyclability and recycling

Recyclable materials	• Consideration of the end-of-life in packaging development • Use of recyclable material • Use of monomaterial
Recycled content	• Use of recycled material in single-use and reusable • Closing loops (e.g. return of obsolete containers)
Separability	• Exclusion of material composites • Easy separability if different materials are necessary
Standardisation	• Ensuring sorting and pure recycling by reducing material diversity and colour coding

Table 2: Recyclability and Recycling

Material Overview:

Plastics
- Frequently used in single-use and reusable packaging
- Provide good protection against environmental influences
- Environmental impact can be minimised through packaging design
- Generally suitable for mechanical recycling

Cardboard, paper, carton
- Commonly used, especially in single-use packaging
- Easy to process and adapt
- Low moisture resistance
- Low environmental impact, globally established recycling

Wood
- Used primarily for heavy loads, such as pallets and boxes
- Available in different qualities
- Customs requirements must be considered (e.g., Integrated Pollution Prevention and Control (IPPC), EU deforestation regulation (EUDR))
- Repairable
- Only downcycling possible

Steel
- Used for very heavy loads and long service life (only for reusable packaging)
- High weight of packaging
- Customs requirements must be considered (e.g., Carbon Border Adjustment Mechanism (CBAM))
- Repairable
- Globally established recycling

5.1 Recyclable materials

5.1.1 Recommended plastics

For plastics, recyclability can be ensured through proper material selection and sensible separation concepts.
The following valuable materials are fundamentally recyclable as monomaterials and with adequate labelling:

Please note:
- PE and PP recycling is established in Europe
- a-PET and rPET are preferable
- PS can be used if the cycle and recycling are ensured
- For the other plastics (07), ABS can be used if the cycle and recycling is ensured

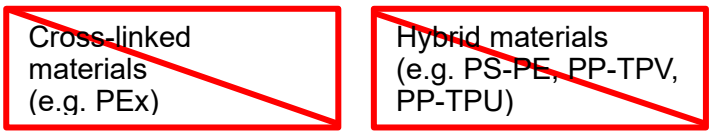
Reusable packaging
To ensure high-quality recycling of reusable packaging, materials must be properly labelled and components must be separable.

Single-use packaging
In the case of single-use packaging, material sorting should be simplified. For this purpose, material types are further specified on a case-by-case basis in the application-specific requirements and colour coding is defined.

5.1.2 Non-recommended plastics

Based on information from various stakeholders along the packaging value chain, the materials listed below, hazardous substances and material composites are either not recyclable or are poorly recyclable and should therefore not be used.

Composite materials are not or only poorly recyclable.



The following plastics are difficult to recycle or contaminate the recycled material and should be avoided, especially with regard to upcoming regulations (e.g., EU Packaging Regulation):

Responsible handling of hazardous substances protects both humans and the environment, while also improving recycling, for example:

National regulations (e.g., German Packaging Act) must be observed along the entire lifecycle/transport path.

- Compliance with and certification of legal limits, including for HBCD (especially EPS) and fluorinated gases (EPP, EPS, etc.)
- Exclusion of flame retardant additives (e.g. EPP)

5.1.3 Classification of bioplastics

According to the Federal Ministry of Education and Research (BMBF), bioplastics are classified based on their production and disposal.

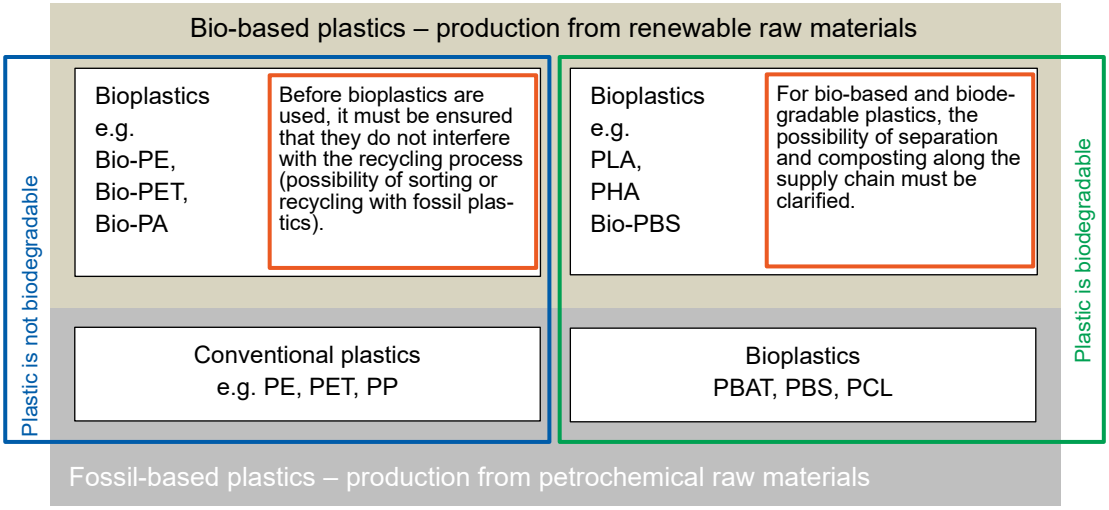


Figure 1: Bio-based plastics

Drop-in materials (Bio-PE, Bio-PP, Bio-PET) can be used and recycled just like conventional materials. Other bioplastics should only be used after careful consideration of their benefits and examination of disposal routes.

5.2 Recycled materials

For plastic packaging, the proportion of recycled content should be continuously increased.

- The use of recycled content from commercial PCR (Post-Consumer Recycled) material is recommended.
- Traceable loops make it easier to assess the quality of PCR material and enable higher recycled content.
- For sensitive products, the use and amount of recycled content should be evaluated.
- The following recycled content percentages are recommended for typical plastic packaging solutions (as of 2024):

	Recycled content
Films	30% in standard film thicknesses
Foams	30% in foams
Rigid plastic (e.g. containers)	50% for standard applications
ESD & VCI packaging	Use of recycled content in ESD & VCI packaging after application case evaluation

Table 3: Recycled content of plastic packaging

A higher recycled content percentage may be possible depending on the application case. The goal is to continuously increase the recycled content and reach a 35% recycled content share in all common applications by 2030.

5.3 Standardisation

5.3.1 Trays and blisters

Based on information from various stakeholders along the packaging value chain, the following recommendations facilitate sorting and recycling.

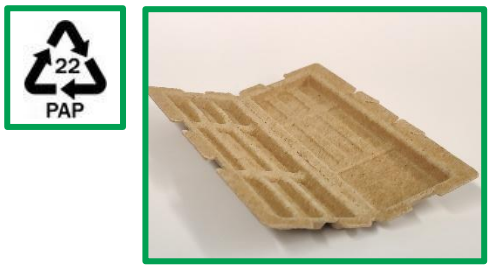
To effectively sort trays and blisters in single-use applications, standardising materials and colour coding is recommended.

PET should be kept **transparent**, with a-PET being preferred. (Without added colour)
Discolouration due to the recyclate is acceptable.

ABS and PS (including PS-EL) should be kept in **black**.

The following plastics should no longer be used in the single-use sector.

Alternatively, plastics can be substituted with fibre-cast blisters.



5.3.2 Components attached to containers

For components attached to containers, both the carrier and the component material should be made from the same material as the base. This eliminates the need to remove them before recycling.

PP material can be attached to EPP and PP containers.

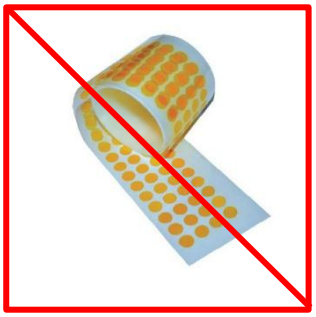
PE material can be attached to PE containers.

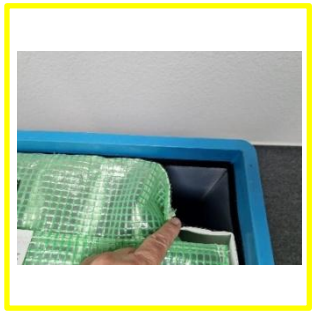
Cellulose-based alternatives are suitable for cardboard boxes.

Polyamide adhesive dots should not be used.

Adhesive dots should generally be avoided by using VDA 4504 in the specified material thickness.

Neither PVC components nor PVC-based adhesives should be used.





5.3.3 Strapping bands

The restriction of materials and colour coding for strapping bands enables pure material separation.

For plastic strapping, PP (polypropylene) or PET (polyethylene terephthalate) should be used. To facilitate pure material collection, the following colour coding should be applied.

PET strapping can be used in green, with r-PET being preferred.

PP strapping bands can be used in black.

No additional materials (such as metal clips) should be used to secure the strapping bands.

5.3.4 Films for component protection

To enable the pure-grade collection of films, it is recommended to limit the variety of materials in part protection to the PE (polyethylene) films commonly used in the automotive sector.

Films should be made of polyethylene, be transparent, colourless and free of imprints.

Exceptions are:

- Discolouration from the recycling process
- Imprints to meet legal requirements

5.3.5 Films with special protective functions

Based on information from various stakeholders along the packaging value chain, the sortability and recyclability of films with special protective functions (ESD, VCI, long-term storage) should be taken into account when using them.
Below is an overview of the available options.

ESD protection

Dissipative films
- Should be made of PE
- Colour: Pink
- Surface resistance up to $10^{10}\Omega$

Shield films
- Lower recyclability
- Should only be used when a surface resistance of $10^{4}\Omega$ is required

VCI protection

Mono films
- Should be made of PE
- Recycled content not yet standard today (2024)
- Recycled content may lead to interactions and a reduction in protective
    - function

Co-extruded films
- Multilayer composites, all PE
- Recycling content in layers without VCI possible

Long-term storage

Aluminium-based foils
- Lower recyclability
- Composition based on HPE specifications:
    - 100µm thickness, basis weight of 125 g/m²
        - 75 µm polyethylene films
        - 12 µm aluminium
        - 12 µm PET film (polyethylene terephthalate)
    - Addition of desiccant
    - Protective function for several years

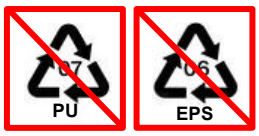
Shield Intercept
- Corrosion + ESD protection
- Recyclable
- PE film with added copper
- Protective function for several years
- Recycled content under testing
- Surface resistance 10^{6} -$10^{8}\Omega$

5.3.6 Foamed plastics

Foamed plastics should be largely avoided, especially in single-use applications. In reusable applications, their use should be decided based on the balance between fill level and mono-material considerations.

The following materials should generally not be used.

Cross-linked materials
(e.g. PEx)



Hybrid materials
(e.g. PS-PE, PS-PP)

Reusable applications

For EPP containers, return concepts should be implemented to promote circularity.
For add-on components (e.g., comb strips), EPE may be used. However, it should be non-cross-linked and not glued to the outer container.

Single-use applications

For EPP containers, return concepts should be implemented to promote circularity.
For add-on components (e.g., comb strips), EPE may be used. However, it should be non-cross-linked and not glued to the outer container.

The addition of colourants/dyeing for EPS and EPE should be excluded even during the transition period.

For ESD-capable containers, the material should be labelled (preferably on the tag or label).

5.3.7 Pallets

Single-use pallets should be avoided. If the use of reusable pallets is not ecologically feasible and single-use pallets must be used, proper material selection and separability must be ensured.

Wooden pallets

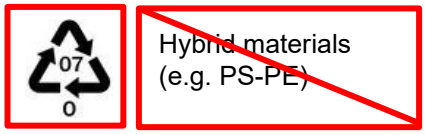
- Should be made from softwood or hardwood of quality class II / III / S7 according to DIN 4074-1
- Surfaces should be rough-sawn and sharp-edged
- Wood moisture content should be between 12 - 22%
- Wood should be free from bark, pests and insects, with no insect damage (e.g., boreholes)
- Pallet blocks should be made of solid wood. Alternatively, pressed particleboard blocks can be used (with a minimum density of 580 kg/m³ and bonding according to DIN 15147, with a permissible moisture content of max. 18% as per DIN 68800-2).

In wood recycling, pallets of Class A I, as per the German Waste Wood Ordinance (Altholzverordnung, AltholzV) of 2002, should be introduced and must meet the requirements for this class.

Plastic pallets

Plastic pallets should be made of PE-HD or PP.

Material labelling must be ensured consistently (recycling code).



In reusable applications, add-on components should be made from materials with similar processing properties.

Metal reinforcements should be designed to be separable and detachable. They should either be visibly identifiable from the outside or the pallet should be appropriately labelled.

Anti-slip elements made from other materials should be designed in such a way that separation before recycling is possible.

6 Joining techniques

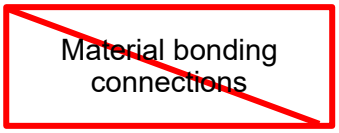
To ensure that load carriers are separable, the correct joining technique must be used. Components made of different material types should be manually detachable.

Form-fit connections prevent loosening under operational forces because the involved components interlock. This can be achieved through the shape of the components or additional connecting elements.
Examples:

- Rivets
- Interlocking elements
- Hook-and-loop fasteners
- Pins

Force-fit connections prevent the movement of binding partners through static friction. Components press against each other, generating static friction that counteracts movement.
Examples:

- Clamps and presses
- Screw connections



Material bonding connections join components through atomic or molecular bonds and can only be separated by destroying the connection. These can be created using either the material itself or additional foreign materials.
Examples:

- Adhesive bonding
- Welding
- Foaming

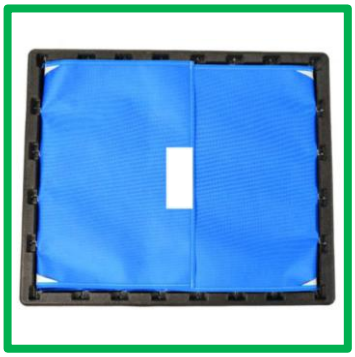
6.1 Joining techniques – form-fit connections

Based on information from various stakeholders along the packaging value chain, the following joining techniques are recommended to improve sorting and recyclability.

Interlocking

Interlocking can help avoid the use of different materials.





Hook-and-loop fasteners

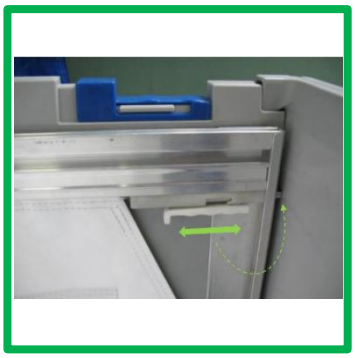
Hook-and-loop fasteners can, for example, be used to attach textile inserts in containers.

Note: Hook-and-loop fasteners on the container represent an additional bond that must also be evaluated.


Riveting is preferable to adhesive bonding but generally involves increased effort in separation. The number of riveted connections should be reduced to the technically necessary minimum.

Pins

Pins can be used, for example, for movable connections.



6.2 Joining techniques – force-fit connections

Pressing/clamping

Pressing/clamping can, for example, be used to secure inserts in containers. A grid structure allows for precise positioning.

Grid structure

Clamping lugs

Screws

Screw connections can be used where necessary and are preferred over rivets.

6.3 Joining techniques – material bonding

To ensure that load carriers are separable, the correct joining technique must be used. Material bonding of different material types should be avoided. Two components made of the same plastic are not part of this consideration.

Adhesive bonding

Example: Adhesive bonding of hook-and-loop fasteners to containers (in addition to rivet connections).

Foam encapsulation/overmoulding

Example: Overmoulding or foam encapsulation of threads in containers.

Welding

In the context of containers, welding two different materials together is not common.

6.4 Attachment of cardboard to pallets

The attachment of cardboard to pallets plays a crucial role in separability.

Considering technical/process requirements (e.g., load capacity), cardboard pallets or complete cardboard-based concepts (reducing material diversity) are preferred.

To ensure separability, cardboard can be attached to wooden pallets using plug-in concepts or loose strapping.

Adhesive bonding should be avoided. Attachments using staples, clips, nails and screws should be manually detachable.

7 Reduction of packaging material

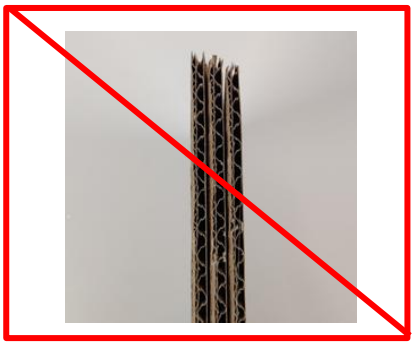
7.1 Reduce packaging material to the necessary amount.

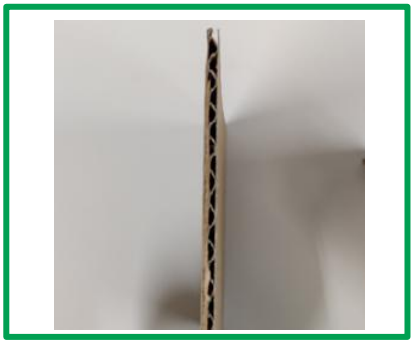
Avoid unnecessary packaging material.
Excess material should be avoided in all areas. Less material in the container can simultaneously increase the fill rate.

Reduce excessive material

- Match film bags to the size of the components.
- Use component protection only at the ends of components that require protection.

Reduce material thickness
It should be checked whether the material thickness meets the necessary component protection and any technical requirements for handling/transport.





Adapt load securing to transport protection
The use of straps and stretch films should be largely avoided. Suitable packaging design can eliminate the need for additional straps.

Reduction of excessive films through smart concepts

- Even for sensitive components, there are various ways to reduce material usage.
- Packaging every second component, ‘sinus’ or ‘zigzag’ concepts.
- Optimising the fill rate often saves not only packaging material but also reduces costs for transport, container handling and container rental per component.

7.2 Reduction of fossil-based primary material usage

The use of fossil-based primary materials should be minimised. Plastics can be replaced with paper-based alternatives. If the use of plastics is necessary, increasing the recycled content can reduce the use of primary materials.

7.2.1 Paper-based single-use materials

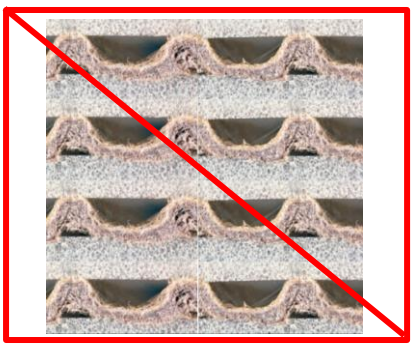
In the single-use sector, plastics should be replaced with paper-based alternatives.

Paper-based packaging is made from renewable resources, often has high recycled content and is usually recyclable. They should be preferred.

If the use of paper-based products leads to trade-offs (e.g., increased transport weight, reduced fill rate), a life cycle assessment (LCA) based on VDA Recommendation 4550 - Carbon Accounting of Transport Packaging can be used to evaluate the overall ecological optimum (see VDA 4550).

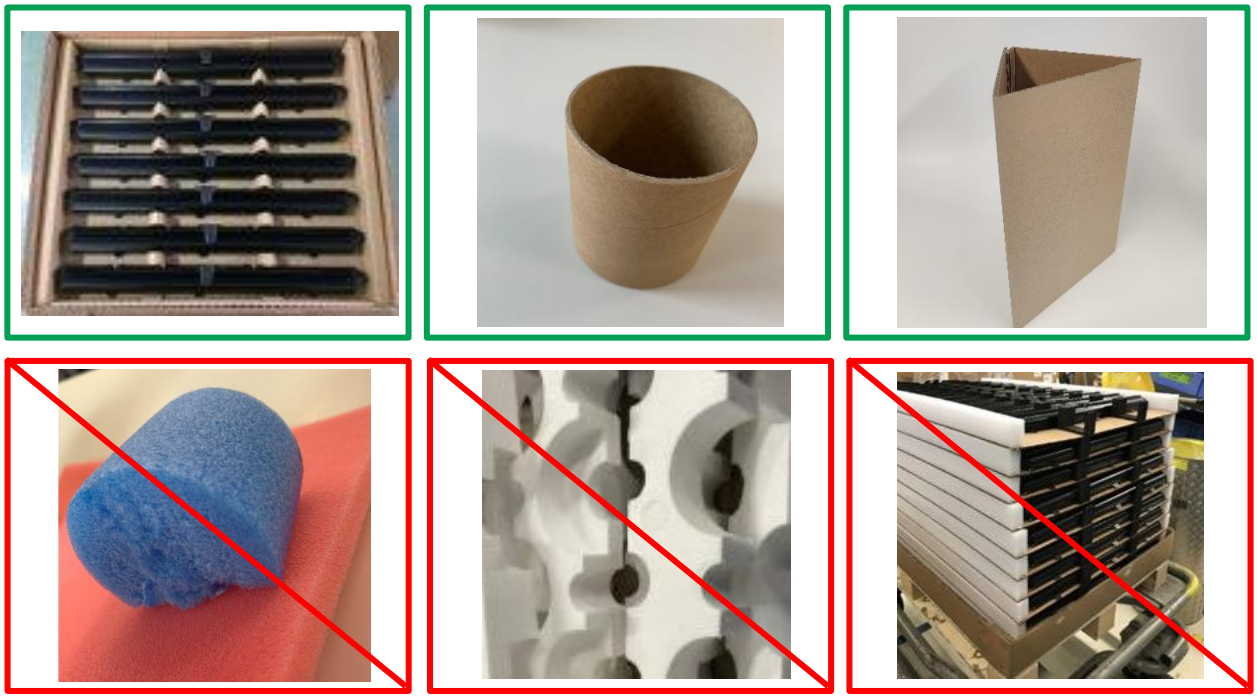
Even with paper-based products, material composites should be avoided.

Wire-reinforced cardboard

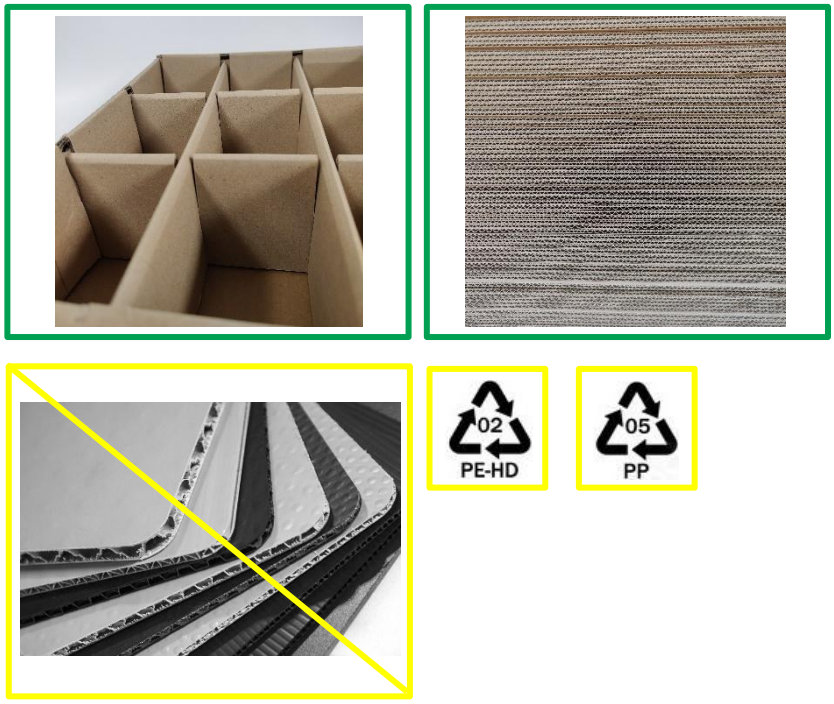


Laminated cardboard.

The use of spacers made of foamed plastics (e.g., EPS, EPE) is often unnecessary. They should be replaced with spacers made of cardboard or shaped cardboard inserts.



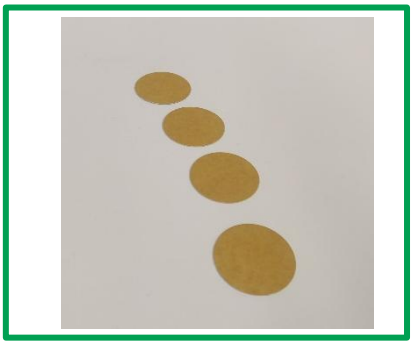
Interlayers should preferably be made of cardboard. If plastic is used, PE or PP with clear labelling should be utilised.



For single-use cardboard, separability can be ensured through the use of paper-based alternatives.

Unnecessary fixation can be avoided by using slip-on lids.

Paper-based alternatives for adhesive points, adhesive tapes and strapping reduce material diversity.



Bonding of plastic to cardboard requires labour-intensive separation.

8 Information and labelling

8.1 Material data

Data and information required to comply with national legal requirements should be provided in an appropriate format.
Packaging and material data should be recorded in a digital and standardised format, if available and shared along the supply chain.
If certificates are required to meet legal requirements or to improve the disposal, sorting and recycling of packaging, they should be provided.

Digitally provided information

Packaging information and data are increasingly being used digitally, facilitating exchange along the supply chain. For optimal data provision, the use of a standardised format, as described in Odette LG19, is recommended.
Reusable packaging should be equipped with a QR code (or comparable identification method) for identification. The requirements of the Digital Product Passport (DPP) should be considered for this purpose. For single-use packaging, this may also be useful, depending on the packaging's use.

8.2 Material identification

Marking of packaging to simplify sorting and recycling.
Depending on the region, symbols may be required by law.
For goods requiring special handling, international symbols must be applied.

Physical markings

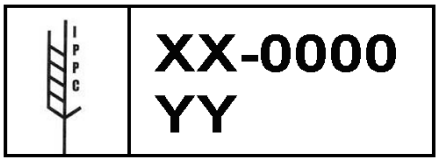
Marking materials simplifies sorting and recycling and may vary by region or be required by regulations.

Plastics
To facilitate sorting, plastic materials should be labelled with their material designation. The designation according to 97/129/EC is recommended for this purpose.

For materials that do not have a defined number and fall under ‘Other’, the abbreviation according to ISO 11469 should be used.

Wood

Solid wood packaging used in international trade must undergo heat treatment to meet customs requirements (country-dependent) and must be marked according to the IPPC Standard ISPM15. This treatment and marking do not affect the recyclability of the material. When repairing reusable pallets, the requirements for renewing markings must be observed.



Country-specific labelling
Labelling requirements for packaging may vary by region and country. There is often a distinction between transport packaging and packaging designed for end users.
Depending on the packaged product, specific labelling may also be required.
The use of appropriate symbols and labels should be verified and applied according to the requirements.

9 Necessary steps for further implementation

To achieve the target state, technical and procedural solutions for the following topics must be developed collaboratively:

Hook-and-loop fasteners	See 9.1Notes on implementation Further elaborations necessary
ABS-TPU for anti-slip properties	
Elements with spring properties	
RFID and other digital tags	To be elaborated
Standardisation of Inlay Slots for KLTs • Standard thermoforming films • Solution and standardised compartments • Attachment of hook-and-loop fasteners via pre-drilled holes	To be elaborated
Recyclability of textiles	To be elaborated
Self-adhesive labels	To be elaborated
Wooden pallets (especially single-use ones)	Revision following the amendment of the Waste Wood Ordinance.

Table 4: Necessary steps for further implementation

9.1 Notes on implementation

For application cases with exception rules, the following guidelines for reduction and separability should be considered during the transition period.

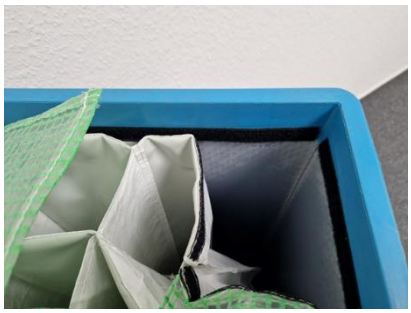
ABS-TPU for anti-slip properties
ABS-TPU is used for certain applications as an anti-slip coating.
The following steps should be implemented for this:

1. Check the necessity for reduction
2. If absolutely necessary, the components should be colour-coded (e.g., with a coloured stripe, distinct recycling code, or similar) and assembled in a way that ensures separability.
3. Additionally, the disposal service provider should be informed in advance.

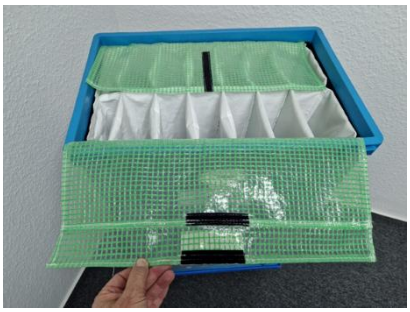
Hook-and-loop fasteners
The application of Velcro fasteners falls under a material bond connection. Velcro fasteners should preferably be made from the same material as the material they are applied to. If this is not possible, the separability of the materials should be ensured.

Application cases

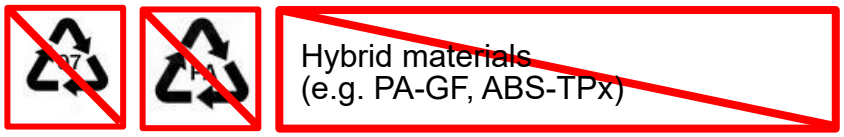
Inlay attachment


Tarpaulins, covers



Spring elements in reusable systems



Certain spring elements (hinges, lift locks, handles, latches, etc.) are currently made from problematic plastics to ensure durability.
To reduce their use:

- The requirements for the container (number of cycles) should be carefully assessed for necessity.
- Repair concepts for alternative solutions (e.g., PP) should be examined.

Where, after evaluating these measures, spring elements cannot be quickly replaced with recommended plastics, POM can be used, provided it is:

- assembled in a separable manner,
- colour-coded,
- clearly labelled (with a recycling code).

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