



Packaging Guidelines

For the Preh Group and all its applicable Plants

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1. Preh packaging contact

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2. Introduction

This document comprehensively outlines the packaging requirements established by Preh, ensuring that suppliers are fully informed of these specifications. It reinforces the expectation that all components and finished products be delivered in optimal condition, with a strong emphasis on design, cost-efficiency, quality, and environmental considerations.

Collaboration with suppliers is a key aspect of this process, involving structured phases of brainstorming, testing, and approval to meet Preh’s stringent standards. The document serves as a detailed guide through the entire packaging process, from the preparation of packaging specification document (PSD) to the evaluation of alternative packaging options, ensuring the consistent application of terms and conditions throughout the supply chain.

It comprehensively addresses all relevant factors, including weight preferences and ISPM 15 compliance, while providing clear instructions on unit handling, shipping, and labeling. Additionally, it contains essential general guidelines for suppliers, covering aspects such as cleaning, storage, packaging handling, regulatory compliance, and an overview of packaging and construction requirements.

The document also underscores Preh’s commitment to sustainability, highlighting the importance of environmental responsibility and eco-friendly practices.

Suppliers are required to adhere to all specified requirements regarding information, packaging, and transportation to maintain a secure and efficient supply chain. They bear full responsibility for ensuring compliance with the provisions outlined in this specification. If a supplier sources components from third-party sub-suppliers and delivers them to Preh as merchandise products, it is their obligation to ensure that this document is made available to sub-suppliers and that all stipulated requirements are strictly followed.

As a critical resource, this document ensures that suppliers are well-informed about the relevant requirements and guidelines. It applies to all types of packaging, including prototype shop, series, service, and after-sales packaging. This comprehensive approach enables suppliers to uphold the integrity of Preh’s supply chain while ensuring that the final product meets both company and customer expectations.

3. Basic information

3.1 Confidentiality

The confidentiality agreement is a fundamental requirement for any collaboration. External suppliers must coordinate on such an agreement with the purchasing department and provide a signed copy. Project-specific data may only be shared with individuals directly involved in the project and must not be disclosed to third parties without prior authorization.

3.2 Purpose of guideline

The Packaging Guideline defines the specifications and requirements for designing and developing packaging for components shipped from suppliers to Preh. It applies to both external suppliers and internal departments, including shipments from PCB production to final assembly. This document provides suppliers with clear guidelines on the expected dimensions, properties, and transportation methods for their packaging solutions. Additionally, it explains the rationale behind the established specifications, ensuring a comprehensive understanding of the requirements for an effective and compliant packaging solution.

Compliance with this guideline is required for the effective implementation of the following packaging strategy:

- Parts protection to ensure required quality
- Efficient and undisturbed material flow from supplier to production, internal production and delivery to the final customers.
- Standardization of container types to optimize costs and enhance environmental sustainability in packaging material usage.

3.3 Terms and requirements

- The part-supply process, from the supplier's intact individual component to the delivery of the final product meeting all requirements, must be ensured.
- The complexity of tasks is heightened by the global network of suppliers, their diverse production locations, and varying local conditions. Compliance with legal and country-specific regulations is mandatory. Standardization of packaging materials and container filling levels must be upheld. Additionally, climate zones and specific requirements for transportation via truck, rail, sea, and air freight must be integrated into the planning process. Packaging development must align with the logistical requirements of various distribution channels.

3.4 Environmental commitment

Preh is committed to continuously exploring and implementing eco-friendly packaging solutions by reducing reliance on single-use plastics, promoting sustainable materials such as returnable packaging, and incorporating recycled carton crates.

Additionally, we adhere to strict waste management guidelines by properly segregating packaging materials for appropriate recycling or disposal. Unauthorized disposal or littering of packaging materials is strictly prohibited. We ensure full compliance with all applicable environmental regulations and waste disposal requirements, maintaining environmentally responsible packaging management practices.

The following detailed description of the delivery process is mandatory and must be strictly followed. Failure to comply may disrupt the entire supply chain, necessitate extensive rework, or lead to quality issues.

- The requirements outlined in this document serve as the technical foundation for developing appropriate packaging and for use in inquiries and proposal preparation.
- Suppliers are expected to take proactive initiatives to optimize processes and reduce overall costs.
- Full compliance with this document is required. Any deviations or modifications must be coordinated with the designated Preh contact person.
- Significant packaging changes must be communicated in advance and carefully coordinated to ensure seamless implementation.

3.5 Regulatory compliance provisions

Packaging must be designed in compliance with the current regulatory requirements applicable in both the producer's and recipient's countries. All relevant laws, standards, regulations, and generally accepted industry practices, as well as specific customer requirements, take precedence and must be strictly followed, even in the absence of individual agreements.

4. General packaging requirements

Before detailing the specific packaging guidelines, it is crucial to establish a set of general requirements that must be followed in all packaging operations.

They encompass various critical aspects, including part protection, transport efficiency, environmental sustainability, and material quality. Regardless of the packaging type, these general requirements must be met, providing the basis for more detailed packaging specifications.

The following key principles define the core expectations for any packaging process, ensuring that products are securely and efficiently packaged, stored, and transported. Adhering to these general requirements will help optimize logistics, reduce costs, and preserve product integrity throughout the supply chain:

- **Product Protection:** Packaging must ensure the protection of products throughout handling, transportation, and storage.
 - **Optimal Packing Density:** Packaging units must be utilized efficiently to achieve optimal packing density.
 - **Positioning and Assembly:** Products must be packaged consistently in the same position, or assembly-specific arrangement.
 - **Stackability:** Packaging must be stackable to build compact loading units.
 - **Standard dimensions:** Compliance with specified standard dimensions is mandatory.
 - **ESD Protection:** Electrostatic discharge (ESD) protection must be implemented where required and specified. ESD protection logo must be visible on packaging.
 - **Unloading:** Packaging must be designed to enable seamless unloading from transport vehicles using industrial trucks.
 - **Handling Efficiency:** Packaging must be designed to enable the efficient assembly and removal of parts.
 - **Transport Locks:** Appropriate and requirement-specific transport locks must be used, applicable only to TISAX-relevant materials.
 - **Recyclable Materials:** The use of recyclable materials should be prioritized.
 - **Stability:** Packaging must provide sufficient stability for the designated product group, ensuring secure handling during transport and storage. Components should be packed to prevent movement and maintain stability throughout the shipping process.
 - **Packaging Integrity:** Damaged packaging must not be utilized under any circumstances.
 - **Insertion Bevels:** Insertion bevels must be incorporated to facilitate the seamless placement of components.
 - **Torsion Protection:** Torsion protection should be implemented whenever feasible.
 - **Abrasion Protection:** Packaging materials must be resistant to abrasion caused by vibration, assembly, or component removal.
 - **Markings:**
 - Date clock (e.g., for ESD protection expiry)
 - ESD identification
 - **Humidity Protection:** Appropriate measures must be taken to ensure protection against humidity.
- With these general requirements established, the following sections will provide a detailed overview of specific aspects of packaging, handling, and transportation, offering further guidance on key considerations.
- **Poka Yoke:** Ensure components are placed in the correct position to prevent assembly errors.

4.1 ESD protection

Electrostatic discharge (ESD) poses a risk of damaging sensitive electronic components during packaging, handling, and transportation. To mitigate ESD-related damage, the following measures shall be implemented where applicable and required.

- **ESD-Safe Materials:** Packaging and handling equipment should utilize ESD-safe materials. Anti-static packaging must be used to protect sensitive components from static electricity.
- **Grounding Procedures:** Grounding measures must be established for personnel, packaging materials, and equipment to dissipate static charges and prevent ESD incidents.
- **ESD Specifications:** Materials must comply with an ESD resistance specification of $10^4 \leq R_s \leq 10^{11}$. Compliance with Preh requirements will be verified through random inspections.
- **Compliance with Standards:** Adherence to ESD guidelines as specified in DIN/IEC 61340-5-1 and DIN/IEC 61340-5-2 is mandatory. Compliance will be verified through random inspections of delivered packaging by the designated ESD responsible person at Preh.

4.2 Technical cleanliness

Thorough cleaning of packaging is crucial to eliminate contaminants, debris, and any substances that could compromise functionality or reliability. Standardized cleaning methods must be established, utilizing only materials compatible with the components. The cleaning process shall be clearly defined, specifying procedures, duration, and equipment used. To ensure effectiveness, validation measures must be implemented to confirm the removal of contaminants and compliance with required cleanliness standards. Specific requirements must be reviewed and coordinated with the Quality Department if applicable to the component.

4.3 Humidity protection

Packaging for all transport methods must provide adequate protection against moisture and humidity. The necessary protective measures should be evaluated based on the specific transport mode.

Particularly for air and sea freight, effective moisture protection is critical. The use of VCI films and desiccant bags is recommended, with the supplier responsible for selecting the appropriate protection. Desiccant bags must effectively absorb and retain moisture without releasing it back into the packaging. The quantity of desiccant bags should be carefully calculated to adequately cover the packaging volume.

The supplier is responsible for assessing the necessity of these protective measures based on the transport method. While recommended materials and solutions are provided, the supplier must determine the required level of humidity protection to maintain part quality and prevent potential damage during transit. This proactive approach helps ensure that components arrive in optimal condition.

5. ISPM 15 Compliance for wooden packaging

ISPM 15 is an internationally recognized standard for wooden packaging materials used in global trade. Preh suppliers must ensure compliance with this standard for all international deliveries. All wooden packaging must be marked with the **IPPC (International Plant Protection Convention)** certification stamp to verify compliance.

5.1 Requirements of IPPCS branding:

- IPPC Logo (1)
- Country of origin (2)
- Manufacturer Code (3)
- Way of Treatment (HT / MB) (4)
- Clear Readable, not hand drawn
- Applied on at least two sides of the pallet/packaging

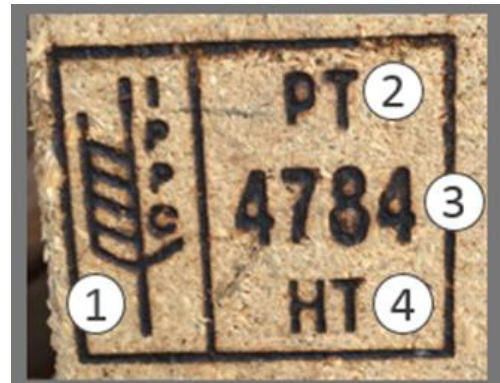


Figure 1: IPPC Branding

5.2 The ISPM15 standard excludes the following points:

- Shipping within the European Union
- Wood packaging made of thin wood materials (less than 6mm thickness)
- Wood packaging made of derived timber products like plywood, laminated wood, OSB fiberboard, or veneer that is manufactured using glue, heat pressure, or a combination thereof.
- Sawdust, wood chips, wood wool
- Wooden components that are permanently connected with containers or other means of transport.

6. Packaging symbols

To ensure the proper handling, storage, and transportation of packaged goods, the following packaging symbols must be used where applicable. These standardized symbols provide clear instructions to all stakeholders in the supply chain, facilitating efficient and safe product handling.

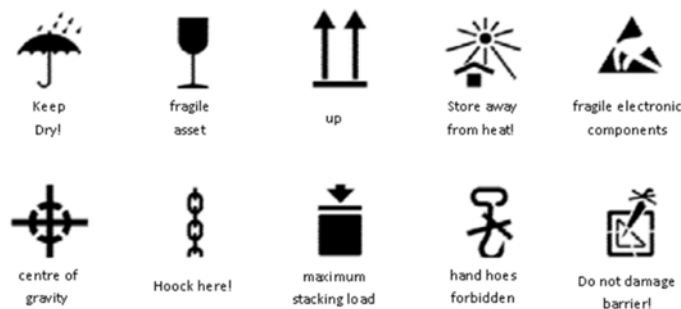


Figure 2: Packaging symbols

7. Packaging concept process overview

7.1 Basic information

Before proceeding with the details of packaging design approval, it is essential to establish a solid foundation by reviewing key aspects of the packaging process. This includes distinguishing between disposable and reusable packaging and ensuring that all preliminary details are properly aligned between Preh and the supplier. The objective is to streamline the packaging process, prevent miscommunication, and ensure full compliance with Preh's guidelines.

Key points to consider:

By verifying these basic elements upfront, the packaging process can proceed smoothly, minimizing delays and ensuring adherence to Preh's quality and environmental standards.

- Confirm whether the packaging will be disposable or reusable based on the project requirements and ecological, economic, and practical factors.
- Review the initial Packaging specification document (PSD) provided by Preh, which typically includes basic project details, part specifications, and packaging requirements.
- Ensure all necessary fields in the packaging specification document (PSD) are completed accurately by the supplier, including dimensions, weight, and material details.
- Align on expectations for trial shipments and initial deliveries to facilitate the approval process.

In general a PSD is necessary to be filled for Preh specific components such with specification (e.g. drawing, CTS,...)

If a pre-filled PSD has not been provided, or material was requested afterwards it can be downloaded from the Preh website or requested from purchasing department.

Additionally, Preh reserves the right to modify the packaging defined as standard by the supplier if necessary; otherwise, standard packaging provided by the supplier may be used.

7.2 Selection of packaging concept

It is essential to choose between one-way and returnable packaging to optimize both economic and operational efficiency. From an economic and financial standpoint, selecting the appropriate packaging concept has a significant impact on costs, directly affecting material expenses, transportation fees, and storage requirements. By ensuring the chosen packaging is cost-effective while preserving product integrity, businesses can achieve improved profit margins.

Additionally, considering repackaging efforts is vital to avoid unnecessary labor costs, downtime, and potential disruptions in the production process. A well-suited packaging solution minimizes the need for complex or frequent repackaging, streamlining operations and reducing the risk of errors.

Furthermore, compatibility with the production plant is key. The packaging should be easy to integrate into existing workflows and machinery, ensuring that it does not cause delays or require costly modifications. Ensuring smooth compatibility with production systems enhances overall productivity and reduces the risk of costly operational inefficiencies.

In summary, a well-verified packaging concept can lead to substantial cost savings, improved production efficiency, and enhanced logistical performance, making it a critical decision in the overall business strategy.

7.3 Returnable packaging

Returnable packaging refers to containers or materials designed to be reused multiple times, without the need for repacking. This packaging is often engineered for durability and longevity, enabling it to withstand repeated cycles of use, transport, and handling. Typically, this includes items like crates, pallets, and specialized containers made from materials such as plastic, metal, or wood.

- **Reusable:** Returnable packaging is not discarded after a single use. It can be sent back, cleaned, and refilled, making it an environmentally friendly and cost-effective solution in the long term.
- **Efficiency in handling:** Because it does not require repacking with every use, it simplifies logistics and speeds up the supply chain.
- **Sustainability:** By minimizing waste and reducing the need for single-use packaging materials, returnable packaging contributes to a more sustainable operation.
- **Long-Term Investment:** Though the initial cost may be higher, over time, the savings in materials, disposal costs, and labor for repacking can offset the upfront expense.

Returnable packaging is ideal in closed-loop systems where products move back and forth between the supplier and the recipient, such as in automotive or consumer electronics industries.

7.4 One-way packaging

One-way packaging, on the other hand, is designed for single-use applications. While it can be utilized as needed, it is important to adhere to the packaging guidelines to ensure that it is used effectively and efficiently. One-Way packaging, such as corrugated boxes, bubble wrap, or shrink film, is typically less durable than returnable packaging, and its use is more common for items that don't require frequent transport or storage.

- **Single-use:** One-way packaging is intended to be disposed of after its initial use. It is often lighter and more economical for one-time shipments.
- **Cost-effectiveness:** In scenarios where returnable packaging isn't feasible or necessary, one-way packaging serves as a practical and affordable alternative. However, its use should be managed to prevent unnecessary waste and costs.
- **Adherence to specifications:** For one-way packaging to be economically viable, it is essential to follow this packaging guideline. This ensures the packaging is used efficiently and that it meets the standards for protection and safety during transit.
- **Minimizing waste:** While one-way packaging can be cost-effective, it is important to avoid overuse or misuse of materials. Overuse of one-way packaging can lead to inflated operational costs and contribute to unnecessary waste.

One important aspect of one-way packaging is the balance between the use of such materials and the cost savings they offer, which should be carefully considered when planning shipments or storing materials.

While one-way packaging is primarily designed for single use, certain exceptions can be made based on the specific needs of the operation. This shall be aligned via the PSD.

8. Packaging approval procedure

For each component, the supplier is required to submit the PSD for approval. The process follows a defined workflow that must be strictly adhered to and mutually agreed upon by both parties. Once Preh grants initial approval, the supplier must provide a trial concept for testing. If modifications are necessary, a revised trial must be submitted for approval. This structured approach ensures alignment, consistency, and continuous improvement in packaging solutions.

If parts arrive in poor condition and the packaging concept outlined in the PSD proves ineffective, corrective actions must be taken immediately. This includes reassessing the existing concept, identifying deficiencies, and developing an improved solution. The revised concept must undergo thorough testing and receive approval to prevent recurrence. The supplier is responsible for addressing any shortcomings, implementing corrective measures, and ensuring that the updated packaging concept aligns with agreed-upon standards. Additionally, all required documentation, including the revised packaging concept, must be resubmitted for approval. Clear communication and detailed feedback between Preh and the supplier are essential to ensuring alignment and a successful resolution.

Packaging testing is critical to ensuring adequate protection against damage or degradation during transportation and distribution. Effective testing preserves product quality while optimizing packaging costs by determining the appropriate level of protection and minimizing excess materials.

Suppliers are responsible for conducting all necessary tests to meet required protection standards. They must ensure that packaging solutions comply with established guidelines and specifications, safeguarding product integrity throughout the supply chain.

Each packaging solution must comply with Preh's requirements.

All related information is strictly confidential and must not be shared with external parties.

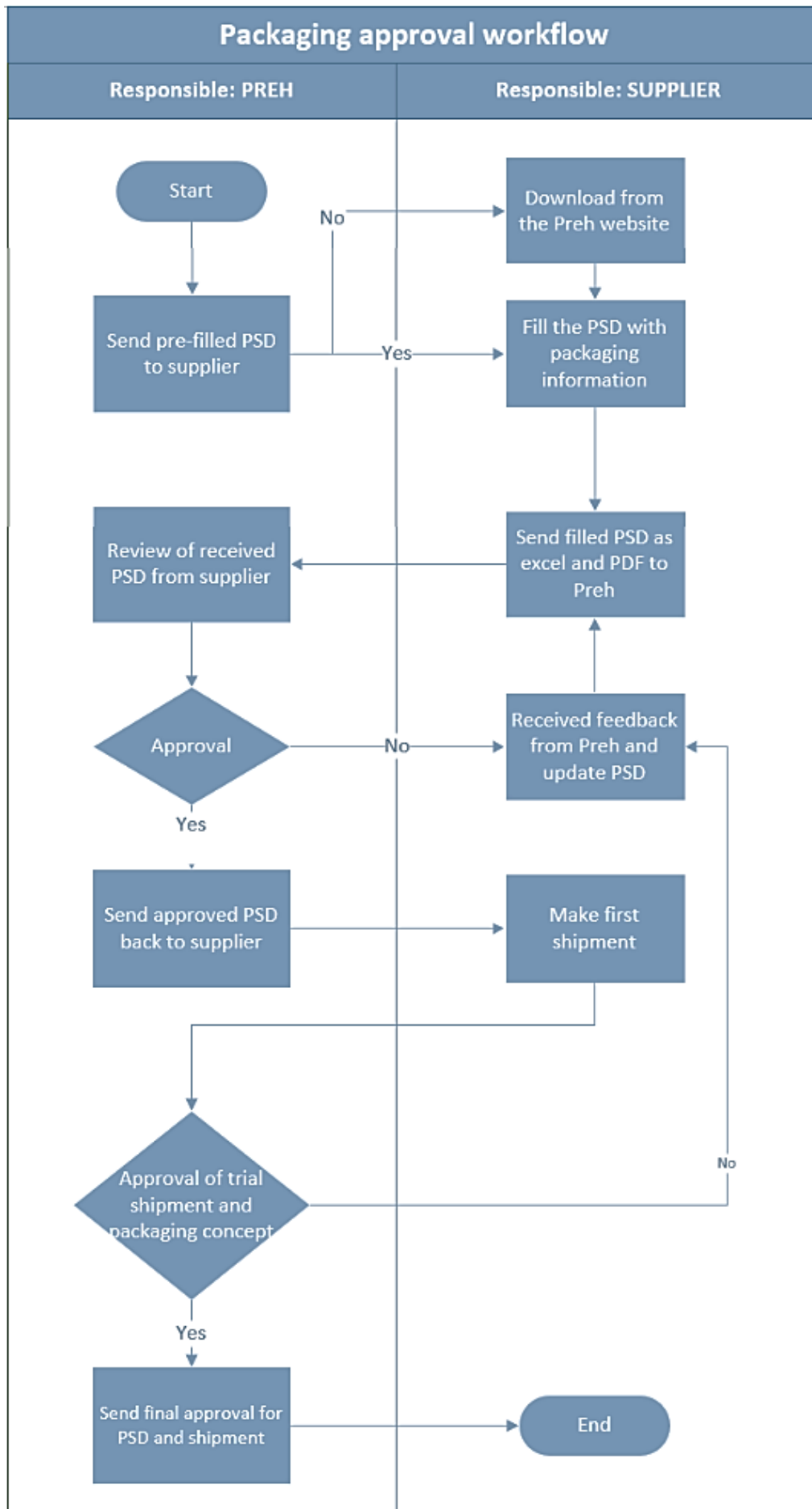


Figure 3: Packaging approval

9. Packaging specification document (PSD) Overview

The packaging specification document (PSD) is a critical document that outlines detailed packaging requirements for each project. It ensures that all packaging solutions meet functional, safety, and regulatory standards necessary for the transportation, storage, and presentation of components. By strictly adhering to the PSD, teams can maintain packaging integrity throughout the supply chain while ensuring compliance with internal and external quality standards.

When Preh provides the PSD to a supplier, it typically includes key project details such as contact information, part material, initial packaging specifications, and the designated production plant. The supplier is then responsible for completing the document by developing a detailed packaging concept proposal and incorporating any project-specific information.

The PSD serves as the foundation for packaging approval. A signed PSD indicates preliminary concept approval however, final approval is granted only after a successful review of a trial shipment or the first delivery using the serial packaging concept. The approval process is finalized upon successful completion of a hardware review protocol.

To facilitate this process, the PSD must be submitted to the designated Preh packaging engineers in both PDF format and the original Excel file filled with the necessary details. Trial shipments or first deliveries using the serial packaging concept must be clearly marked, and the responsible Preh packaging engineer must be informed in advance to coordinate the review. The current version can be found on the homepage of Preh.

Packaging Specification Document
One-Way

SUPPLIER MUST COMPLETE SECTIONS IN GRAY		Type:	Units :	Weight	Height				
Requirements									
ESD- protection product Primary packaging suitable for ESD area Technical cleanliness relevant In PE Bag (dust protection)		Consider <input type="checkbox"/>	Packaging concept Calculated quantity of parts per packaging unit (PU) Packaging unit (PU) size for assembly supply (length x width x height in mm)						
Comments for supplier									
PART INFORMATION									
Project									
Preh Part Number									
Preh Plant(s)									
Description									
Part dimensions		Length	Width	Height	Part Weight				
SUPPLIER INFORMATION									
Supplier name			Contact person						
Supplier number			E-mail						
Adress			Phone number						
City		Country		Zip/Postal Code					
PACKAGING INFORMATION									
Part arrangement									
Packaging unit		Lenght	Width	Height	Tare	Gross	Parts/packaging unit		
Shipping unit							Layers/shipping unit		
							Packaging units/Layer		
							Parts per shipping unit		
PALLET STACKABILITY									
Static		SPECIFIC PACKAGING REQUIREMENTS			Corrosion protection				
Dynamic		Hazardous goods			ESD protection		Technical cleanliness compliant		
comments			Image - Label			Image - Box with label			
			Insert: Picture of label			Insert: Picture of box with label			
Packaging Unit (PU)								Image - Box with parts	
Mat. description Packaging unit (PU)	Material quality	Ref.	Type	Outer dimensions ()			Tara weight ()	ESD suitable	Amount per PU
				Length	Width	Height			
									Insert: Picture of box with contents visible
Shipping Unit (SU)								Image - Shipping unit	
Mat. description Shipping unit (SU)	Material quality	Ref.	Type	Outer dimensions ()			Tara weight ()	ESD suitable	Amount per SU
				Length	Width	Height			
P. unit						0		0	Insert: Picture of Shipping unit
APPROVAL									
Responsible		Supplier				Preh			
Date		_/_/___				_/_/___			
Name		_____				_____			
Signature		_____				_____			

Figure 4: Packaging Specification Document example

10. Packaging units

10.1 General information about handling units

Suppliers must comply with the specific packaging requirements of each plant. It is important to note that the weight specifications for packaging units (material plus packaging) and shipping units vary by plant, as detailed in the table below.

Additional note: Monterrey's resin material has an exception with a weight limit of 25kg.

Weight (KG)	Bad Neustadt	Trofa	Ghimbav	Dippach	Monterrey	Ningbo
10	X	X	X		X	
15				X		X

Table 1: Weight packaging requirements per plant

10.2 One-way handling unit

For one-way handling units, dimensions must primarily comply with Euro Pallet standards (DIN EN 13698-1). The internal dimensions of the one-way carton provided by the supplier must not exceed the internal dimensions of the KLT (refer to Table 2 in Section 10.3), as the internal dimension is the key reference measurement.

Alternative dimensions may be permitted with explicit approval from the plant's packaging engineers. A critical factor for approval is the box height, which must be verified with the responsible authority before shipment.

10.3 Returnable handling unit

Similar to one-way units, returnable packaging must comply with the specific requirements of each plant. All returnable packaging materials must be delivered in a clean condition to ensure seamless integration into the production process. Preh offers the following box options per plant:

Dimensions		Availability per plant					
Outer dimensions (mm)	Inner dimensions (mm)	Bad Neustadt	Trofa	Ghimbav	Dippach	Monterrey	Ningbo
600x400x220	550x350x200	X	X	X		X	
600x400x170	550x350x150	X					
600x400x145	550x350x125	X					
601x400x120	550x350x100	X					
400x300x220	350x250x200	X	X		X		
400x300x170	350x250x150	X	X	X			
400x300x120	350x250x100	X					
300x200x120	250x150x100	X					
566x379x212	556x369x202	X					
349x266x170	339x256x160	X					
349x266x120	339x256x110	X					
245x173x100	215x143x80			X			
600x400x270	560x360x250			X			
600x400x320	570x370x300				X		X
400x300x300	370x270x280						X
400x300x150	370x270x135						X
300x200x150	265x165x135						X
600x400x150	570x370x130						X
600x400x280	565x365x245					X	X

Table 2: Dimensions requirements per plant

11. Shipping unit weight & dimensions

Any deviation from this requirement must be approved by the packaging engineer:

Plant	Shipping unit pallet type	Preferred pallet height
Bad Neustadt	Wooden euro pallets	1200mm x 800mm x 144mm
Trofa	Wooden euro pallets	1200mm x 800mm x 144mm
Ghimbav	Wooden euro pallets	1300mm (max 1100mm for buffer FIFO & PCB)
Dippach	Wooden euro pallets	1200mm x 800mm x 144mm
Monterrey	Wooden euro pallets	1200mm x 800mm x 144mm
Ningbo	Multiple pallet sizes: 1200x800mm 1200x1000mm, 1140x980mm	1200mm x 800mm x 144mm

Table 3: Weight shipping unit dimensions per plant

12. Structure of loading units

Loading units must comply with Euro Pallet dimensions of 1200 x 800 x 144 mm (DIN EN 13698-1). One-way flat pallets are permitted only if they meet the dimensional requirements specified in DIN EN 13698-1.

Closed pallets or pallets with codirectional planks on the underside are not allowed:

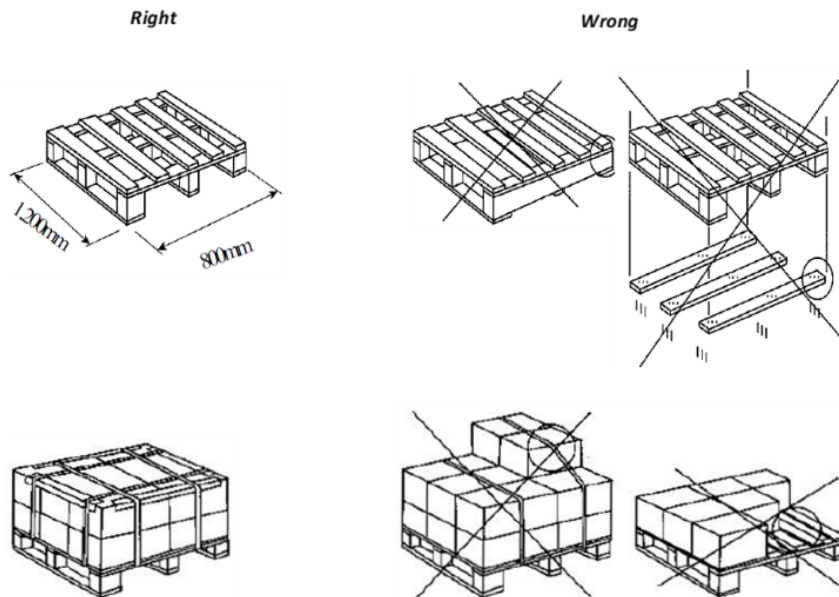


Figure 5: Closed pallets or pallets with codirectional (not allowed)

13. Weight per shipping unit

The shipping unit specifications vary for each plant:

Plant	Weight preferred	Weight maximum
Bad Neustadt	400Kg	600Kg
Trofa	400Kg	550Kg
Ghimbav	500Kg	500Kg
Dippach	500Kg	600Kg
Monterrey	400Kg	500Kg
Ningbo	500Kg	600Kg

Table 4: Weight per shipping unit per plant

14.Repacking

The effort and resources required for repacking within Preh's operations should be minimized. Repacking results in increased labor costs, potential delays, and a higher risk of product damage or errors. To mitigate these challenges, packaging must be designed and implemented in strict alignment with specific handling and shipping requirements from the outset.

The inner dimensions of the one-way carton provided by the supplier must not exceed those of the KLT (see Table 2 in Section 10.3). By adhering to these standards, plants can significantly reduce the need for repacking, streamline processes, and enhance overall supply chain efficiency.

15.Specific requirements on returnable packaging

15.1 Packaging stock / demand / amount

Effective packaging stock management is crucial for ensuring a seamless supply chain. Suppliers are responsible for maintaining packaging inventory levels that align with Preh's demand forecasts and operational requirements. Accurate tracking and proactive management are essential to prevent shortages or excess stock that could disrupt production.

Suppliers must continuously monitor packaging usage and adjust stock levels accordingly. This includes anticipating demand fluctuations and ensuring sufficient packaging availability to meet Preh's needs. By maintaining optimal stock levels, suppliers contribute to an efficient material flow while minimizing waste and storage costs.

An effective packaging demand calculation relies heavily on the proper use of packaging. Additionally, it is crucial to note that returnable packaging must only be used for storing and transporting materials to Preh's plant - any other use is strictly prohibited. Ensuring that packaging is utilized correctly is key to accurately assessing packaging needs and optimizing both cost efficiency and operational effectiveness.

15.2 Cleaning, storage and handling of packaging

Suppliers must ensure that all parts are delivered in clean and fully functional load carriers. Preh reserves the right to charge the supplier for any costs incurred due to the delivery of contaminated load carriers.

It is the supplier's responsibility to maintain the cleanliness of the packaging, either by performing the necessary cleaning themselves or by coordinating with Preh for cleaning arrangements. This requirement, if specifically needed, must be clarified with Preh in advance to avoid any disruptions.

During storage, packaging must be properly maintained and protected from harmful environmental factors, including:

- Moisture
- Exposure to intense solar radiation
- Dust

Additionally, condensation caused by rapid and significant temperature fluctuations must be prevented. Packaging must be prepared and ready for use in production, with all assembly operations completed in advance outside the production area.

Suppliers are responsible for regularly inspecting the condition of all packaging they provide, promptly identifying and addressing to Preh any damaged or defective packaging to prevent disruptions. Suppliers must proactively manage packaging inventories, ensuring sufficient availability at all times. This includes reordering packaging as needed. If packaging damage results from the supplier's neglect or oversight, the supplier will bear the cost of replacement or repair. In cases where damage occurs during transport or handling by Preh, cost responsibility will be determined on a case-by-case basis through mutual agreement.

Suppliers are not permitted to request additional funds for packaging replacement due to their own negligence. Instead, they must ensure diligent and efficient maintenance and reordering processes to prevent supply chain interruptions.

15.3 Alternative packaging

The availability of returnable packaging is a critical concern for Preh, as any shortage may disrupt operations. Therefore, an alternative packaging solution must be established to maintain workflow continuity. This alternative packaging must adhere to the same standards as returnable packaging, including identical dimensions, box quantities, and pallet configurations, to minimize operational impact. It should only serve as a substitute for returnable packaging in exceptional cases.

Preh will not accept supply disruptions due to the unavailability of returnable packaging inventory, and failure to comply may result in consequences.

Whenever alternative packaging is required, the supplier must adhere to specific steps:

- The logistics team must be informed of the delivery schedule and intended material usage.
- Pallets containing alternative packaging must be clearly marked with a blue label stating, "Alternative Packaging."
- The supplier must ensure that finished goods fit securely and are properly fixed within the alternative packaging to prevent damage during transport.

16. Structure of loading units and labels

16.1 Labeling

- All deliveries must be properly labeled to ensure clear and easy identification of each product.
- The identification label must include all necessary data to facilitate a clear and efficient goods receipt process.
- Each loading unit, container, or individual package must be labeled in accordance with VDA 4902 standards.
- Any previous labels must be completely removed before applying the Preh-specific label.
- A VDA master label must be used to identify external packaging, such as pallets.
- The goods label must be securely attached, clearly visible from the outside, and must not exceed the dimensions of the packaging.

- Labels must be placed on at least both short sides of the packaging unit.
- The smallest packaging unit must contain homogeneous parts and only one batch number.
- All information on the supplier's label must accurately correspond to the delivered goods and the accompanying documentation.

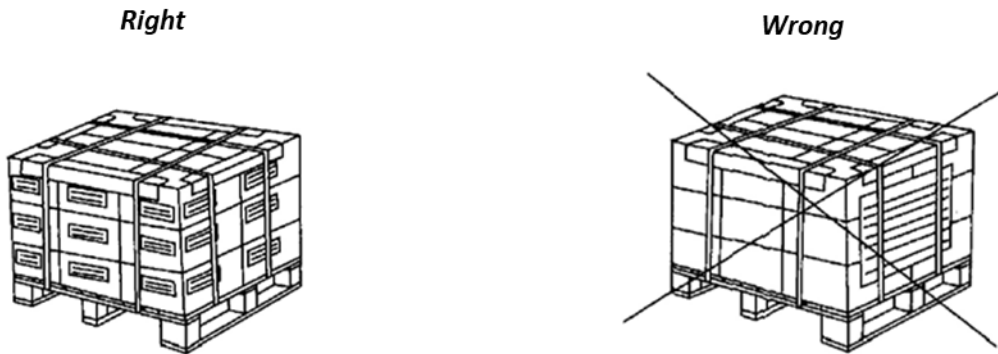


Figure 6: Packaging guide

16.2 Packaging label – for loading unit

Each packaging unit must contain only one part number. If multiple part numbers are included within the same loading unit, a mix-load label must be used to clearly identify the different parts. The mix-load label must include, at a minimum, the following information:

- Indication of "Mix-Load"
- Preh part number
- Quantity of each part number

For loading units containing a single homogeneous part number (e.g., one pallet), each unit must be labeled accordingly. The label must comply with the latest version of VDA 4902. The following information is the minimum requirement and must be displayed in plain text:

(1) Receiver MANMEDIEN AG		(2) Dock - Gate A5-L31	
(3) Advice Note No (9) 2581752		(4) Supplier Address [Redacted]	
[Barcode]		(5) Net weight 345	(6) Gross weight 450
		(7) No Boxes 01	
(8) Part No (9) 765-HGD89-123			
[Barcode]			
(9) Quantity (9) 140		(10) Description GEBLAESE	
[Barcode]		(11) Supplier Part No (10) 0-123B10-0	
(12) Receiver (9) 4638141		[Barcode]	
		(13) Date D 910226	(14) Eng. Change A43-275 XL
(15) Serial No (5) 2581752 01		(16) Batch No (9) C 123	
[Barcode]		[Barcode]	
<small>(17) CSS, POSTFACH 456, 6750 KAISERSLAUTERN</small>		<small>Warenanhänger VDA 4902, Version 4</small>	

Figure 7: Packaging label – for loading unit

16.3 Packaging label – for handling unit

Each handling unit (e.g., carton box) must be labeled for proper packaging identification. The label must fully comply with the latest version of VDA 4902, following the requirements for small load carriers. An example of the required label format (as of the date these guidelines were created) is provided below:

The following data are the minimum requirement with plain text:

- Part number Preh - with additional barcode
- Quantity - with additional barcode
- Part description
- Production date

(1) Warenempfänger Kurzadresse	(2) Artikelbezeichnung - Lagerort - Verwendungsschlüssel	(3) Lieferschein-Nr. (No)
	ABLAD - LAGER - M	2581752
(8) Sach-Nr. Kunde (P)	(10) Bezeichnung (Lieferung - Lieferart)	
765-HGD89-1234567	ELEKTR. STEUERGERAET	
(9) Füllmenge (Q)	(11) Serien-Nr. Lieferart (Seri)	(12) Lieferant-Nr. (V)
140 ST	00123B1070	1234546789
(15) Produkt-Nr. (S)	(13) Datum	(14) Änderungsstand Konstruktion
2481752 01	D940407	AENDERUNGSSTAND
	(16) Chargen-Nr. (Ch)	
	C12345678	

Figure 8: Packaging label – for handling unit

The following typical data are required for particular product:

- Expiration date, in case of perishable goods e.g. soldering paste, painting
- Batch No., in case of special material group e.g. resin material, painting material

16.4 Manufacturing label – for electronic components

For traceability components (exclusive electronic parts), a manufacturing label must be applied to the smallest packaging unit (e.g., each reel) to ensure proper material identification and facilitate the goods receipt process. The label must comply with VDA 4992 MAT Label, version 1.0. An example of the required label format is provided below:

	Part No.:	9800131640
	Quantity:	200
	Index:	AA
	Add. Info:	5003020
	Exp. -Date:	20080218
	Date Code:	20070430 MS-Level: 5
	1. Batch:	04567890123456789
	2. Batch:	12345678901234567
	Purchase:	ABCXYZ
	Shipping Note:	122584
Man. Loc.:	GER-Hannove2	
Part Name:	10KOhm 5%	
Supplier-ID:	815 Package-ID: S000000017785	
Ord. Code:	SC44127 CFNR2	
Man. Part No:	SL105103MAA-S	
Supplier-Data:	Customer01	
Suppl.:	Supplier Sample & Co.	

Figure 9: Manufacturing label – for electronic

16.4.1 Barcode type and label size

The barcode format must adhere to either the MAT PDF417 label or the MAT Data Matrix label standards. The recommended label dimensions are 60 mm (L) x 40 mm (H).

16.4.2 Information content

The following data are the minimum required specifications:

- Customer Part Number
- Quantity
- Manufacturer Part Number
- Date of Manufacturing
- Batch Number
- Brightness Class (for LED)
- Color Class (for LED)
- Moisture Level (if applicable)
- Expiration Date
- Distributor Part Number (if applicable)

Data field	Data identifier	Length (digit)	Format	Example
Purchase Order Number	(K)	10	XXXXXXXXXX	0004408792
Customer Part Number	(P)	14	XXXXX- XXX/XXXX	05516-057/0000
Shipping Note	(2S)	Supplier-defined	---	103791161
Quantity	(Q)	7	XXXXXXXX	0005000
Manufacturer Part Number	(1P)	Supplier-defined	---	SL105103MAA-S
Date of Manufacturing	(6D)	6	YYYYMMDD	20151031
Batch-No.	(1T)	Supplier-defined	---	045678912456789
Moisture Level	(Z)	1	X	3
Date of Expiration	(14D)	6	YYYYMMDD	20151031
Package ID	(3S)	Supplier-defined	---	106123456789
Brightness class	(20P)	2	XX	L1
Color Class	(2T)	2	XX	2E
Distributor Part No.	(31P)	Supplier-defined	--	SL105103MAA-S

Table 5: Definition of data identifier, length and format

16.5. Manufacturing label – for printed circuit board

For printed circuit boards (PCBs), a manufacturing label must be affixed to the smallest packaging unit (e.g., vacuum packaging) to ensure proper material identification and traceability throughout the production process.

16.5.1 Information content for PCB label

All PCB manufacturing labels must include the following mandatory information in both plain text and barcode format:

- Preh Part Number
- Date Code
- Quantity
- Trace Code

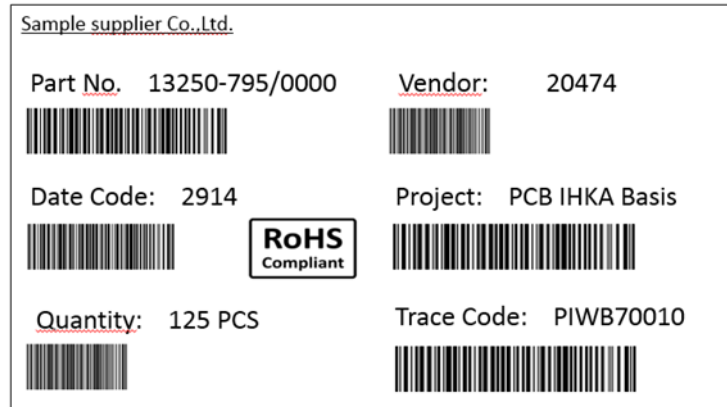


Figure 10: Label example

The date code represents the week and year of PCB production. The trace code is an internal identifier assigned by the supplier to ensure full traceability of each PCB. The supplier has the flexibility to define the trace code's content and format.

16.6 Data length

Data field	Length (digit)	Format	Example
Preh Part No.	14	XXXXX-XXX/XXXX	13248-014/2000
Date code	6	WWYYYY	302016
Quantity	5	XXXXX	04000
Trace Code	5	Supplier-defined	Supplier-defined

Table 6: Data length