



ZFFCN Packaging Standard Manual

ZF Foxconn Chassis Modules (North America)
Version 1.0

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II List of Abbreviations and Specialized terms.

Abbreviations

PDS: Package Data Sheet

RFQ: Request for Quotation

Specialized terms

One way packaging

Returnable packaging

Carton Box / Cardboard Box

Heavy Duty Carton Box

Common Carton Box

Blister/Foam tray

Plastic Pallet

Packaging Material

Auxiliary Packaging Material

Spare Parts

Insert

Unit Load

1 Foreword

This manual is issued to standardize processes, ensure consistency in operations, and guarantee that all activities are carried out in accordance with the guidelines established by ZFFCN. ZFFCN is responsible for the control, distribution, and maintenance of this document, ensuring that all updates are properly managed and communicated.

General

On the premise of ensuring the quality of components, the goal of this manual is to promote the standardization and normalization of inbound packaging, improve packaging quality, reduce logistics costs, and enhance production efficiency.

2 Purpose & Scope

This manual aims to standardize the incoming packaging for all ZFFCN NA plants, including returnable packaging and one way packaging.

This manual aims to standardize the packaging standards for component suppliers and packaging suppliers of ZFFCN NA Plants.

3 General principles

Packaging development and design should satisfy the following basic requirements:

3.1

EHS - Safety Requirements: The safety of operators and components must be ensured. All types of packaging must be reviewed with the participation of EHS engineers before official investments.

3.2

Quality Requirements: Before and after operator put component into packaging, the packaging material itself should not have unacceptable quality and shape changes.

3.2

Cost Requirements: Pursue the lowest overall packaging material cost (including maintenance costs), pursue the maximum density, prioritize even numbers, and ensure that the packaging dimensions can match the truck space effectively.

3.3

Environmental Requirements: Choose renewable and environmentally friendly packaging materials whenever possible, avoid repetitive or excessive packaging, and strive for sustainability.

3.4

ZFFCN PDS Label Requirements: Refer to the label requirements in ZFFCN PDS,

4

Main factors are the label format, label quantity, and paste position.

3.5

ZFFCN packaging release: ZFFCN is responsible for the final approval of the packaging concept. ZFFCN has the right to require suppliers to optimize packaging if a lower-cost packaging concept appears or if quality issues occur.

4 Process of Packaging Development

4.1

ZFFCN F04: The returnable packaging concept is initiated by the ZFFCN F04 team. After receiving feasibility confirmation from long-term cooperative packaging suppliers and Tier 2 suppliers, it can be adopted as the official concept.

4.2

Tier2: Through discussions and confirmation from plant logistics, quality, and production (process), the concept will be finalized as the design version.

4.3

RFQ: Based on the design concept, prepare the RFQ and send it to the NPM department to purchase a sample prototype.

4.4

Validation and Approval Process: If the road test is approved, series production may start. If the review is not approved, the packaging sample must be modified until approval is obtained.

5 Packaging Category and Priority

5.1

Packaging category: The category of packaging at the ZFFCN NA plants are divided into one way packaging and returnable packaging:

One way packaging means carton box or carton-wooden combined packaging.

KLT/GLT/EVA

Returnable packaging means KLT standard box, GLT cardboard box, plastic boarding box, metal box (tin box, mesh box), foam tray, specialized EVA supporter, and specialized metal rack.

5.2

Domestic packaging: For domestic suppliers, the packaging category is determined by some factors such as distance and protection requirements.

In General, the priority as below:

KLT/GLT/EVA

KLT standard carton/GLT cardboard box>plastic boarding box> metal box> specialized foam tray/specialized EVA supporter>specialized metal rack>One Way packaging.

6 One Way Packaging

Packaging that is used only once is defined as one-way packaging. One-way packaging is typically made of paper and wood. Common types of one-way packaging are as follows:

6.1

Heavy Duty Carton Box with Wooden Pallet: Suggested dimensions for heavy-duty cartons are listed in the table below. If the packaging cannot meet the requirements, please communicate with ZFFCN NA for confirmation.

Overseas Dimensions:

Description	*	Height with pallet	Pallet height
	L×W (mm)		
Heavy Duty Carton Box with Wooden Pallet	1200*1000	≤1200	≤150
	1200*800	≤800	



NA Dimensions:

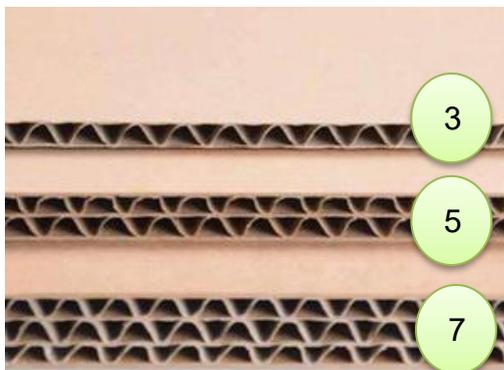
Description	L × W (mm) (estándar NA)	L × W (in)	Altura con total pallet (mm)	Altura pallet (mm)	NA	Volumen máx. por pallet (m ³)
Heavy Duty Carton Box with Wooden Pallet	1219 × 1016 mm	48 × 40 in	≤ 1200	140–165		≈1.49 m ³
Heavy Duty Carton Box with Wooden Pallet	1219 × 1016 mm	48 × 40 in	≤ 800	140–165		≈0.99 m ³

6.1.1

The length and width of the wooden pallet should be same or slightly larger than the heavy-duty carton. It should allow for four-way forklift entry. Solid wood is preferred.

6.1.2

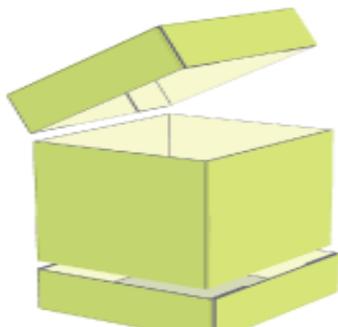
The material of the heavy-duty cartons side panels and covers should be at least 5-layer corrugated cardboard. The surface paper of the side panels should be graded A or higher, with a weight of no less than 150g. For heavy products (≥300KG) or those parts with high protection requirements, 7-layer corrugated cardboard should be used. Inner fixtures can choose 3-layer or 5-layer corrugated cardboard.



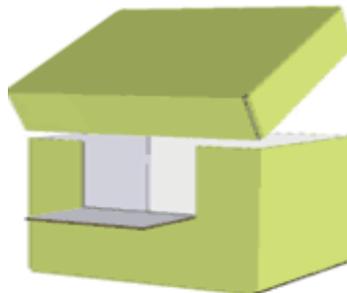
From top to bottom, they are 3-layer, 5-layer, and 7-layer corrugated cardboard.

6.1.3

Common heavy-duty cartons are type 0310 and 0312A. When the packaging height is low, type 0310 is preferred. When the packaging height is higher, type 0312A is preferred to pick up parts conveniently.



0310
Type 0310



0312A
Type 0312A

6.1.4

After finish packaging, at least two straps should be used to secure it in the length direction.

6.1.5

The stacking factor needs to be marked on the upper left corner of the outer box and printed on two opposite corners.

6.2 Common Carton Box with Wooden Pallet



0312
Type 0312



0201
Type 0201

Standard box cardboard is 0312 type (shoe box type) and 0201 type (flap type), The most common type is 0201. Considering the actual needs of the production line, it is suggested to use the 0312 types. The dimensions are shown in the table below. If these dimensions do not meet the requirements, please communicate with ZFFCN NA F04 for confirmation.

Type	Dimension (L×W×H) mm	Material
0312 0201	400×300×120	/
0312 Priority 1	400×300×230	
	600×400×120	

0201 Priority 2	600×400×230	3-layer/5-layer corrugated cardboard
	600×400×340	

6.2.1

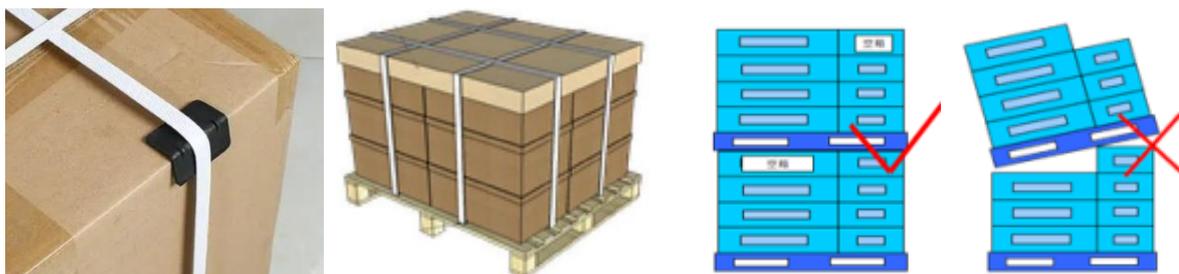
The pallets used for standard cartons should meet the same requirements as those pallets for heavy-duty cartons. The pallet height should be $\leq 150\text{mm}$, and they must allow for four-way forklift entry. Solid wood is preferred."

6.2.2

Standard cartons are generally using 3-layers corrugated cardboard. For heavy components or those components which require high protection, 5-layers corrugated cardboard should be used. Inner dividers should use 3-layer corrugated cardboard based on the situation.

6.2.3

The cartons should be regularly stacked secured to the pallet with straps. It is suggested to place corner protectors between the straps and the cartons. If a full layer cannot be realized, use the same empty cartons to fill the gaps, and put it on top layer. Paste the 'Empty Carton' label in a prominent position.



6.2.4

In order to improve the utilization rate of containers or trucks, the strength of standard cartons must not only meet the load requirement itself but also can meet the stacking factor requirements. If this cannot be satisfied, please communicate with F04 for confirmation.

7 Returnable Packaging

The normal lifetime is over 5 years, and the usual types are as follows:

7.1 KLT standard plastic box

KLT standard plastic boxes are produced by injection molding technology. The bottom needs to use reinforced bottom structure. Based on actual situation, the lid can be chosen or not. The recommended dimensions are as follows.

Type	Outside Dimension (in)	Inside Dimension (in)	LB Weight (lb)	Load Bearing (lb)	Max Load Weight (lb)	Nest Height (in)
NA-Tote1215-05	12 × 15 × 5	9.4 × 13 × 4.0	2.9	20	33	1.6
NA-Tote1215-07	12 × 15 × 7	9.5 × 13.1 × 6.9	3.7	20	33	2.3
NA-Tote2415-07	24 × 15 × 7.4	21.5 × 13.1 × 6.8	4.9	20	33	3.7
NA-Tote2415-14	24 × 15 × 14.5	21.5 × 13.1 × 13.9	5.7	20	33	6.3
NA-Tote2422-07	24 × 22 × 7.4	21.5 × 20.6 × 6.8	4.9	20	33	4.9
NA-Tote3215-11	32 × 15 × 11	29 × 13 × 10.2	4.7	20	33	5.3

7.1.1 KLT

The material and technical standards for KLT box are as follows:

material	100%PP() 100% new PP (Polypropylene)
color:	(RAL5005)(RAL7001) blue (RAL5005), medium gray (RAL7001)
Production process	Injection molding

7.1.2 KLT box picture



7.1.3

KLT anti-static boxes color is black. The anti-static performance is long-lasting and stable, with an anti-static



KLT
Anti-static KLT

7.2 Plastic Pallet and Lid

7.2.1

The common specifications and requirements for plastic pallets are as follows:

Name	Dimensions (mm)	Process	Material	Dead WT (kg)	Static Load (kg)	Dynamic Load (kg)
Plastic Pallet – NA Standard 48×40	1219 × 1016 × 143	Injection	HDPE / PP	22–25	≈13,600 kg	≈2,270–2,500 kg
Plastic Pallet Lid – NA Standard	1250 × 1050 × 80	Thermoforming	HDPE	6–8	--	--



7.3 GLT box

7.3.1

Name	EX (L×W×H mm)	IN (L×W×H mm)	Material	Dead WT (kg)	Process	Fold Height (mm)	Static Load (kg)	Dynamic Load (kg)
NA Bulk Pack – Plastic (AIAG 48×45×42)	1219 × 1143 × 1067	~1130 × 1080 × 1000	HDPE	45–55	Injection	330–380	680–900 kg	450–680 kg
NA Bulk Pack – Corrugated Gaylord (48×40×36)	1219 × 1016 × 914	~1150 × 950 × 870	Corrugated 3–5 wall	20–28	Die-cut corrugated	N/A	1800–2270 kg	~1360 kg



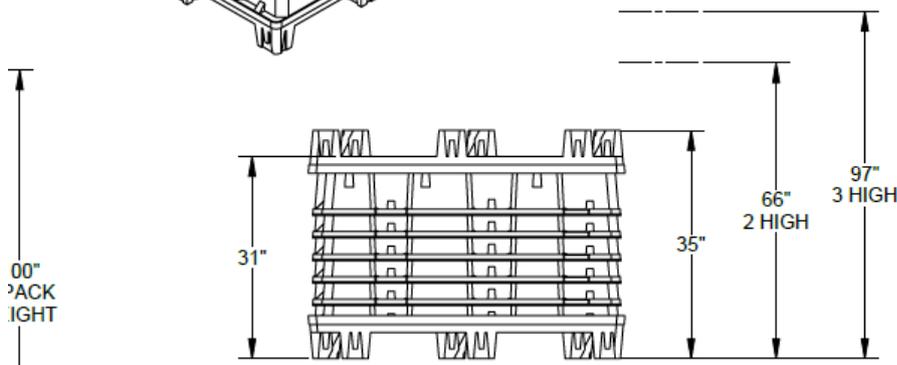
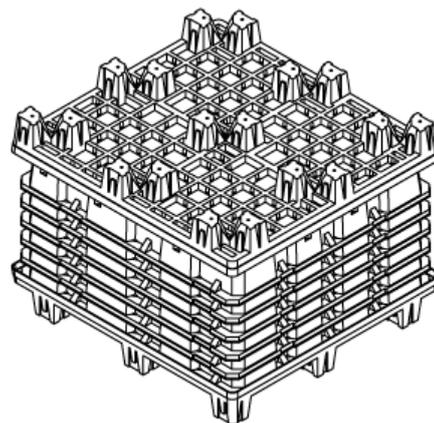
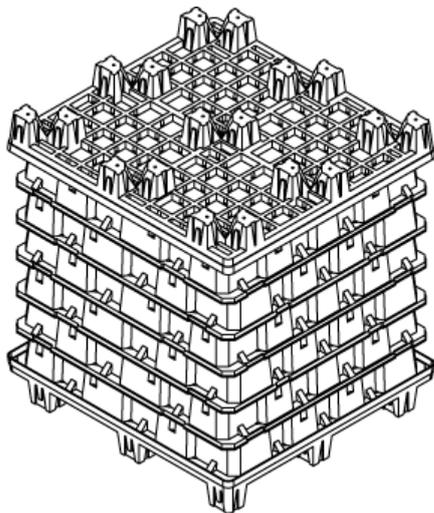


7.3 Special foam trays with pallet

7.3.1 Special foam trays are designed for one or several (universal) parts. They need to be nestable when they return empty trays.

Since the packaging is specially designed, the range of length, width and height is large. For ease of management, the common dimensions are as follows:

Length × Width (mm)	Material	Height with pallet (mm)	Pallet height (mm)
1219 × 1016 (48×)	HDPE	≤1150	≤150
1219 × 1143 (48	HDPE	≤1150	≤150



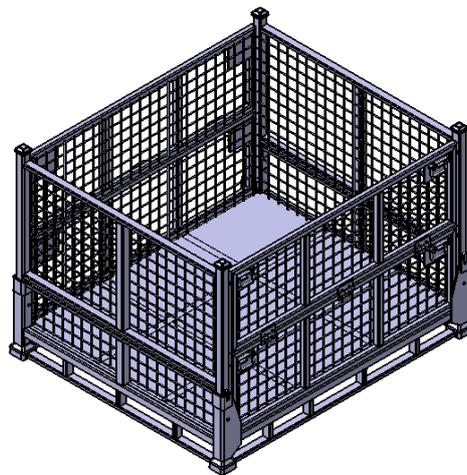
7.3.2

For special foam trays with a dynamic load weigh 400kg, the pallet board thickness is recommended to be 6-8 mm.

For pallet with a maximum load weight >800 kg during transportation, it is recommended to add a reinforced structure in the pallet design, using a steel nested structure. The pallet board thickness is recommended to be >8 mm, and the top cover board thickness is recommended to be >6 mm.

7.4 Metal Box

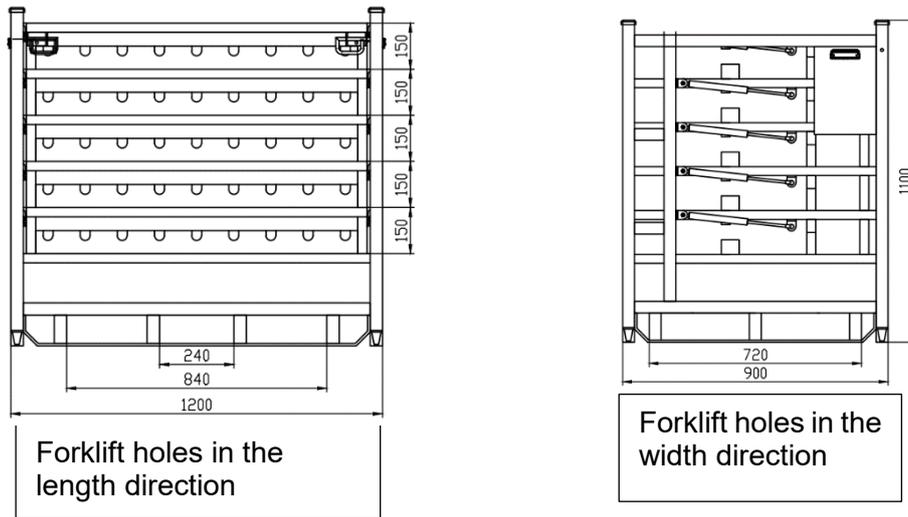
Metal Box is used for packaging heavy products with high protection requirements. It can be used together with a special blister tray or independently by metal box itself. The metal box is customized packaging with adjustable length, width and height, but the basic structure remains unchanged. Therefore, we only discuss standard size metal boxes here. If other sizes of metal boxes are needed, adjustments can be made based on this.



7.5 Special Metal Racks

Special metal rack is not suggested as a high priority packaging type because they are inability to fold, and in higher logistics and processing costs.

The drawing and sample production evaluation review is needed. This packaging approval needs to be confirmed one by one with F04 and plant packaging engineers. The bottom structure needs to meet forklift loading requirements.



8 Cushioning Materials

Cushioning materials are used in large quantities, mainly including cardboard (sheets), bubble wrap (PE), pearl cotton (EPE), and stretch film. Bubble wrap is cost-effective; the thickness of pearl cotton can be adjusted and can be made into complex structures. Generally, single or multiple layers of bubble wrap can be used for shock absorption, but when high requirements are placed on the paint surface, it is best to choose pearl cotton as packaging materials in close contact with the paint surface. Additionally, the strength of pearl cotton is directional and can be improved by pasting PE films. Stretch film (wrap film) mainly serves the purpose of waterproofing, moisture-proofing and fastening, and has a certain cushioning effect.



Air bubble film



EPE Foam



EPE Foam Block

9 Anti-rust Materials

Considering the special nature of components, in general only VCI (Vapor Corrosion Inhibitor) is allowed for rust prevention. Common types include VCI anti-rust bags (light blue or light yellow) and VCI anti-rust paper (VCI attached to kraft paper). VCI rust prevention needs to work in a closed space, preferably used together with desiccants. The use of VCI anti-rust oil is not recommended.



Anti-rust method for imported drive shafts: The entire shaft is wrapped in an anti-rust bag, and anti-rust paper in the middle also serves as a buffer.

10 SAP code of packaging

If there are packaging number applications in the future, please first check whether the packages type is already included in the following list or not. If yes, please use the existing packaging number and do not apply for duplicates.

SAP - Nr.	Designation English	Length	Width	Height	Volume
91233216	Returnable Totes 24159	1,219	1,143	<i>1,110</i>	1.547 m ³
91233217	RET -Totes 24159	610	381	<i>241</i>	0.056 m ³
91233218	RET -Lid-ULTotes	1,143	1,219	<i>150</i>	0.209 m ³
91233219	RET -Pallet_Totes 45x48	1,143	1,219	<i>150</i>	0.209 m ³
91233220	Returnable Totes 12157	1,143	1,219	<i>867</i>	1.208 m ³
91233221	RET-Totes 12157	305	381	<i>177</i>	0.021 m ³
91233218	RET -Lid-ULTotes	1,219	1,143	<i>150</i>	0.209 m ³
91233214	RET_Bulk-Box_484534	1,219	1,143	<i>864</i>	1.204 m ³