

# Overseas Packaging Guideline

### Spirit and Purpose

Due to recent damage to overseas shipments and the cost involved, this requirement is intended as a guideline for suppliers and to sharpen the focus on packaging. This document is supplemented by the current version of the **HARMAN Packaging Manual** and the document **VDA 4525** (November 2009).

It is the supplier's duty to design, to purchase and to use packaging that is "fit for purpose" in the correct way. Thereby the supplier must ensure the necessary physical characteristics until the transfer of risk at the HARMAN site is completed.



### Citation from an IEEP Report for INCPEN (27 September 2004)

#### “Packaging for Sustainability”

Packaging can be seen in two ways. Firstly, packaging prevents waste. Packaging is not a product in itself: it is a means of delivering a product to a customer in good condition and is designed to ensure that the product passes through the supply chain without being damaged. Secondly, however, packaging becomes waste at the end of its useful life. Despite the fact that in many instances, under-packaging can cause more waste than over-packaging, in terms of both energy and raw materials. The negative impact of product wastage due to inadequate packaging is substantially higher than the impact of using more packaging to protect the product. Research has indicated that in one sector alone, damage in the European supply chain costs an estimated €3.5 billion per year. This not only represents a great loss of financial resources but also a loss of the natural resources that have gone into manufacturing and transporting the product.

The role that packaging plays in preventing the loss of resources therefore needs to be emphasised. Reducing the amount of packaging with the sole objective of reducing the amount of packaging waste we discard risks increasing the amount of goods which are thrown away because they become damaged or spoiled as they pass through the supply chain to the final consumer and therefore place more pressure on natural resources.

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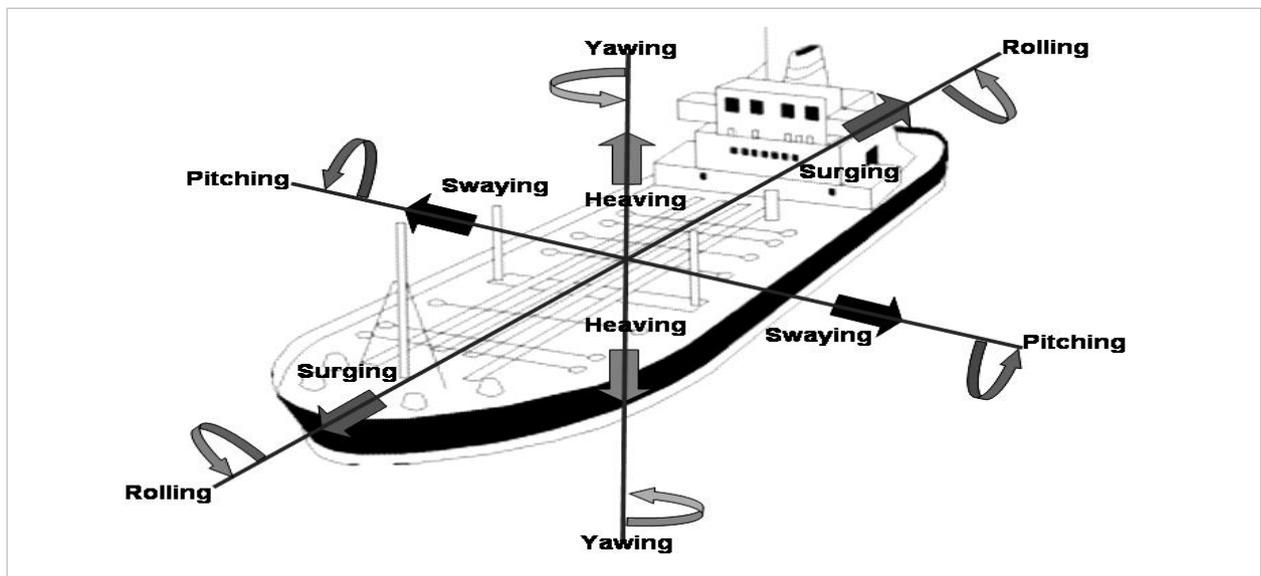
VDA 4525 page 24

### Impacts

#### Mechanical Impacts

During shipping, a combination of forces is exerted upon the ship and its cargo over a prolonged period. Such forces may arise from pitching, rolling, heaving, surging, yawing or swaying or a combination of any two or more.

Acceleration during maritime shipment generates dynamic fluctuations of  $\pm 0.8$  g for ocean-going vessels. Development of the packaging must take account of this fact in the calculation.



[http://www.tis-gdv.de/tis\\_e/verpack/verpackungshandbuch/03verpackungshandbuch\\_0131.htm](http://www.tis-gdv.de/tis_e/verpack/verpackungshandbuch/03verpackungshandbuch_0131.htm)

#### Climatic Impacts

A container as a more or less closed environment creates its own climate with alternating conditions with regards to temperature, air humidity and condensation water on the inner walls and the ceiling.

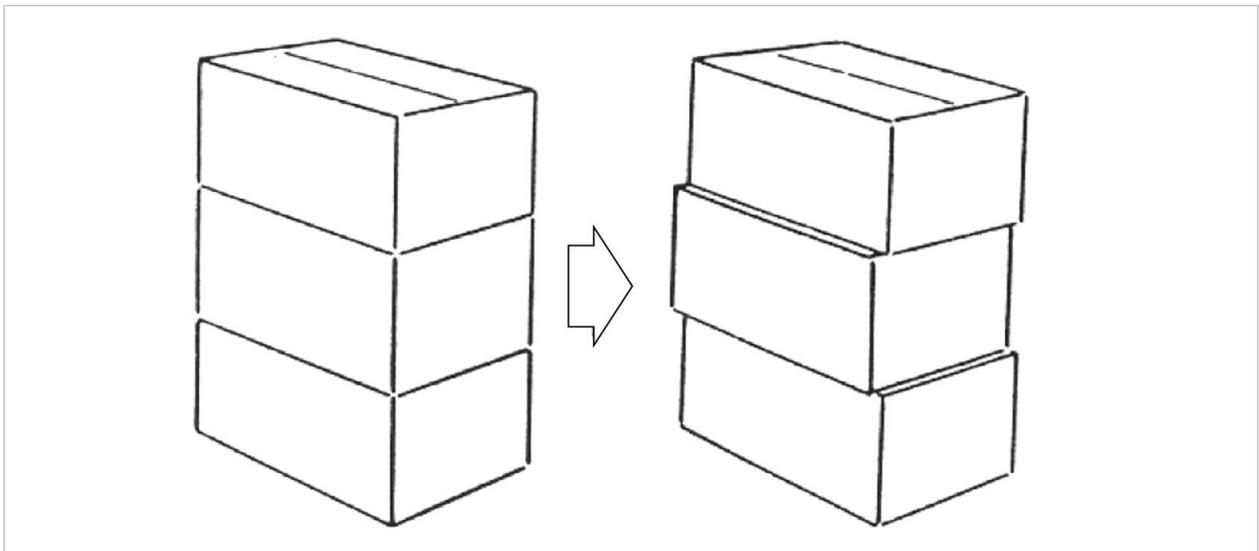
Water is above all critical when corrugated cardboard is used in packaging materials. When hydroscopic materials are used, the compression strength often decreases rapidly as humidity is absorbed.

[http://www.tis-gdv.de/tis\\_e/containe/klima/klima.htm](http://www.tis-gdv.de/tis_e/containe/klima/klima.htm)

### Additional negative Impacts

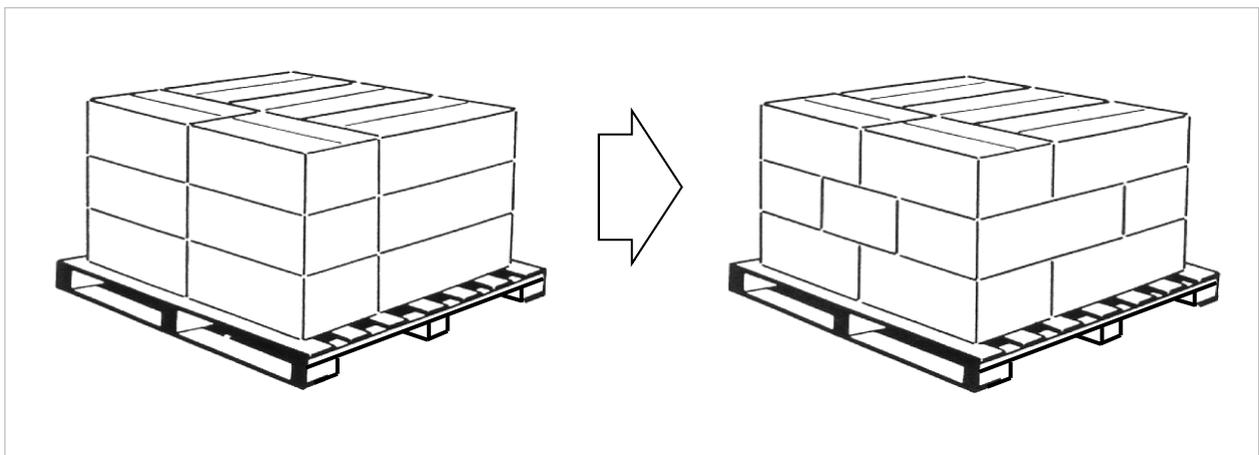
#### Misalignment

Misalignment of a column of cardboard boxes can result in as much as 29% decrease in the overall compression strength of the stack.



#### Column stack versus interlock

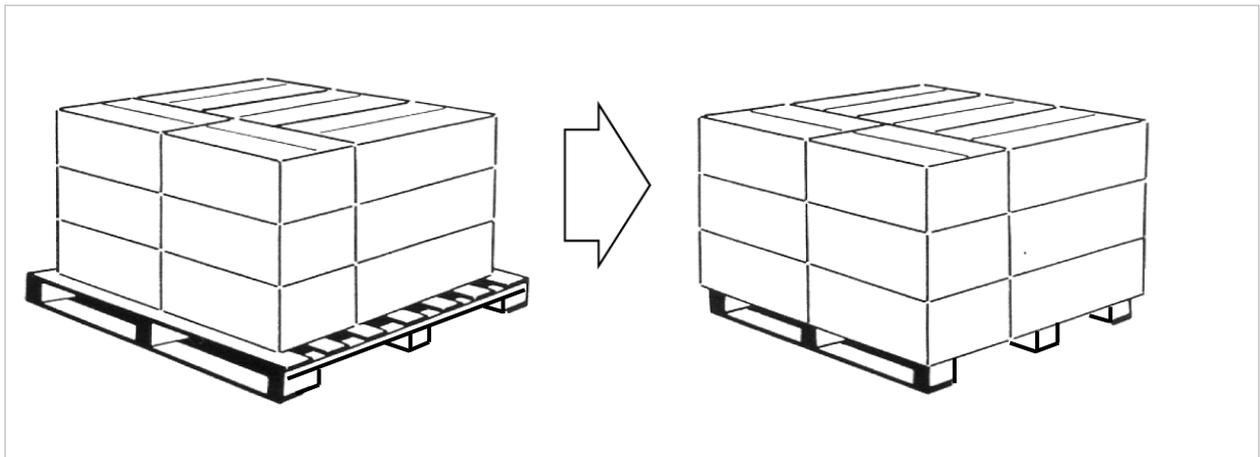
A change in the pallet pattern from column stack to interlock can reduce the compression strength by as much as 60%.



### Additional negative Impacts

#### Pallet Overhang

If boxes are stacked on a pallet with an overhang of 2cm the compression strength of containers can be decreased up to 40%. Be aware that a pallet overhang is strictly forbidden.



#### Rough Handling

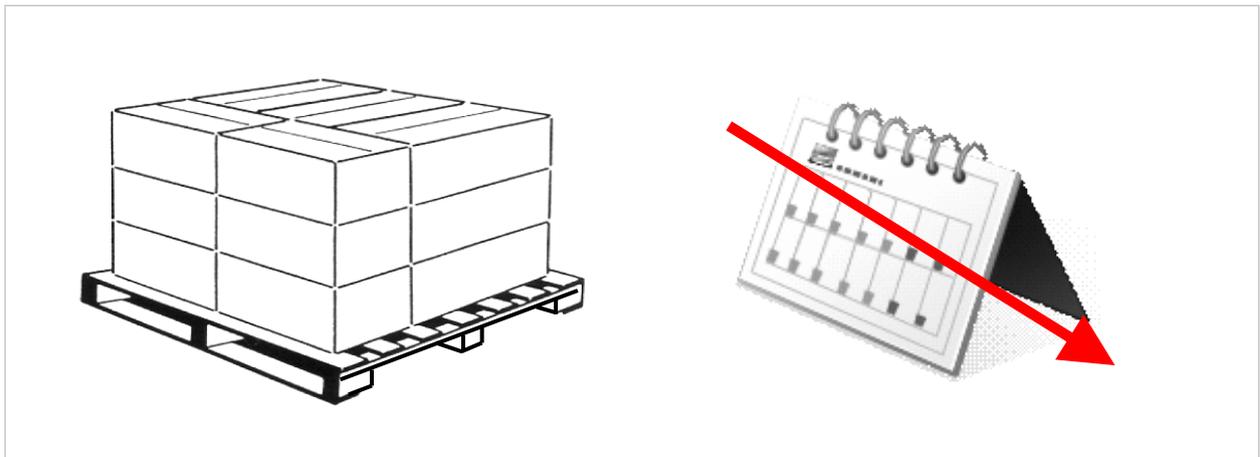
Mishandling including dented edges on the boxes can result in as much as 50% decrease in the box compression strength when compared to a brand new box.



### Additional negative Impacts

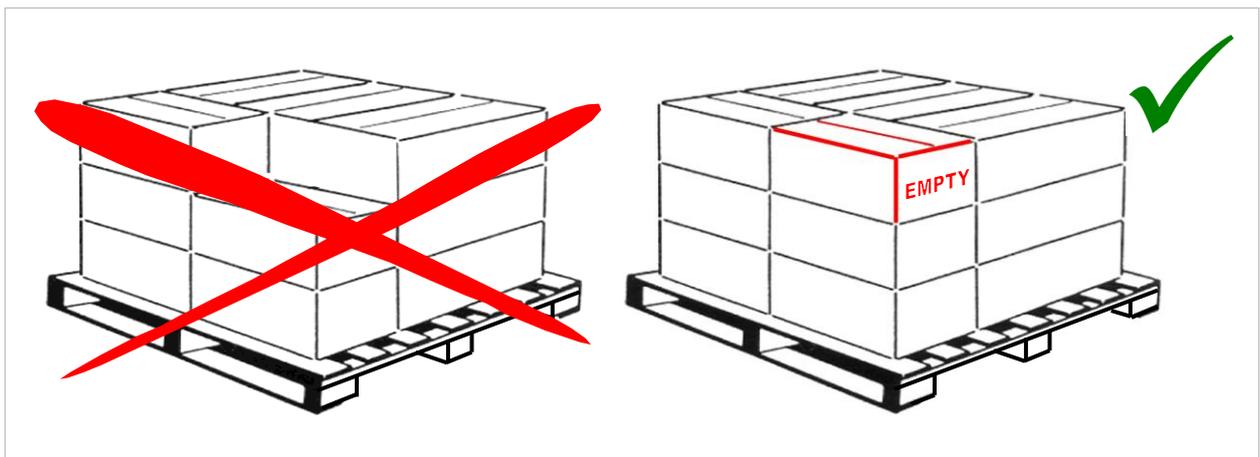
#### Age

If the material is packed and the cardboard boxes are under compression the boxes will lose compression strength by up to 50% over a 6 month period.



#### Pallet Deckboard Gap

If a layer - especially the top layer - shows a gap/free space it is a strict requirement that the supplier has to use empty boxes.



### Additional negative Impacts

#### Multiplier

The spreadsheet shows the increase of bearing pressure due to acceleration during transportation and the decrease of compression strength due to the environmental factors.

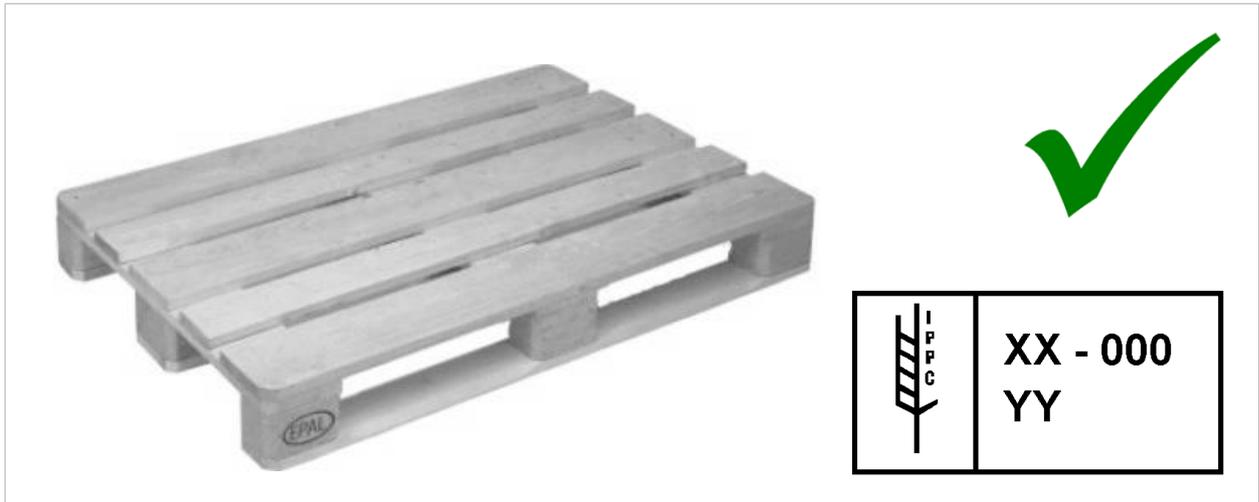
Mechanic Impacts			
Sea Freight			
			Multiplier for Compression
Acceleration during maritime transport (directions and acceleration force)	acting forwards	±0,4 g	1,80
	acting backwards	±0,4 g	
	acting sideways	±0,8 g	
Air Freight			
Acceleration during maritime transport	horizontal	±1,5 g	3,00
	vertical	±3,0 g	

Environmental Factors				
	Compression Loss		Multiplier for Compression Strength	
Storage time under load	10 days	-37% loss	0,63	
	30 days	-40% loss	0,60	
	90 days	-45% loss	0,55	
	180 days	-50% loss	0,50	
Relative humidity, under load (cyclical RH variation further increases compressive loss)	rh 50%	-0% loss	1,00	
	rh 60%	-20% loss	0,90	
	rh 70%	-20% loss	0,80	
	rh 80%	-32% loss	0,68	
	rh 90%	-52% loss	0,48	
	rh > 90%		0,15	
Pallet Patterns			<b>Best case</b>	<b>Worst Case</b>
Misalignment	10% -	29% loss	0,90	0,71
Columnar, aligned	Negligible loss			
Columnar, misaligned	10% -	15% loss	0,90	0,85
Interlocked	40% -	60% loss	0,60	0,40
Pallet Overhang	20% -	40% loss	0,80	0,60
Rough Handling	10% -	50% loss	0,90	0,50
Age	10% -	50% loss	0,90	0,50
Pallet deckboard gap	10% -	15% loss	0,90	0,75

### Approved types of 4 way entry pallets

#### Wooden pallets

(Treated according ISPM 15)



#### Pallets of derived timber product

(Wood panel products like OSB (oriented structural board), hardboard, and plywood)



### Approved types of 4 way entry pallets

#### Plastic pallets

(Material in accordance to the requirements of the receiving country)



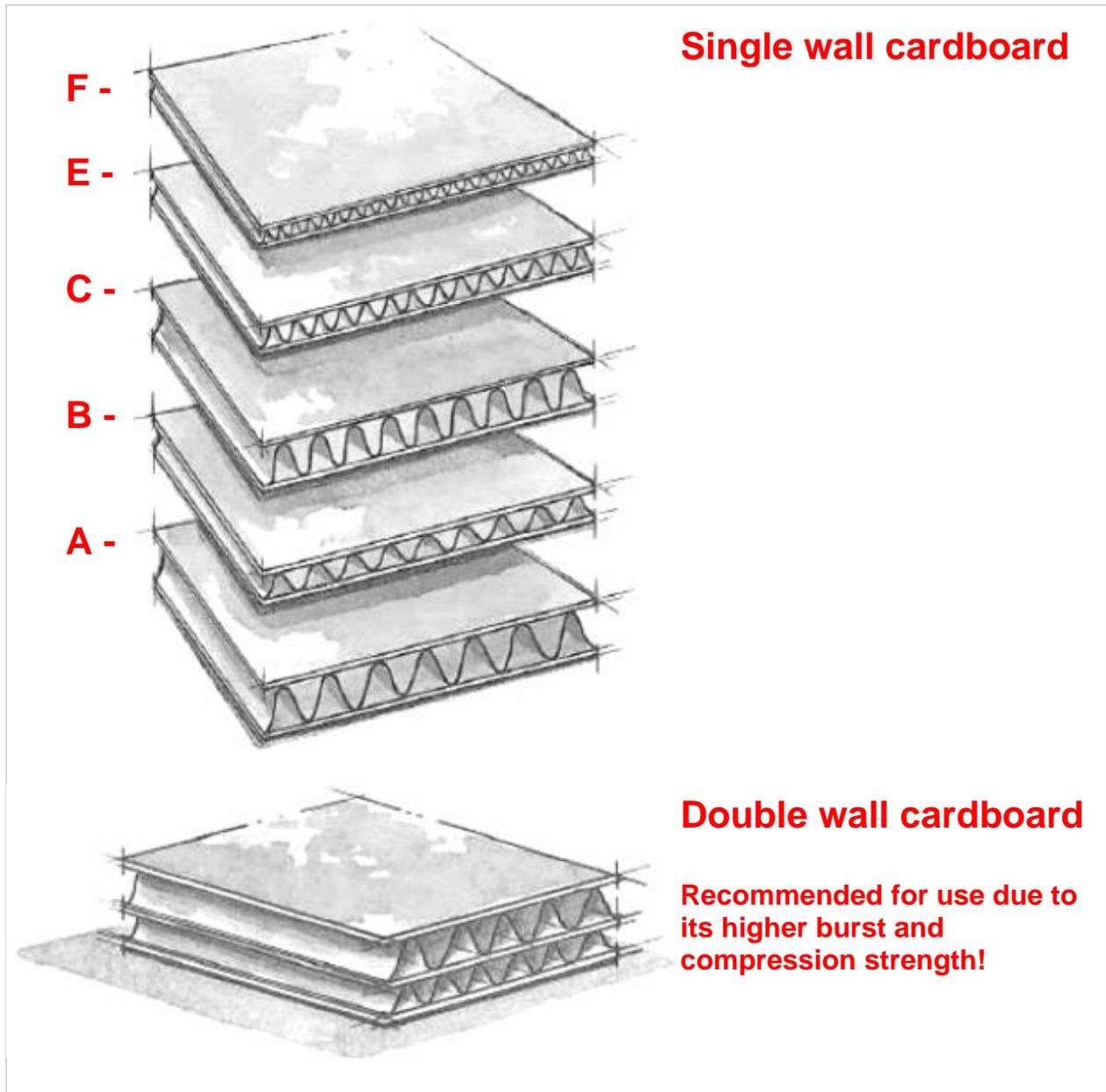
#### Cardboard pallets

(Pallets built of corrugated cardboard or other paper-based materials)



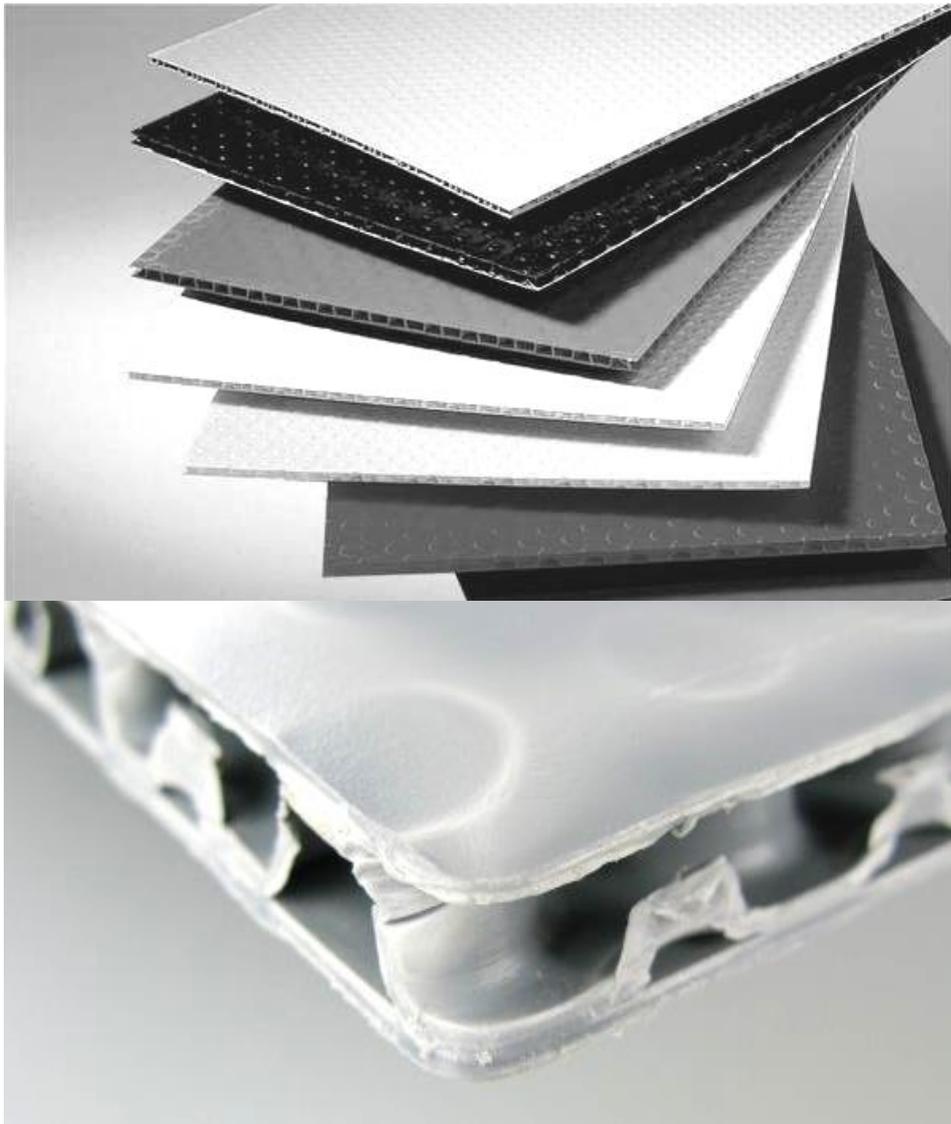
### Approved material for boxes

One way corrugated cardboard boxes (single or double wall cardboard)



### Approved material for boxes

One way plastic boxes (made of multiwall sheet)

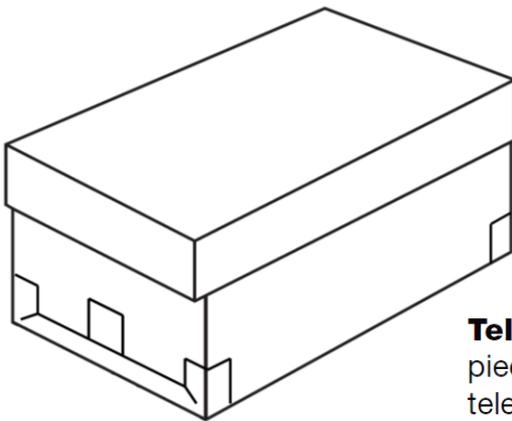


### Boxes – Type of construction

#### FEFCO (International fibreboard case code)

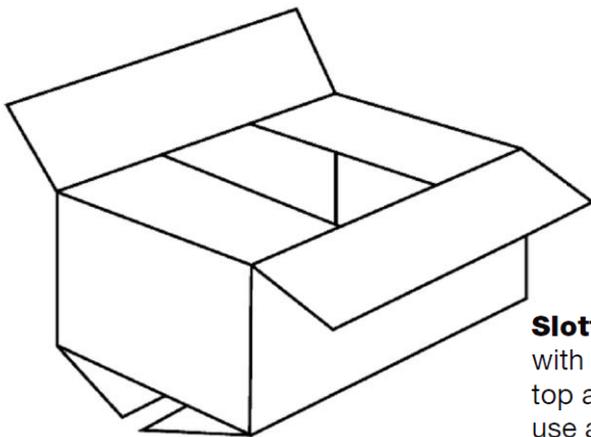
##### FEFCO 312

Other types with a separate lid to ease the handling and the removal of the parts.  
Recommended for use due to decreased handling costs.



**Telescope-type** boxes consist of more than one piece and are characterised by a lid and/or bottom telescoping over the body of the box.

#### FEFCO 201, 202, 203, 204, 205, 206

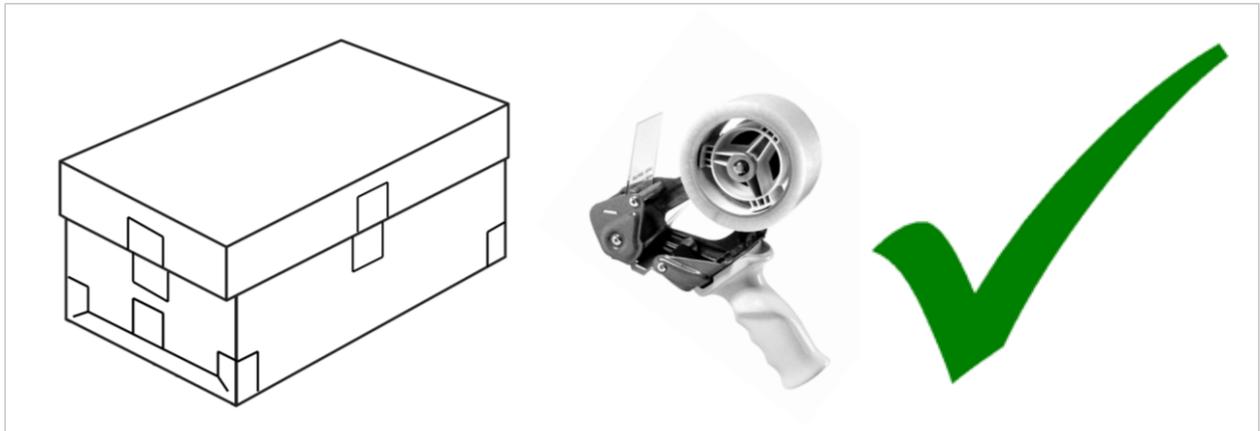


**Slotted-type boxes** consist of basically one piece with a glued, stitched or taped manufacturers joint and top and bottom flaps. They are shipped flat, ready to use and require closing using the flaps provided.

### Boxes – Type of closing

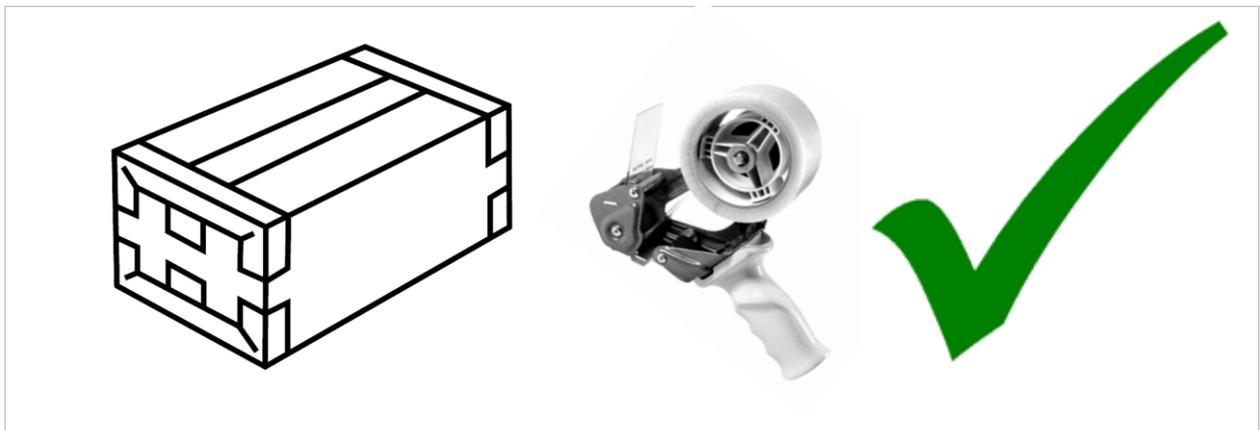
#### Container with lid

Closing the box and the lid in the described way

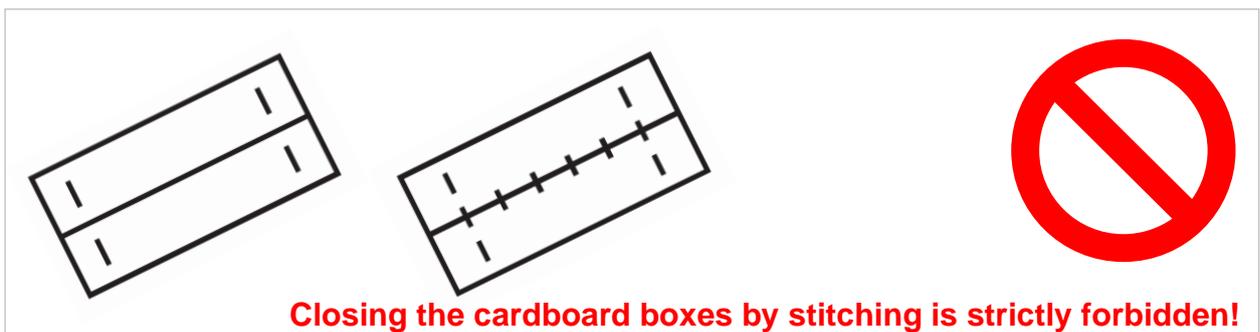


#### Slotted container

Closing the box on both sides in the described way



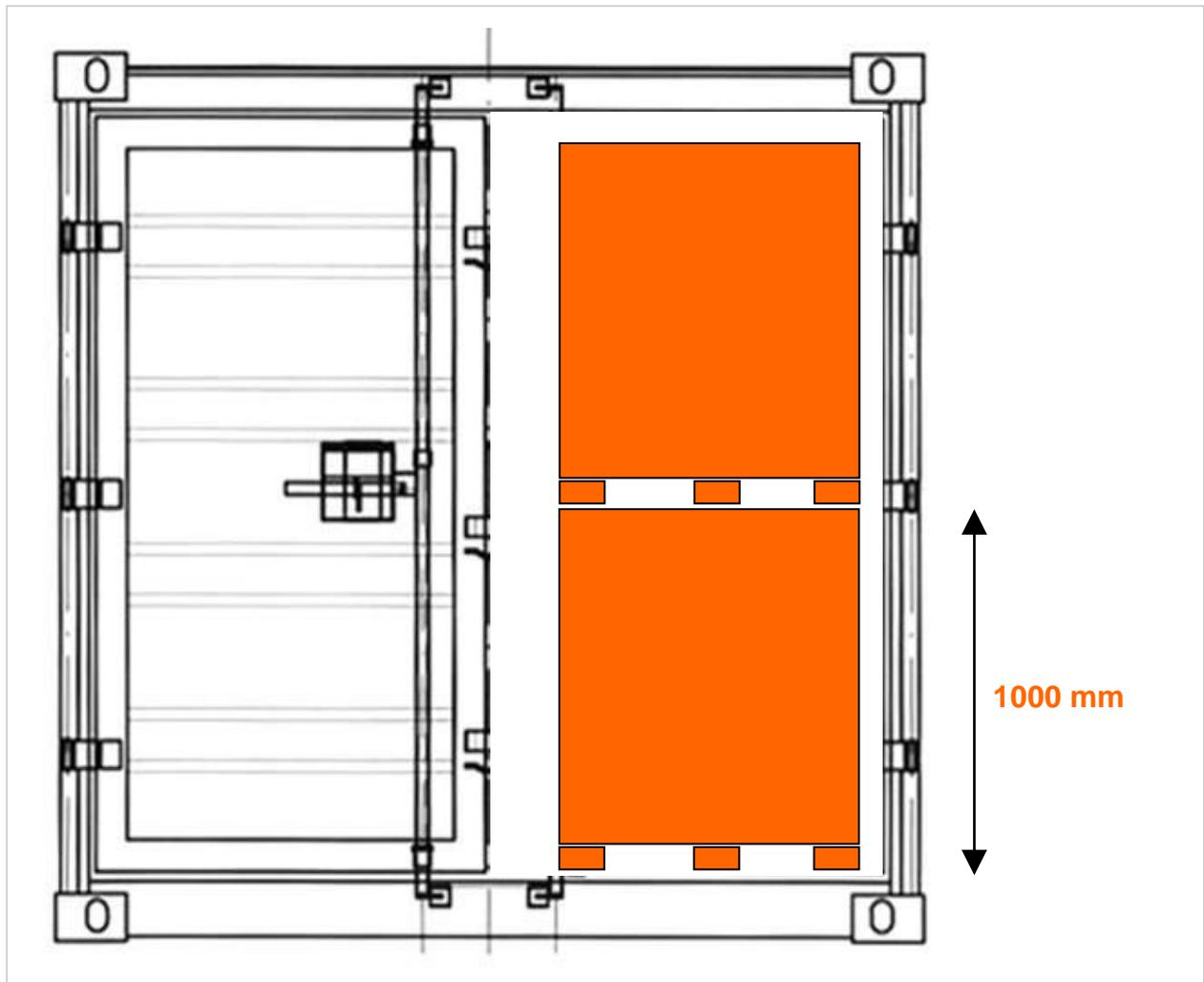
#### Important



### Shipping Unit – Measurements

#### Pallet height

The pallet height must not exceed 1000 mm including the pallet based on the approved footprints.



### Shipping unit – Measurements

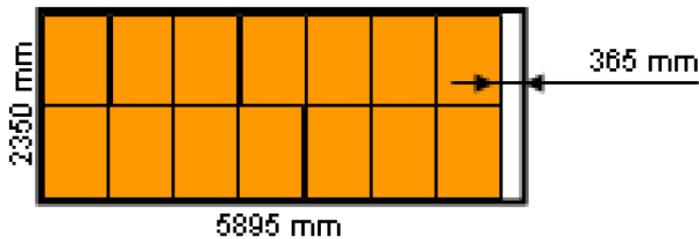
Footprints of the pallets in millimetres

1200*800 mm	EURO standard	
1200*1000 mm	ISO standard	
1140*1140 mm	container pallet	(Needs a written approval by HARMAN!)
1140*790 mm	container pallet	(according VDA 4525)

### Container utilization with export loading units with container-optimized dimensions

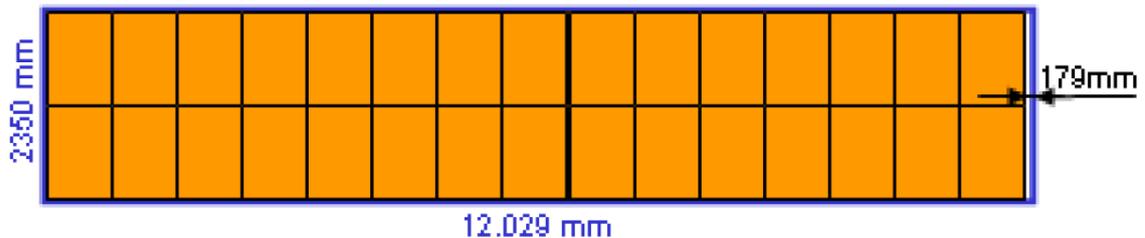
1140 mm x 790 mm

20' Container: 14 loading units / layer



Top view

40' Container: 30 loading units / layer

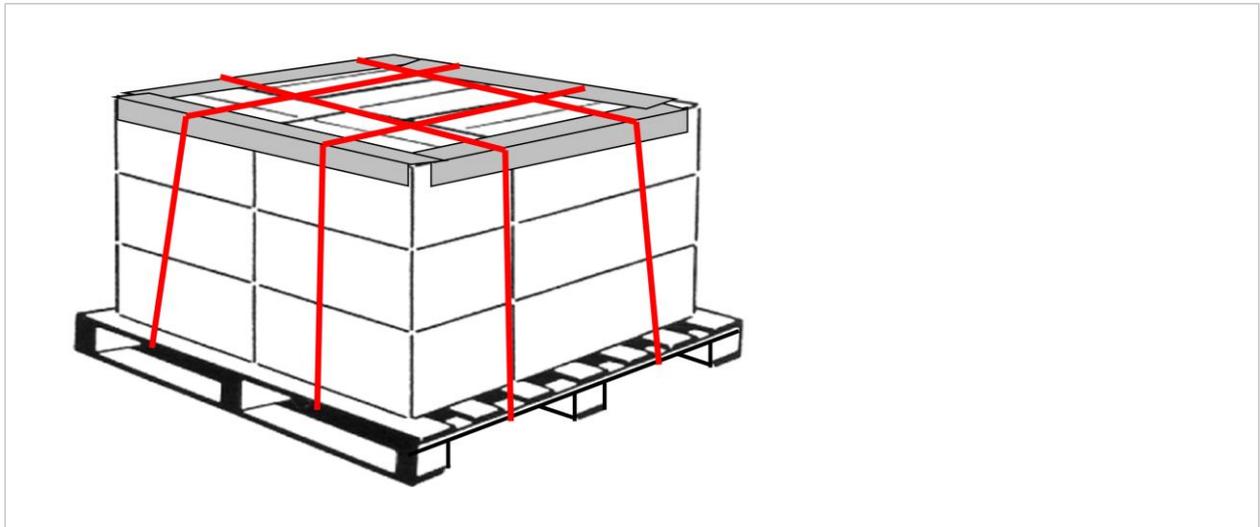


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### Shipping Unit - Strapping

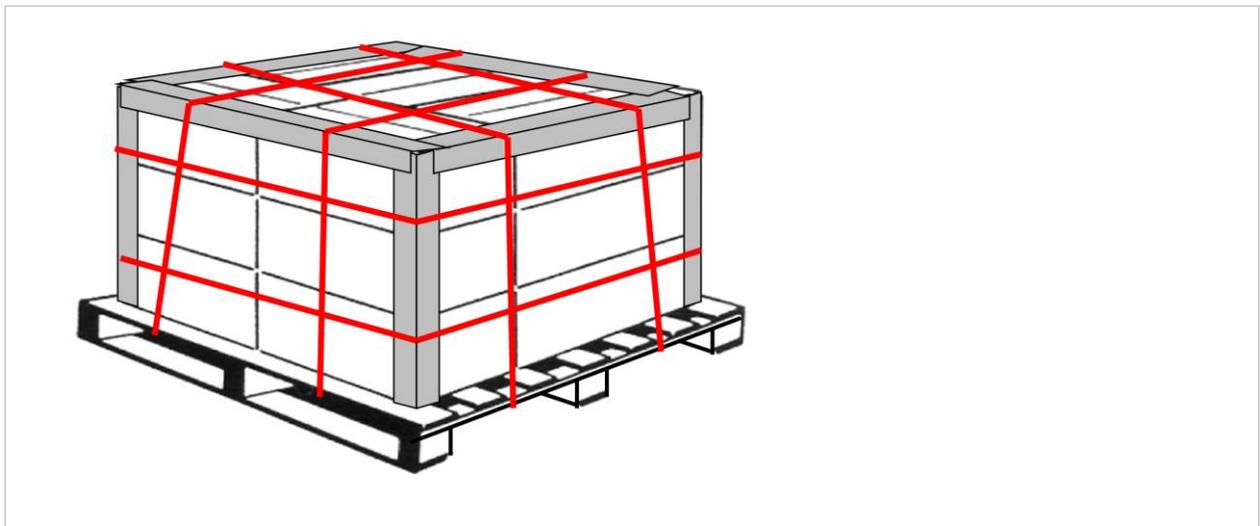
#### Vertical strapping

Four vertical strappings with cardboard corner protection are required



#### Horizontal strapping

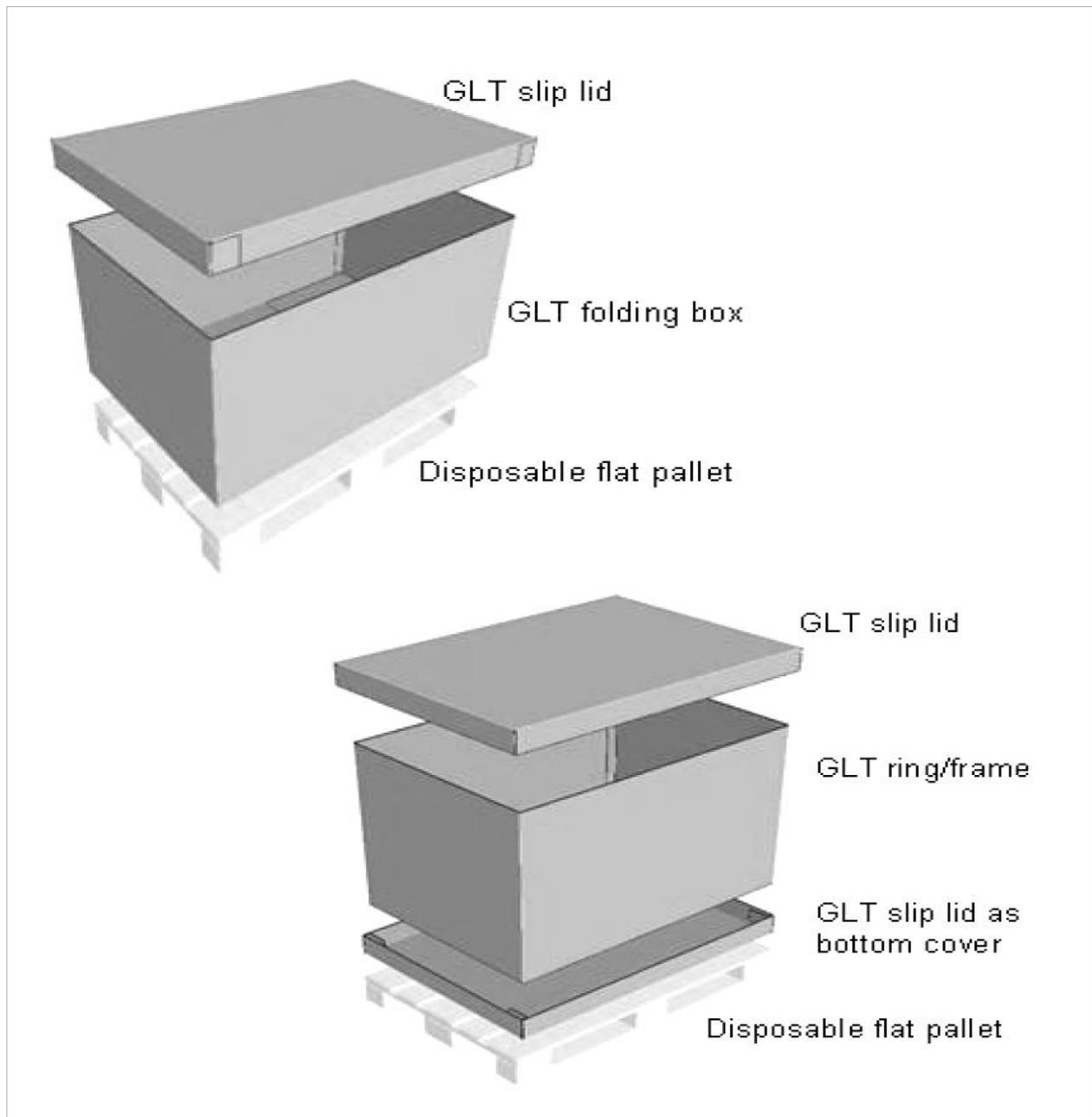
Horizontal strappings with cardboard corner protection to increase the compression strength of the shipping unit are not required but accepted



### Shipping unit – Pallet cargo box

#### Container optimized GLT (GLT >>> pallet cargo box)

An appropriate *pallet cargo box* offers a packaging solution with an important feature: To relieve the parts and the packages by absorbing the compression pressure of another stacked shipping unit.

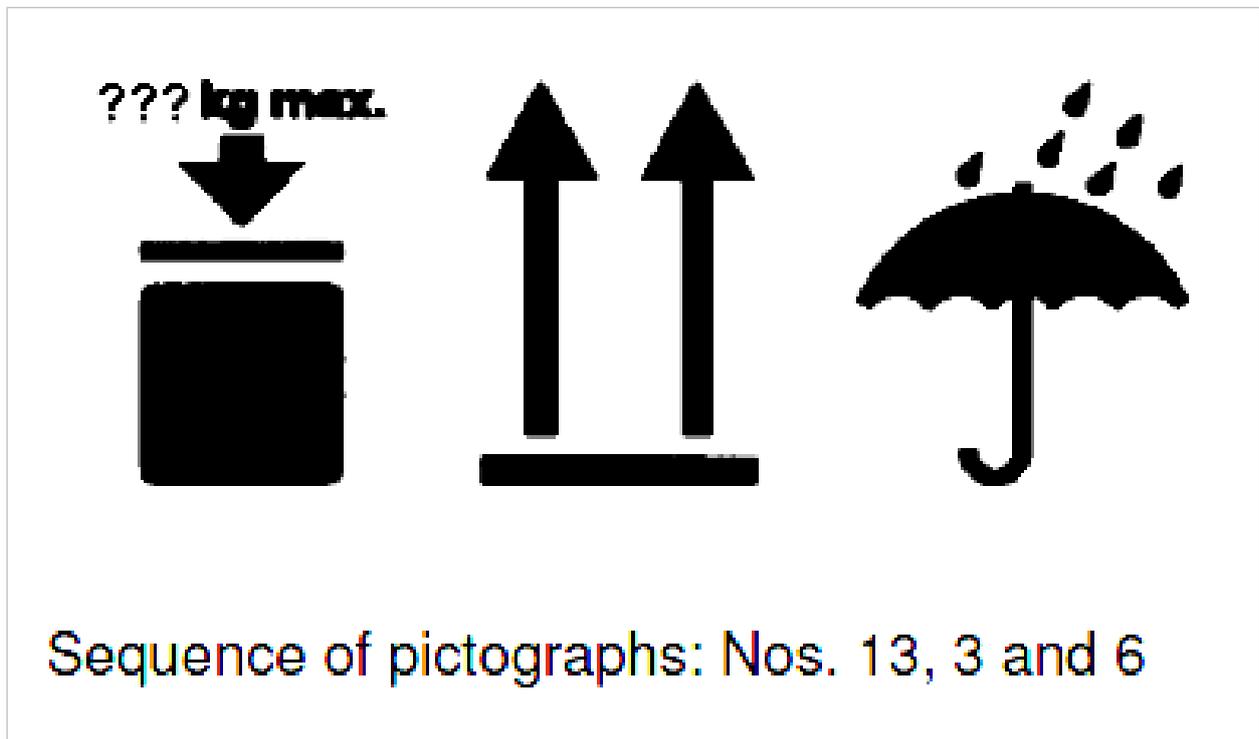


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### Shipping unit – Marking of shipment units

#### Pictographs

The shipment unit must be marked in accordance with VDA 4525 with pictograph “top” (3), pictograph “protect against wetting” (6) and “limit of stacking load” (13) pictographs. Ensure that the signs are visible and not hidden by packaging components.



[http://www.vda.de/en/publikationen/publikationen\\_downloads/detail.php?id=678](http://www.vda.de/en/publikationen/publikationen_downloads/detail.php?id=678)

### Shipping unit – General humidity protection

#### Shrinking

The pallet hood must cover the boxes and the pallet plate completely and must be carefully heat shrunk.

#### Wrapping

The wrapping must cover the boxes and the pallet plate completely by using an upper foil plate or by several layers of wrapping foil

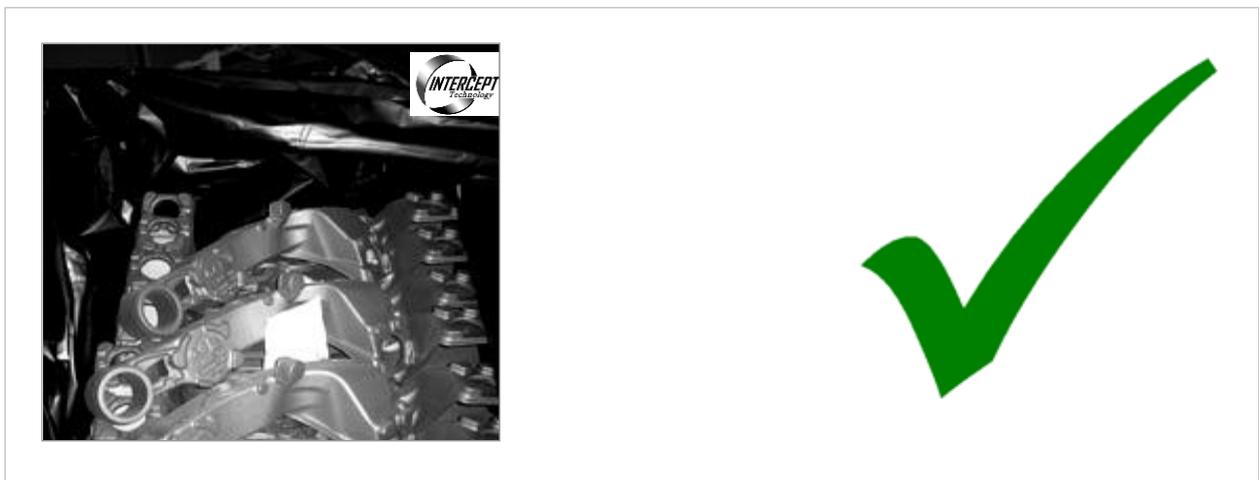


### Shipping unit – Approved anticorrosion methods

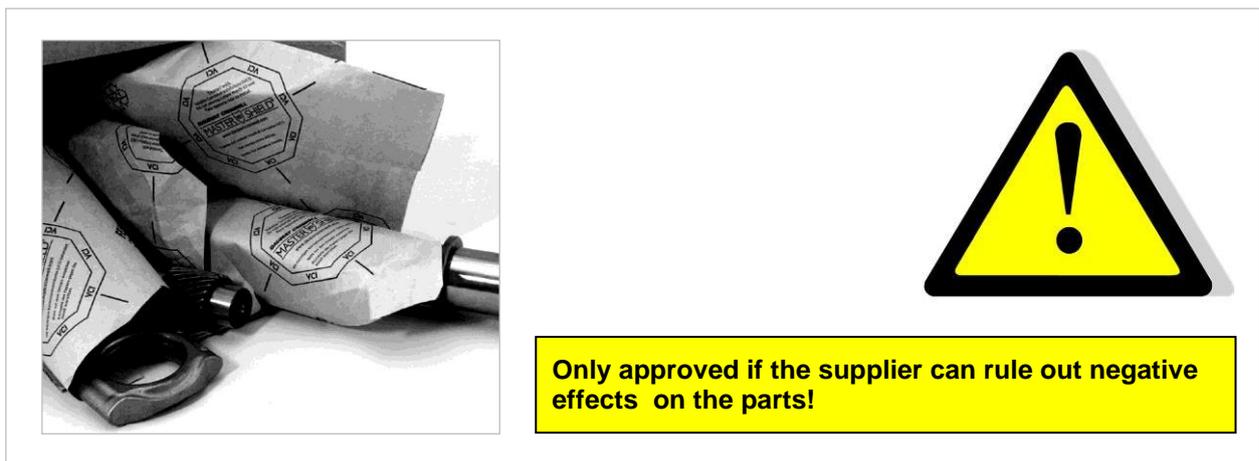
#### Desiccant method



#### Intercept technology



#### VCI method



### Definitions

#### **BCT          Box Compression Test**

The box compression test measures the compressive strength of boxes made of corrugated fibreboard. It plots deformation against compressive force. A BCT plot is a measure of the strength of a shipping container and is measured in kilonewtons; deflection or deformation is measured in mm.

The BCT plot can be estimated using a formula involving, amongst other characteristics, the board ECT, but the physical testing of filled and closed boxes is still required!



*German Standard DIN 55440-1 Packaging Test; compression test; test with a constant conveyance-speed*

*ISO 12048 Packaging -- Complete, filled transport packages -- Compression and stacking tests using a compression tester*

## Definitions

### **ECT            Edge Crush Test**

The edge crush resistance R gives information regarding the maximum power at which a corrugated board sample with a defined length and height (100 x 25 mm) was stressed. ECT is a true performance test and is directly related to the stacking strength of a carton. ECT is measured in kilonewtons per meter (kN/m) but can also be reported as an ECT value (e.g. 44 ECT).

*ISO 3037:2007-03, Corrugated fiberboard - Determination of edgewise crush resistance*

### **ISPM 15        International Standards for Phytosanitary Measures No. 15**

"Irrespective of the type of treatment applied, wood packaging material must be made of debarked wood. For this standard, any number of visually separate and clearly distinct small pieces of bark may remain if they are: - less than 3 cm in width (regardless of the length) or - greater than 3 cm in width, with the total surface area of an individual piece of bark less than 50 square cm."

Products exempt from the ISPM 15 are made from alternative material, like paper, plastic or wood panel products (i.e. OSB, hardboard and plywood).

### **HARMAN "Packaging Manual"**

Suppliers must request the latest version of the manual from the purchasing department of HARMAN International.

### **VDA 4525      Standardized expendable packaging for sea container applications**

"This VDA Guide pursues the following objectives:

As an intermediate step on the way to achieving overarching global Container Management with e.g. "World-KLT" without movements of empties, it is necessary to standardize the design of expendable packaging used for intercontinental transportation."

Version 1.0 November 2009

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