



Doc. Type	TST		
Doc. Num.	N 098 05.01		
Doc. Part	001	Doc. Ver.	00
Date:	2015-02-16	Page 1 of 16	

### CONTENTS

Changes .....	2
Previous Editions .....	2
1 SCOPE .....	2
2 REFERENCES .....	2
3 LOADING UNIT .....	3
3.1 Outer corrugated cardboard box (GLT) .....	4
3.2 Pallets .....	4
3.3 Carton (KLT) .....	5
3.4 Load Securing (of the LU) .....	5
4 GLT - SPECIFICATION .....	7
4.1 GLT Slip Lid .....	8
5 PALLETS – SPECIFICATION .....	9
5.1 Pallet LT 1108 .....	9
5.2 Pallet LT 1110 .....	10
6 PROPOSAL FOR KLT .....	11
7 Optimization of Overseas – Packaging .....	12
7.1 Example 1: Pallets / Loading Unit .....	12
7.2 Example 2: Plastic Foil Stretched Around The Box .....	13
7.3 Example 3: Stackability of Loading Units .....	14
7.4 Example 4: Stackability of Loading Units and Inner Packing .....	15
7.5 Example 5: Identification .....	16

Weitergabe sowie Vervielfältigung dieses Dokuments, Verwertung und Mitteilung seines Inhalts sind verboten, soweit nicht ausdrücklich gestattet. Zuwiderhandlungen verpflichten zu Schadenersatz. Alle Rechte für den Fall der Patent-, Gebrauchsmuster- oder Geschmacksmustereintragung vorbehalten.

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without express authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

No guarantee can be given in respect of the translation. In all cases the latest German-Language version of this standard shall be taken as authoritative.

MITTEILUNG NR.  
NOTE NO.

ERSTELLT DURCH  
CREATED BY

GENEHMIGT VON  
APPROVED BY

FREIGEgeben VON  
RELEASED BY

© Continental AG. 2015

FRB-14133335

SCMA – CTP  
Team

SCMA  
J.Braunstetter

QPS  
U.Czerwon

## Changes

- References to Continental Automotive Technical Standard Norms (TST) :  
TST N 098 00.01 000 Packaging - Definition, Process, Requirements  
TST N 098 02.01 001 Container Optimized Wood Pallet L1108 and L1110
- Reference to INCOTERMS 2010
- New: Chapter 4.1 GLT Slip lid

## Previous Editions

- Former specification called „Guideline for Expendable Packaging” and SML “Appendix A04” update January 2010, Vers. 3
- This TST replaces all other existing guidelines and procedures.

## 1 SCOPE

Due to growing globalization, it is necessary to use expendable packaging with standardized specification (dimension, quality, design), optimized regarding the whole material flow within the complete supply chain, e.g. dimension of the overseas container.

This TST is an extract of a specification we worked out together with the VDA (German association of automotive industry), with car manufacturers and worldwide 1Tier suppliers.

## 2 REFERENCES

- TST N 098 02.01 001 Container Optimized Wood Pallet L1108 and L1110 (1140 x 790/980x 140 mm)
- TST N 098 00.01 000 Packaging - Definition, Process, Requirements
- SML Supplier Manual Logistics
  
- VDA 4525 Standardized expendable packaging for sea container applications
- VDA 4525, App. 1 and 2 Standardized expendable packaging for sea container applications - Annex\_A1-4-system-elements
- EN ISO 8611-1 Pallets for materials handling - Flat pallets / Paletten für den Gütertransport – Flachpaletten
- FEFCO Codes International fibreboard case code
- ISPM No. 15 / IPPC International Standard for Phytosanitary Measures - – Regulation of wood packaging material in international trade / International Plant Protection Convention (official web-side: IPPC)

All TSTs are downloadable at the Continental Automotive Homepage for Suppliers:

[http://www.conti-online.com/www/automotive\\_de\\_en/general/contact\\_services/suppliers\\_logistics\\_en.html](http://www.conti-online.com/www/automotive_de_en/general/contact_services/suppliers_logistics_en.html)

### 3 LOADING UNIT

Loading units that are presently used often cause additional costs, e.g.

- Increased transport costs due to bad utilization of the container
- Excessive load securing and therefore needed material
- Higher risks for damaged or not available parts
- Additional workload for handling of claims
- Additional work of replacement to avoid capacity bottleneck

due to

- Unsuitable dimensions of Loading Unit (LU)
- Non stackable LU
- Unsufficient quality of packaging material
- Pallets with point load during stacking (missing skids, e.g. presswood pallets)
- Inadequate load securing
- Missing or incorrect labelling

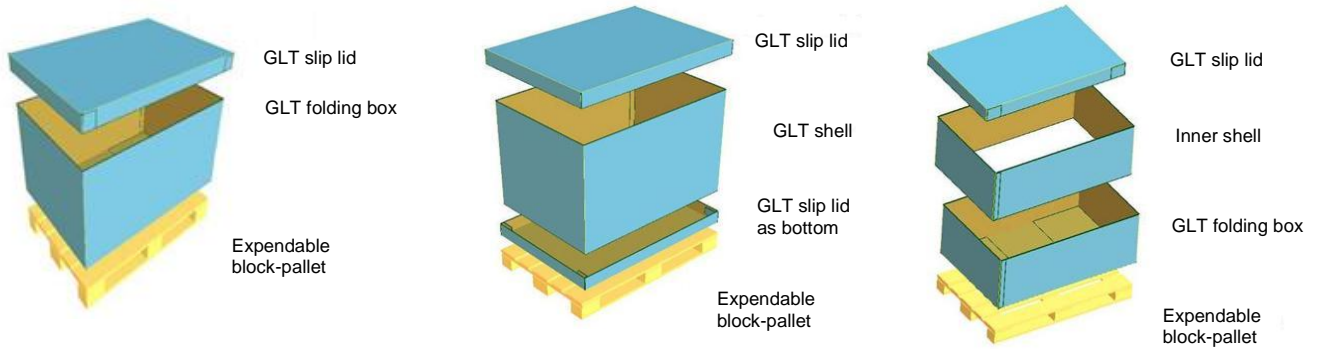
For these reasons (to avoid damages and additional costs) the LU have to fulfil following characteristics:

- LU have to be stackable (static: min. 1+2, dynamic: min. 1+1)
- An outer cardboard box has to be used (three flutes, outer and inner layer kraft liner, water-resistant glue)
- secured with PET- or PP-straps (see chapter load securing)
- Dimensions of the LU adapted to 20' and 40' container: 1140mm x790mm or 1140mm x 980mm

We refer to these dimensions for all kind of transport modes (sea, air, land) to achieve one standard packaging mode with a minimized variance of packaging materials. Also for returnable loops these dimensions are suitable as alternative packaging.

### 3.1 Outer corrugated cardboard box (GLT)

Design of the outer corrugated cardboard boxes (GLT):



System: FEFCO 0312

- GLT slip lid
- GLT folding box
- Expendable block-pallet

System: FEFCO 0310/0314

- GLT slip lid
- GLT shell
- GLT slip bottom
- Expendable block-pallet

System: FEFCO 0312 + 0501

- GLT slip lid
- Inner shell
- GLT folding box
- Expendable block-pallet

### 3.2 Pallets

In this TST you will find two specified pallets with the dimensions 1140mm x 790mm or 1140mm x 980mm. The minimum requirements are:

Material:

- Solid wood, mono-material plastic (only after agreement).
- Required max. loading capacity has to be achieved.
- By using solid wood, the import- and export-regulations of the involved countries have to be considered (IPPC, ISPM No. 15).

Design:

- Four-way-free-entry block-pallet, with three skids, min. width of skids 90mm
- Usage of a „Full Perimeter Pallet“ has to be agreed by the receiving plant, because
- These pallets cannot be handled with a manual pallet jack.
- Usage of moulded presswood pallets is not acceptable.

Load capacity:

- Capacity min. 500kg per pallet, if evenly loaded
- Capacity statically stacked min. 2000kg per pallet, if evenly loaded
- Suitable for storage in a high rack min. 500kg

Tests of pallets have to be done according to EN ISO 8611-1. For tests of stiffness a safety factor of 2 has to be met.

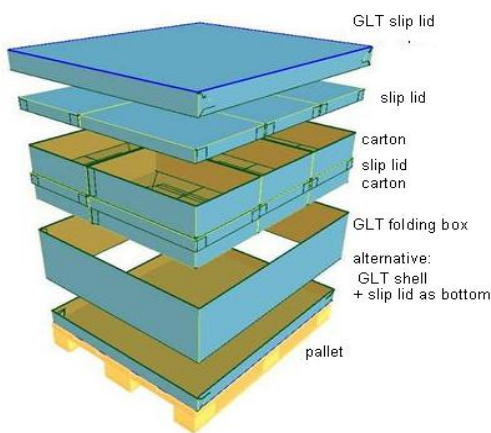
### 3.3 Carton (KLT)

Attached you will find also a proposal of inner packaging material, corrugated cardboard cartons with slip lids. It is also possible to use cartons according FEFCO code 0201 with flaps instead of slip lids, but than other dimension can be chosen than mentioned in the table of the KLT.

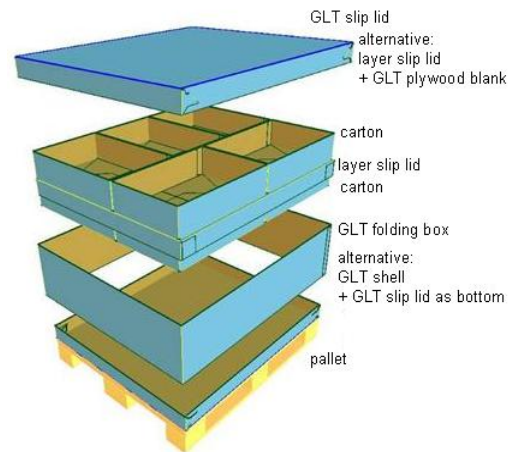
But it is also possible to use the currently used inner packaging material inside the GLT. The height of the GLT could also be adapted to the height of your inner packaging material.

#### Design of the KLT:

With single slip lids in shell:



With layer slip lids in shell:



### 3.4 Load Securing (of the LU)

Following aspects have to be taken into consideration for securing the outer cardboard box on the pallet:

- The goods have to be secured against any movement on the transport
- The LU has to be strapped 4 times, 2 times lengthwise and 2 times crosswise.
- Wide plastic straps made of PET or PP have to be used to secure the goods (GLT) on the pallet. Min. breaking strength: 4200N and a maximum elongation at break of 12%. For a sufficient pretension (setting of cardboard material) cutting into the material by the straps has to be avoided!
- Therefore edge protection support has to be used.
- Loading flaps at the GLT have to be closed with filament-reinforced adhesive tape (min. 70mm, filament tape applied crossways in order to prevent splitting parallel with the loading flap).
- Using of additional stretch or shrink foil has to be agreed by the receiving plant.



Expendable Packaging

Doc. Type	TST		
Doc. Num.	N 098 05.01		
Doc. Part	001	Doc. Ver.	00
Date:	2015-02-16	Page 6 of 16	

This TST is based on the recommendation VDA (German association of automotive industry) 4525. Additional information you could also find in our "TST N 098 00.01 000 Packaging - Definition, Process, Requirements", available on SupplyOn platform and our internet site "For Suppliers":

[http://www.conti-online.com/generator/www/de/en/continental/automotive/general/contact\\_services/suppliers\\_logistics\\_en.html](http://www.conti-online.com/generator/www/de/en/continental/automotive/general/contact_services/suppliers_logistics_en.html)

The appliance of this TST doesn't abdicate from suppliers' responsibility for his action (choosing the right packaging, which is adequate for material flow, also written in INCOTERMS 2010). Every supplier act on at his own risk.

4 GLT - SPECIFICATION

Module	Code	System element	Nominal dimension [mm]			External dimension [mm]			Internal dimension [mm]			Design (options)	Quality <sup>1)</sup>			LU - load scale		
			l	w	h	l	w	h	l	w	h		Breaking strength or LU <sup>1)</sup> 23°/50% [N]	Thickness of cardboard [mm]	ECT (Edge Crush Test) [kN/m]	Puncture resistance [J]	Wet bursting strength [kPa]	Max. gross weight / LU [kg]
GLT lid	GLT-SD-1108	GLT-slip lid 1.140*790	1.140	790	80	1.140	790	87	1.128	765	80	FEFCO 0457	7	14,0	15	800		
	GLT-SD-1110	GLT-slip lid 1.140*980	1.140	980	80	1.140	980	87	1.128	955	80	FEFCO 0200 with drop door <sup>2)</sup>					< 240 kg	240 kg <sup>3)</sup>
GLT-L light	GLT-FK-088L	GLT-folding box 1.140*790*900	900			909			879+			FEFCO 0200	12,5	18,0	22	1.200	< 240 kg	480 kg
	GLT-FK-086L	GLT-folding box 1.140*790*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	18,0	22	1.200	< 240 kg	480 kg	
	GLT-FK-083L	GLT-folding box 1.140*790*900	900			909			879+		FEFCO 0200	12,5	18,0	22	1.200	< 240 kg	480 kg	
	GLT-R-089L	GLT-shell 1.140*790*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	18,0	22	1.200	< 300 kg	300 kg <sup>3)</sup>	
	GLT-R-086L	GLT-shell 1.140*790*900	900			909			879+		FEFCO 0200	12,5	18,0	22	1.200	< 300 kg	600 kg	
	GLT-R-083L	GLT-shell 1.140*790*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	18,0	22	1.200	< 300 kg	300 kg <sup>3)</sup>	
	GLT-FK-108L	GLT-folding box 1.140*980*900	900			909			879+		FEFCO 0200	12,5	18,0	22	1.200	< 300 kg	600 kg	
	GLT-FK-106L	GLT-folding box 1.140*980*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	18,0	22	1.200	< 300 kg	300 kg <sup>3)</sup>	
	GLT-FK-103L	GLT-folding box 1.140*980*900	900			909			879+		FEFCO 0200	12,5	18,0	22	1.200	< 300 kg	600 kg	
	GLT-FR-109L	GLT-shell 1.140*980*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	18,0	22	1.200	< 300 kg	300 kg <sup>3)</sup>	
GLT-H heavy	GLT-FK-088H	GLT-folding box 1.140*790*900	900			909			879+		FEFCO 0200 with drop door <sup>2)</sup>	12,5	24,0	30	1.800	< 360 kg	360 kg <sup>3)</sup>	
	GLT-FK-086H	GLT-folding box 1.140*790*900	900			909			879+		FEFCO 0200	12,5	24,0	30	1.800	< 360 kg	720 kg	
	GLT-FK-083H	GLT-folding box 1.140*790*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	24,0	30	1.800	< 360 kg	360 kg <sup>3)</sup>	
	GLT-R-086H	GLT-shell 1.140*790*900	900			909			879+		FEFCO 0200	12,5	24,0	30	1.800	< 360 kg	720 kg	
	GLT-R-083H	GLT-shell 1.140*790*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	24,0	30	1.800	< 360 kg	360 kg <sup>3)</sup>	
	GLT-FK-108H	GLT-folding box 1.140*980*900	900			909			879+		FEFCO 0200 with drop door <sup>2)</sup>	12,5	24,0	30	1.800	< 450 kg	450 kg <sup>3)</sup>	
	GLT-FK-106H	GLT-folding box 1.140*980*900	900			909			879+		FEFCO 0200	12,5	24,0	30	1.800	< 450 kg	900 kg	
	GLT-FK-103H	GLT-folding box 1.140*980*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	24,0	30	1.800	< 450 kg	450 kg <sup>3)</sup>	
	GLT-R-108H	GLT-shell 1.140*980*900	900			909			879+		FEFCO 0200	12,5	24,0	30	1.800	< 450 kg	900 kg	
	GLT-R-106H	GLT-shell 1.140*980*900	900			909			879+		FEFCO 0501 with drop door <sup>2)</sup>	12,5	24,0	30	1.800	< 450 kg	450 kg <sup>3)</sup>	
GLT-R-103H	GLT-shell 1.140*980*900	900			909			879+		FEFCO 0200	12,5	24,0	30	1.800	< 450 kg	900 kg		

1) Min. Breaking strength that has to be achieved! Test has to be done with one pallet under the loading unit and one pallet on top! The values for breaking strength in the table have been achieved with the cardboard material with the stated data (ECT....).

2) Drop door at one long side, 750mm widthwise and a height of 440mm. Creasing station only 750mm widthwise, not over the complete length of the box!  
Cuttings of the drop door has to be glued with reinforced adhesive tape!

3) Loading units with this height can only be stacked 1+1 inside the container. Therefore only the superimposed load of one loading unit has to be guaranteed (at all times a safety factor ≥ 3.5 has to be guaranteed!).

4) Cardboard material with three flutes has to be used for the GLT (GLT lids two flutes), which are wet strength glued. The external layers (inside and outside) has to consist of Kraftliner.

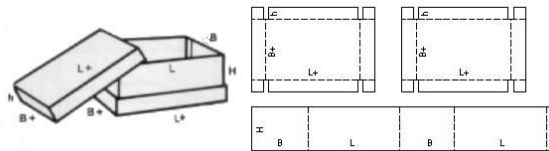
#### 4.1 GLT Slip Lid

<b>Designation</b>	<b>CA part-no</b>
GLT cover LT 1108	98-4525-0108-1-00
GLT cover LT 1110	98-4525-0110-1-00

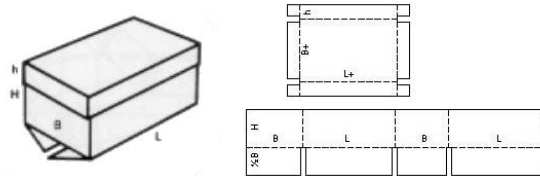
Module	Code	System element	Nominal dimension [mm]			External dimension [mm]			Internal dimension [mm]			Design (options)	Quality <sup>1)</sup>				
			l	w	h	l	w	h	l	w	h		Breaking strength of LU <sup>1)</sup> 23°C/50% [N]	Thickness of cardboard [mm]	ECT (Edge Crush Resistance) [kN/m]	Puncture resistance [J]	Wet bursting strength [kPa]
GLT lid	GLT-SD-1108	GLT-slip lid 1.140*790	1.140	790	80	1.140	790	87	1.128	765	80	FEFCO					
	GLT-SD-1110	GLT-slip lid 1.140*980	1.140	980	80	1.140	980	87	1.128	955	80			7	14,0	15	800

Following cover designs (FEFCO codes) are established at Continental Automotive:

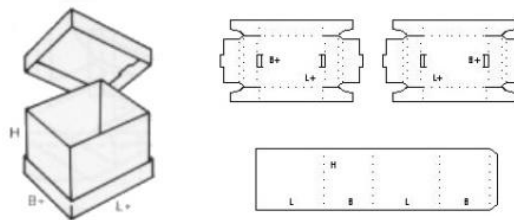
- FEFCO code 0310



- FEFCO code 0312



- FEFCO code 0314







### 5.2 Pallet LT 1110

See also:  
 VDA 4525 and VDA Annex 1  
 CA Norm TST N 098 02.01 001 Container Optimized Wood Pallet L1108 and L1110  
 SAP CSE part-no.: 98-4525-0110-0-00

LT-1110

Nadel- oder Laubholz  
 Güteklasse II/III / S7 nach DIN 4074-1  
 Oberfläche rau und scharfkantig  
 softwood or hardwood  
 surface rough sawn and sharp arrises

Nach IPPC-Standard  
 Verwendetes Holz muss völlig frei sein von Baumrinde und Bohrlöchern  
 Used wood must be free of bark and drillholes

Bei Bedarf technische Trocknung  
 ( 18-22% Holzfeuchte )  
 technical drying, if required (18-22% moisture content)

An 2 gegenüberliegenden  
 Klötzen weiß gekennzeichnet  
 marked white on 2 opposite blocks

Angegebene Maße sind Fertigmaße,  
 und dürfen auch nach technischer  
 Trocknung nicht unterschritten werden.  
 given dimensions are final dimensions and  
 must not be below, even after technical  
 drying

IPPC Kennzeichnung auf zwei  
 gegenüberliegenden Seiten  
 IPPC marking on two opposite sides

Unterfahrhöhe min. 92<sub>-0</sub>  
 forklift space min. 92<sub>-0</sub>

Klotz aus Vollholz, alternativ aus  
 Pressspan (Rohdichte min 580kg/m<sup>3</sup>,  
 Verleimung nach DIN 15147,  
 entsprechend Holzwertstoffklasse  
 100,gemäß DIN 68800-2

block made of solid wood, alternatively of  
 derived timber (DIN 15147, gross density  
 min 580kg/m<sup>3</sup>, tack according to  
 DIN68800-2, derived timber class 100)

5	3	Deckbrett/boards top	1140x78x18
4	3	Bodenbrett/boards cross	1140x90x18
3	9	Klotz/block	90x90x78
2	3	Quer Brett/ boards cross	980x90x18
1	2	Deckbrett/boards top	1140x90x18

Lfd.Nr.	Stück	Maße
Überfläche	ISO E	Material
		Stoff/
Gr. St.	27.11.08	aus/
gr./		Stemmerung/
sp./		
sp./		
Original:	<b>Einweg-Vierwege-Palette</b>	
Original:	<b>non-returnable four-way-entry pallet</b>	
DIN	VDA	Nr. /
A3		LT-1110
CAB		Blatt
Ers.f./		1 Bl./
Ers.g./		

	Anzahl und Art der Nägel	Nagellänge	Nageldicke	Fehl. Angaben/ i. Verwendung/
von oben Klotzverbindung block connection top down	9 x 2 Ring- / Schraubnägeln screw nails	min.80mm	3,4mm	Stückliste besonderes Blatt/
Verbindung Deck-Quer Brett connection top- crossboards	6 x 2 Nietnägeln hangnails	40 mm	2,5mm	
von unten Klotzverbindung block connection from bottom up	9 x 2 Ring- / Schraubnägeln screw nails	min.55mm	2,8mm	



Expendable Packaging

Doc. Type	TST		
Doc. Num.	N 098 05.01		
Doc. Part	001	Doc. Ver.	00
Date:	2015-02-16	Page 11 of 16	

6 PROPOSAL FOR KLT

Module	Code	System element	Nominal dimension [mm]			External dimension [mm]			Internal dimension [mm]			Design (recommended variants) <sup>3)</sup>	Thickness of cardboard [mm]	ECT [kN/m]	Puncture resistance [J]	Bursting strength [kPa]	Loading Unit (LU) - load scale	
			l	w	h	l	w	h	l	w	h						Max. gross weight / LU [kg]	Max. superimposed load / LU, dyn. [kg]
GLT lid	GLT-SD-1108	GLT-slip lid	1.140	790	80	1.140	790	87	1.128	765	80	FEFCO 0457	7	14,0	15			
	GLT-SD-1110	GLT-slip lid	1.140	980	80	1.140	980	87	1.128	955	80							
KLT	KLT-B2-5730	Carton	540	360	293	533	357	291	519	343	277*	FEFCO 0200 FEFCO 0200 with slot plug bottom	7	8,0	7,5	1350		
	KLT-B2-5715	Carton	540	360	146	533	357	144	519	343	130*		7	8,0	7,5	1350		
	KLT-B2-57SD	Slip lid, 1 flute	540	360	60	540	360	60	534	357	58	FEFCO 0450 FEFCO 0453	1,5	5,5	4,5	1350		
	KLT-B2-3830	Carton	360	270	283	353	267	291	339 (343)	253 (257)	277* (281*)	FEFCO 0200 FEFCO 0200 with slot plug bottom	7	8,0	7,5	1350		
	KLT-B2-3815	Carton	360	270	146	353	267	144	339 (343)	253 (257)	130* (134*)	FEFCO 0700 <sup>1)</sup>	7	8,0	7,5	1350		
	KLT-B2-38SD	Slip lid, 1 flute	360	270	60	360	270	60	354	267	58	FEFCO 0450 FEFCO 0453	1,5	5,5	4,5	1350		
	KLT-B2-2815	Carton	270	180	146	263	177	144	253	167	134*	FEFCO 0200 FEFCO 0700 <sup>1)</sup>	5	8,0	7,5	1350		
	KLT-B2-28SD	Slip lid, 1 flute	270	180	60	270	180	60	264	177	58	FEFCO 0450 FEFCO 0453	1,5	5,5	4,5	1350		
	KLT-B2-LD1108	Layer slip lid, 1 flute	1.140	790	60	1.076	724	62	1.073	718	60	FEFCO 0451	1,5	5,5	4,5	1350		
	KLT-B2-LD1110	Layer slip lid, 1 flute	1.140	980	60	1.076	904	62	1.073	898	60	FEFCO 0452	1,5	5,5	4,5	1350		

\* depending on design of the bottom

<sup>1)</sup> For bulk goods a closed flat bottom similar to FEFCO 0700 for an additional inlay is advisable.

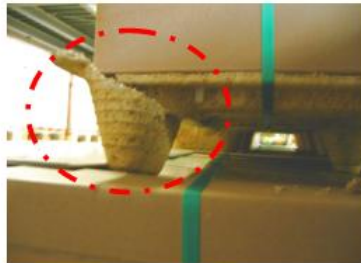
<sup>3)</sup> Every chosen design has to be checked regarding applicability for the chosen application. Recommended design variants should facilitate selection.

## 7 Optimization of Overseas – Packaging

Following you will find some examples for unacceptable and acceptable condition of overseas packaging / loading units.

### 7.1 Example 1: Pallets / Loading Unit

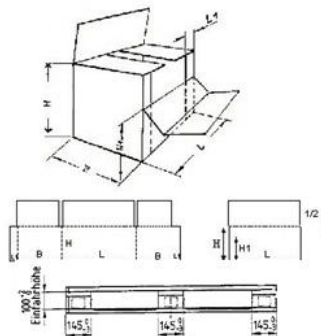
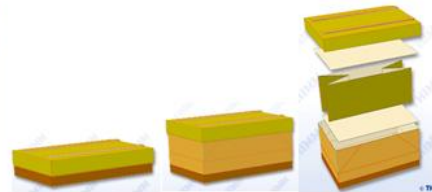
Unacceptable condition:



Damaged carton cover by foot of the presswood-pallet during stacking

Acceptable condition:

- ✓ No press wood-pallets anymore! Only 4-way-free-entry block-pallets!
- ✓ Using of outer cardboard box (loading unit) is necessary!
- ✓ Dimensions of the loading unit [LU] should be sea-container optimized!
- ✓ 2- till 3-times (dynamical) stackability of the LU ! (1+1 till 1+2 LU)
- ✓ Securing devices: No shrinking or stretching plastic sheets for the LU, only polypropylene or polyester (PP or PET) straps!



## 7.2 Example 2: Plastic Foil Stretched Around The Box

Unacceptable condition:

- ☹ Not really better security during the transportation
- ☹ Often the foil closes the entrance-holes of the pallet
- ☹ More handling time to remove the foil
- ☹ More waste and waste-costs



Acceptable condition:

- ✓ The loading unit is not shrunk or stretched with foil and is secured only with PP- or PET- straps!





### 7.3 Example 3: Stackability of Loading Units

Unacceptable condition:

- ☹ 2-way pallets
- ☹ Presswood-pallets
- ☹ Stretched single cartons
- ☹ Single cartons with no outer cardboard box (LU)



Acceptable condition:

- ✓ 4-way-free-entry block-pallet
- ✓ The LU is strapped with PP- or PET- straps
- ✓ The LU is stackable



### 7.4 Example 4: Stackability of Loading Units and Inner Packing

Unacceptable condition:

- ☹ Small single carton at the top of the LU
- ☹ LU is not stackable
- ☹ Stretched single cartons on a pallet
- ☹ Single cartons with no outer cardboard box (LU)
- ☹ Single cartons into a LU, but too much free space inside the LU



Acceptable condition:

- ✓ Small cartons are into an outer cardboard box (LU)
- ✓ The small cartons fill out the LU from bottom to top
- ✓ Inner packaging support outside stacking
- ✓ The LU is stackable
- ✓ 4-way-free-entry block-pallet
- ✓ The LU is strapped with PP- or PET- straps



### 7.5 Example 5: Identification

Unacceptable condition:

- ☹ General: Symbol at the packaging with less than double stacking
- ☹ Symbol only on the top of the LU, no remarks at the sides
- ☹ No symbol and only text : That's not clear for all nations



Acceptable condition:

- ✓ Stackability, dynamical factor: 1+1 better 1+2!
- ✓ Clear symbol (comprehensible for all nations)!
- ✓ Place identifying symbol at each side!
- ✓ Clear identifying symbol:

