

Augsburg Centre FB. Automotive Engineering / Road Accident Analysis / Cargo Securing
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ALUKON KG Münchberger Straße 31 D-95176 Konradsreuth		
from: Michael Gürtner 00 49 / 163 / 43 60 718	to: Mr Ilgmann	Augsburg, 20.07.2015

DEKRA Certificate 226 / 35527 / 702073 / 181-6924682

Cargo securing of long goods racks, packaging and accompanying packing material on road vehicles

1. Legal requirements fulfilled:

⇒ Section 22 (German Road Traffic Regulations):	"Cargo is to be secured"
⇒ Section 23 (German Road Traffic Regulations):	"Duties of the vehicle driver"
⇒ Section 30 (German Road Traffic Regulations):	"Vehicle composition"
⇒ Section 31 (German Road Traffic Regulations):	"Operational responsibility"
⇒ Section 412 (German Commercial Code):	"Operationally safe loading"

2. Fulfilled technical regulations and standards:

⇒ VDI 2700 :	Securing of loads on road vehicles
⇒ VDI 2700 Sheet 2:	Calculating lashing and securing forces
⇒ VDI 2700 Sheet 3:	Cargo securing devices
⇒ VDI 2700 Sheet 4:	Cargo distribution plan
⇒ VDI 2700 Sheet 5:	Quality assurance systems for cargo securing
⇒ VDI 2700 Sheet 14:	Determination of friction coefficients
⇒ VDI 2700 Sheet 15:	Anti-slip materials
⇒ DIN EN 12195-1 :	Calculating lashing and securing forces
⇒ DIN EN 12195-2 :	Web lashing made from man-made fibres
⇒ DIN EN 12640:	Lashing and anchorage points on commercial vehicles
⇒ DIN EN 12642:	Commercial vehicle bodies, Appendix A / B
⇒ Section 22 Accident Prevention Regulations 29:	Health and safety regulations for commercial vehicle bodies

3. Series of Tests

Test series A 27.04.13 – 1 - 24	
Test series A 18.05.15 – 1 - 26	
Test series A 20.07.15 – 1 - 37	
Series of tests – dynamic according to DIN EN 12642 Appendix B:	Test of 0.5 g laterally, rearward as well as forward of 0.8 g

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4. Vehicles and Equipment

4.1 Vehicles of the firm ALUKON

- Sprinter up to 3,5 t permissible total weight.
- Truck - box superstructure up to 12 t permissible total weight
- Truck - tarpaulin and bows up to 12 t permissible total weight.
- Truck - swap body, tarpaulin and bows with double-decker loading
- Truck - swap body box with double-deck loading
- Truck - swap body, tarpaulin and bows
- Truck - swap body with tarpaulin as per DIN EN 12642 CODE XL with insertable aluminium slats and lateral plastic honeycomb panels
- Truck - swap body with tarpaulin as per DIN EN 12642 CODE L with side planking (70 cm), insertable wooden slats (4 per stanchion) and lateral chipboard panel (19mm) as reinforcement
- Truck - jumbo tarpaulin and bows
- Truck with tarpaulin and bows as per DIN EN 12642 CODE XL
- Vehicles with trailers corresponding to vehicle type

4.2 Vehicle equipment

- Pallet stop bar or comparably tested lateral cargo space limiters such as side walls.
- There must be an unbroken, strong bulkhead.
- Dividing shelf floors for double-deck loading can also be used depending on vehicle equipment.
- The side planks must be complete in number and are not to be in a damaged state. The side slats are to be attached at least up to cargo height.
- The lashing devices must bear the following marking (blue stripe).
 $LC \geq 2,000 \text{ daN}$, $S_{HF} = 50 \text{ daN}$
- Lashing points as per DIN EN 12640.
- Observe lashing table in Point 5.1.4.1

5. Unit Loads

- Long goods racks loaded with aluminium sections etc. packed in boxes and also partially unpacked.
- Accompanying packing material packed in boxes
- Load weights:
 Sprinter 500 to 900 kg
 Truck 12 t permissible total weight 3,000 to 5,000 kg
 Swap body combination 13,000 to 19,000 kg
 Jumbo combination up to 24,000 kg

Unpacked or unbundled goods in racks must be secured rearward by a banding with a wooden plank (height ≥ 15 cm, thickness 15 mm). The goods must be positioned flush and the overlapping plank attached to the top layer. Multiple layers of film are likewise permissible.



5. 1 Loading and securing

- Basically, loading is to be towards the front and in a form-locked fashion. This applies both to the long goods racks as well as for loads in long boxes or other packaging formats.
- Laterally, as far as possible load the boxes next to each other in a form-locked fashion.
- Lateral slippage of individual boxes does not have a negative effect on the overall securing system.

5.1.1 Example: Lateral securing of palletised accessory parts

Non-tilt and stable pallets (height loaded crosswise up to 2.00 m) must be loaded in a form-fit fashion, e.g. by loading an additional pallet (precondition: Palette stop bar). Rearward securing is also required. Alternatively individually standing pallets must be lashed down.



5.1.2 Example: Loading of Sprinter / roof rack

Securing of the boxes on the roof rack by means of anti-slip mats and loop lashing forwards and lashing down twice. The strap at front crosswise to the boxes must be attached so that it cannot fall off. Roof loading max. 150 kg. Load securing strap LC ≥ 500 daN



5.1.3 Example: Truck - box superstructure up to 12 t permissible total weight. CODE L



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5.1.4 Example: Truck - swap body box with double-deck loading CODE L



- If the accessory cartons cannot be loaded in a form-fit fashion at the side, this must be achieved by means of two clamping bars and a pallet.

5.1.5 Example: Lkw Jumbo tarpaulin and bows steel racks CODE L



- A uniform distribution of the racks in the cargo area is to be assured. It is not permissible to load solely on one side without employing additional securing measures.

5.1.5.1 Lashing table for the steel racks in stacks of up to four and wooden racks in stacks of up to three on top of each other

Anti-slip mats must be laid under all the feet or wooden skids of the lowest racks (solely loading surface/frame) with anti-slip mats.

This does not apply to vehicles with pallet stop bars or with side planking.

A maximum of 3 wooden racks are permitted to be stacked one on top of the other.

$LC \geq 2,000 \text{ daN}$, $S_{HF} = 50 \text{ daN}$

$S_{TF} = 300 \text{ daN}$	Number of racks	Total weight in kg	Number of lashing devices
	1x 3	3,000	2
	2x 6	6,000	2
	3x 9	9,000	4
	4x 12	10,000	9
	4x 12	12,000	11

For weights that lie between two lines, the number of lashing devices of the next line underneath is to be taken.

$S_{TF} = 500 \text{ daN}$	Number of racks	Total weight in kg	Number of lashing devices
	1x 3	3,000	2
	2x 6	6,000	2
	3x 9	9,000	3
	4x 12	10,000	6
	4x 12	12,000	7

For weights that lie between two lines, the number of lashing devices of the next line underneath is to be taken.

5.1.5.2 Lashing table for the steel racks empty up to four stacked one on top of the other

Empty racks are generally to be lashed down using two load-securing devices
 $LC \geq 2.000 \text{ daN}$, $S_{HF} = 50 \text{ daN}$.

5.1.5.3 Example: Loading of wooden racks (max. 3x one on top of the other)

If the lashing point locations on the vehicle mean that the lashing devices lie directly on the aluminium sheets, robust, plastic edge protectors are to be used.



5.1.5.4 Example: Loading customer's own boxes/racks, Hapa in Herrieden

The rear rack or 2 racks must be positioned on the facing side at least partially at the front cartons. Racks/boxes with their own stable bulkhead.



5.1.6 Example: Truck jumbo tarpaulin and bows, steel racks CODE XL

Securing by means of two load securing straps $LC \geq 2,000$ daN, $S_{TF} = 500$ daN (lashed down) is sufficient for CODE XL vehicles if used in combination with a pallet stop bar or a comparable device.



5.1.7 Example: Loose cartons and racks

- Truck with tarpaulin and bows **CODE L** with side planking (70 cm), 4 insertable wooden slats per stanchion and a chipboard panel (19 mm) at the side
- Truck with tarpaulin and bows **CODE XL** with plastic honeycomb panels and 4 insertable aluminium slats on the floor per stanchion
- Load weight of the loose cartons up to 4,000 kg form fitted towards the front.
- Racks maximum 2x on top of each other, each up to 1,100 kg form fitted towards the front.
- The lateral securing of the racks is effected by two side loops or by two vertical locking beams (1,000 daN).
- If securing by means of two vertical locking beams the rearward securing of the racks must be effected by a horizontal locking beam (1,000 daN), lashing strap or each by a stop in the cargo floor.

Lateral securing of the racks loaded one on top of the other via two side loops.

Load securing device

as per DIN EN 12195-2,

$LC \geq 2,000$ daN, $S_{HF} = 50$ daN

$S_{TF} = 500$ daN

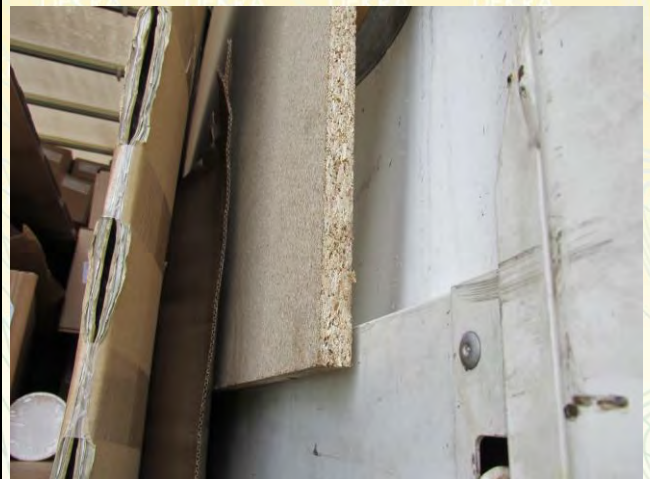


5.1.7.1 Example: Vehicles CODE L

Truck with tarpaulin and bows **CODE L** with side planking (70 cm), 4 insertable wooden slats per stanchion and a chipboard panel (19 mm) at the side



To lateral reinforce the superstructure, a chipboard panel (height ≥ 140 cm; thickness 19 mm) is used. 4 insertable wooden slats are also used per stanchion.



The chipboard panel must cover the side planking and have an internal height of approx. 70 cm (approx. 2 cm).

5.1.7.2 Example: Vehicles CODE XL

Truck with tarpaulin and bows **CODE XL** with plastic honeycomb panels and 4 insertable aluminium slats on the floor per stanchion or insertable aluminium slats across the entire side



At the bottom 4 insertable aluminium slats are required to prevent the tarpaulin from bulging.



The plastic honeycomb panels are suspended in three stanchion pockets on each side above the insertable aluminium slats.



Alternatively the entire side of the vehicle can be equipped with insertable aluminium slats.

3 individual honeycomb panels can also be suspended each via stanchion pockets.

6. DEKRA instructions & stipulations:

The stability of the tested unit loads complies with the required accelerations as set out in DIN EN 12642 Appendix B. The certification is only valid for the tested form or up to a weight load complying with the payload of the vehicle. It expires upon the coming into force of new statutory provisions, alterations of key components of the packing, loading and securing regulations. Fundamental changes or new developments of the packing, loading and securing variants must be subject to recertification by DEKRA Automobil GmbH.

7. DEKRA Certification Centre:

DEKRA Engineer



Michael Gürtner

Master of Science (M.Sc.)

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