Dir. (EU) No. 47/2014

New inspection rules for cargo securing

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Note (1): This presentation was created with the greatest care. However, mistakes cannot be ruled out. The author will therefore not accept any guarantee, responsibility or liability for possible inaccuracies.

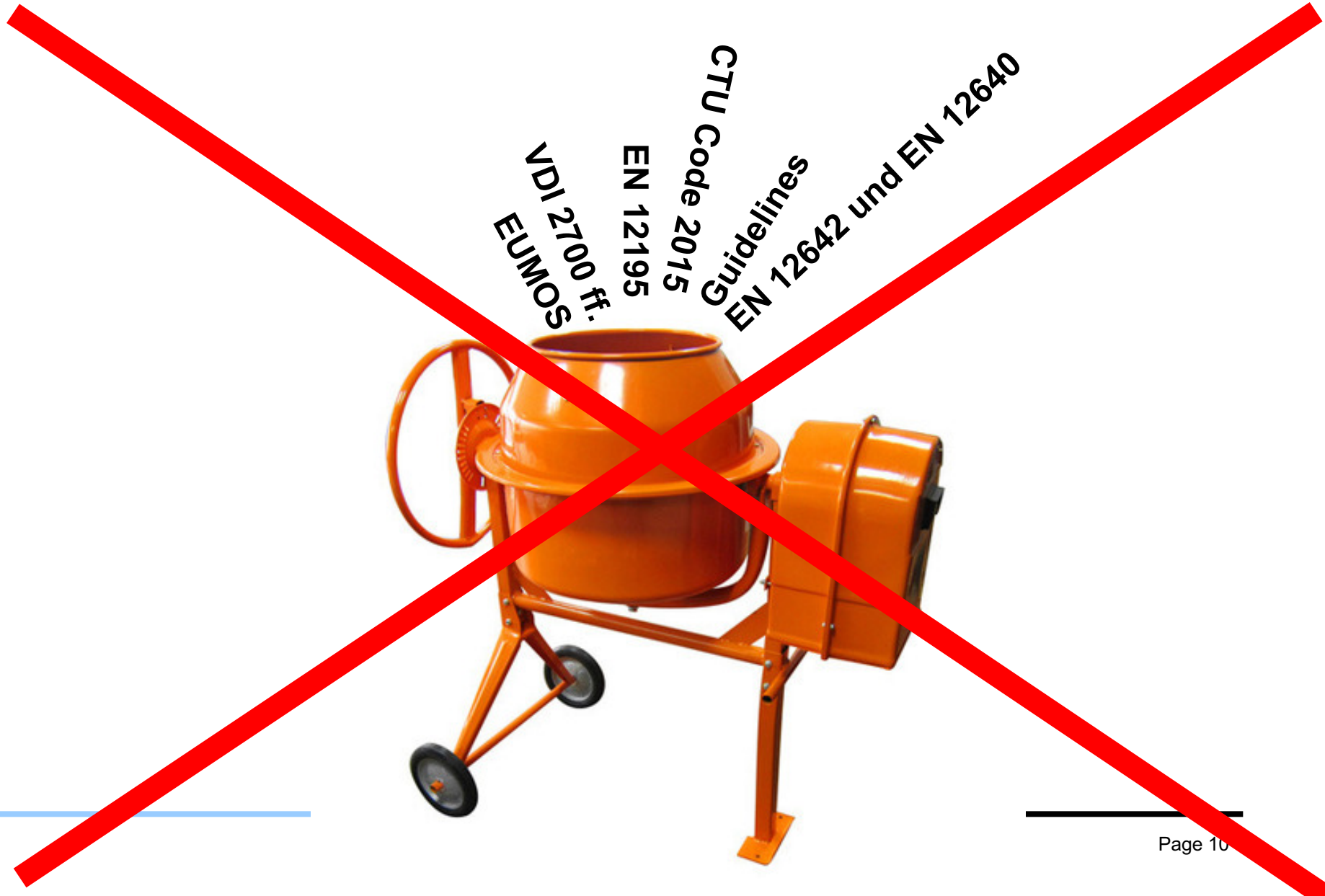
Note (2): I would like to say thank you for the support of Herr Malits and Herr Noske and all other persons, companies and controlling authorities who have (in)directly helped with this presentation.

Have we seen it all before???

2005

2015

…not everything that other people do is also suitable and effective for one‘s own area of work!


VDI 2700 ff.
EUMOS
EN 12195
CTU Code 2015
Guidelines
EN 12642 und EN 12640

Content of the presentation

1. Legal basis

2. Practical tips

1. Legal basis

DIRECTIVE ON TECHNICAL ROADSIDE INSPECTION

- **Dir. (EU) No. 2014/47** – dated 03/04/2014

Note:

✓ Enactment into national law before 20/05/2017

✓ Application of the Directive from 20/05/2018

DIRECTIVE ON DIMENSIONS AND WEIGHTS

- **Dir. (EU) No. 2015/719** – dated 29/04/2015

Key points:

- Definition of the term “cargo”
- Classification of violations into deficiency categories
- Annex with catalogue of deficiencies
- References to Standards
- Unified regulation
- Measures in the case of violations
- Risk rating

Key points (future § 5 TechnKontrollV):

(3) Every initial technical roadside inspection includes:

- 1. a check of the latest inspection report created for the commercial vehicle, relating to an inspection in accordance with Directive 2014/47/EU including a check of whether the deficiencies reported therein have been rectified,
- 2. a check of the latest roadworthiness certificate in accordance with Directive 2014/45/EU and
- 3. a visual assessment of the technical condition of the vehicle.

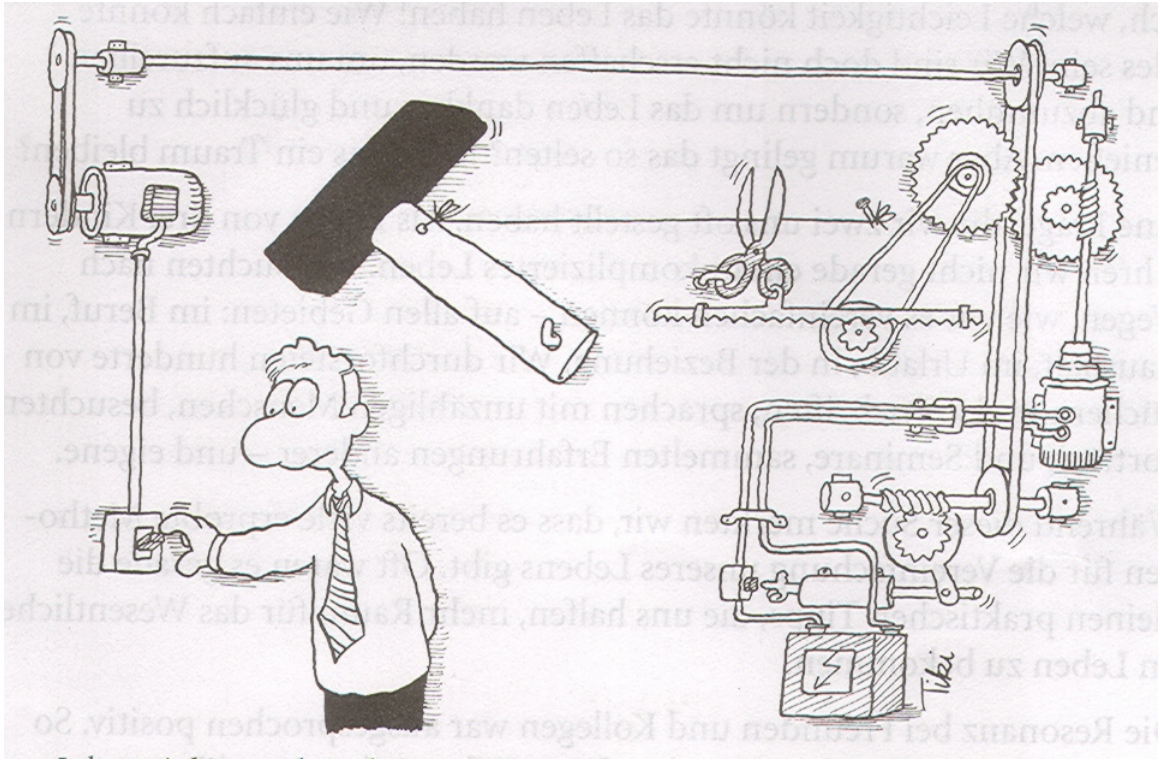
…

Key points (future § 5 TechnKontrollV):

(4) In addition to the types of checks mentioned in paragraph 3, the initial technical roadside inspection can include the following:

- 1. Visual assessment of the securing of the vehicle‘s cargo in accordance with § 22 par. 1 of the StVO (traffic regulations) and Annex III Section II of Directive 2014/47/EU,
- 2. technical checks regarding the items listed in Annex II of Directive 2014/47/EU by any method deemed appropriate.

Accepted rule of technology?



Accepted rule of technology?

The term “cargo” – Article 3 item 5

- all goods that would normally be placed in or on the part of the vehicle designed to carry a load and that are not permanently fixed to the vehicle, including objects within load carriers such as crates, swap bodies or containers on vehicles

Cargo securing: YES…

….but how?

Source: KLSK e.V.

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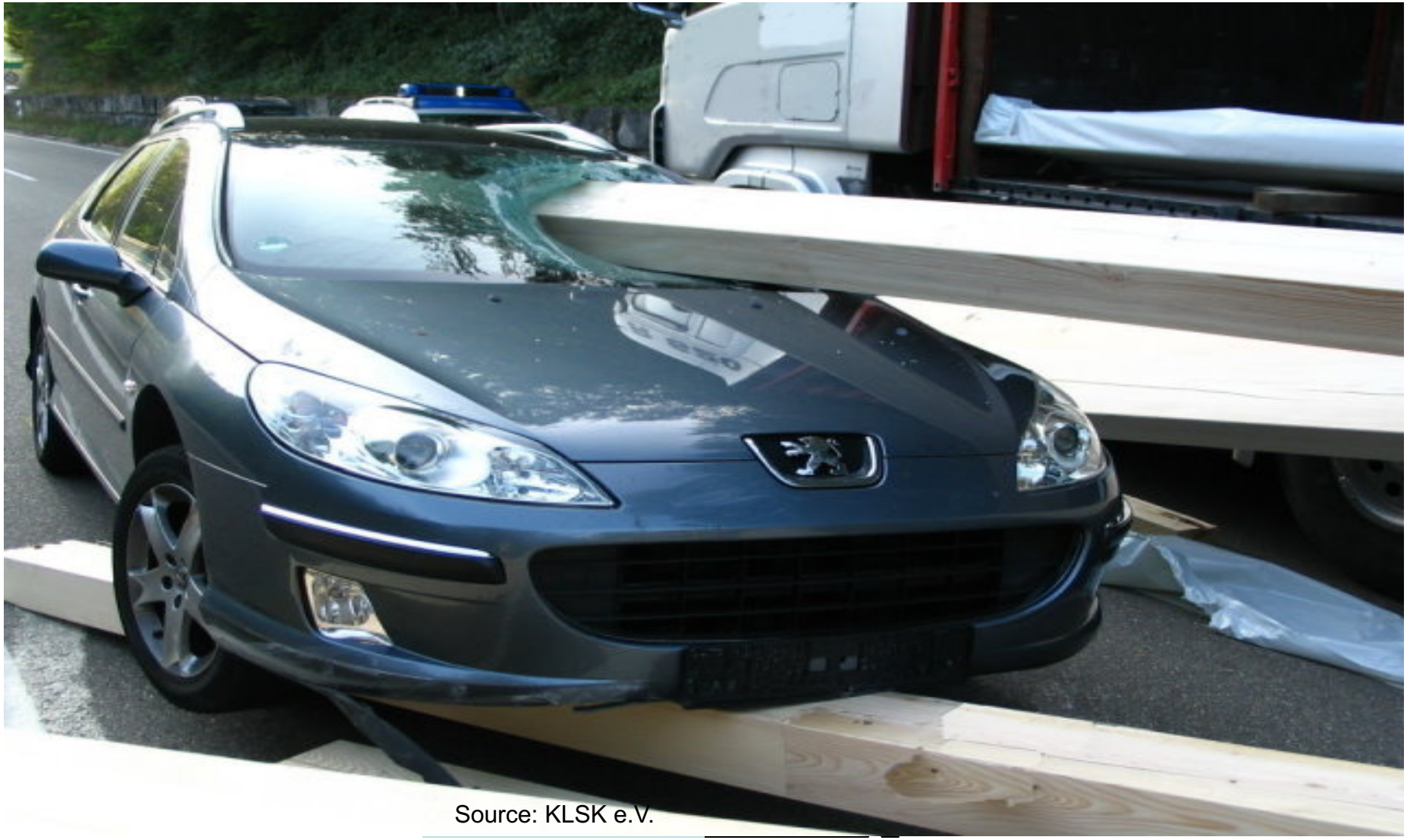
Source: KLSK e.V.



Source: KLSK e.V.

§ 22 (1) S. 2 StVO - Cargo

“The accepted rules of technology are to be paid attention to.”

Loading recommendations

- Raw timber up to 6 m length (2006)
- Concrete wire fabric (2009)
- Rebar steel, bent and cut (2011)
- Steel sheets from 5 mm thickness (2011)
- Bales of recycled paper – part 1 (2012)
- Bales of recylced paper – part 2 (2016)


ND 0610
Reisch - Fahrzeugbau
Reischstrasse 14, 86676 Ehekirchen - Hollenbach
Tel.: 08435/150, Fax.: 08435/15 18
http://www.reisch-fahrzeugbau.de


SCHWARZMÜLLER

Subsumption

- Current provision with reference to Standards
- Current provision without reference to Standards

With reference to Standards

DIRECTIVE ON TECHNICAL ROADSIDE INSPECTION

- **Dir. (EU) No. 2014/47** – dated 03/04/2014

Note:

✓ Enactment into national law before 20/05/2017

✓ Application of the Directive from 20/05/2018

Standard	Subject
EN 12195-1	Calculation of lashing forces
EN 12640	Lashing points
EN 12642	Strength of vehicle body structure
EN 12195-2	Web lashings made from man-made fibres
EN 12195-3	Lashing chains
EN 12195-4	Lashing steel wire ropes
ISO 1161, ISO 1496	ISO container
EN 283	Swap bodies
EN 12641	Tarpaulins
EUMOS 40511	Poles — Stanchions
EUMOS 40509	Transport Packaging

Without reference to standards

D I N E N 4 5 0 2 0 : 2 0 0 7 – 0 3

(Standardisation and associated activities)

Without reference to standards

D I N E N 4 5 0 2 0 : 2 0 0 7 – 0 3

1.5 accepted rule of technology

“…technological definition which is accepted by a majority of representative experts as a representation of the state of the art.”

Without reference to standards

D I N E N 4 5 0 2 0 : 2 0 0 7 – 0 3

1.5 Condition for loading recommendations:

Determination of friction values and driving tests are conducted with the involvement of

- Berufsgenossenschaft für Transport und Verkehrswirtschaft (trade association for transport and traffic)
- (Insurance) industry associations
- Testing organisations and
- Authorities

[(E) Erlass MIK NRW vom 22.09.2016 -402-61.04.05-]

Future inspection practice

- For each initial technical roadside inspection of a vehicle, the inspector:
- a) shall check the latest roadworthiness certificate and, the latest technical roadside inspection report, where available, kept on board, or electronic evidence thereof in accordance with Article 7(1).
- b) shall carry out a visual assessment of the technical condition of the vehicle.
- c) **may carry out a visual assessment of the securing of the vehicle's cargo** in accordance with Article 13.

Discretion of inspection

Minor deficiency

A minor deficiency exists when the load has been properly secured but a safety advice might be appropriate.

Major deficiency

A major deficiency exists when the load has not been sufficiently secured and a significant shifting or overturning of the load or parts thereof is possible.

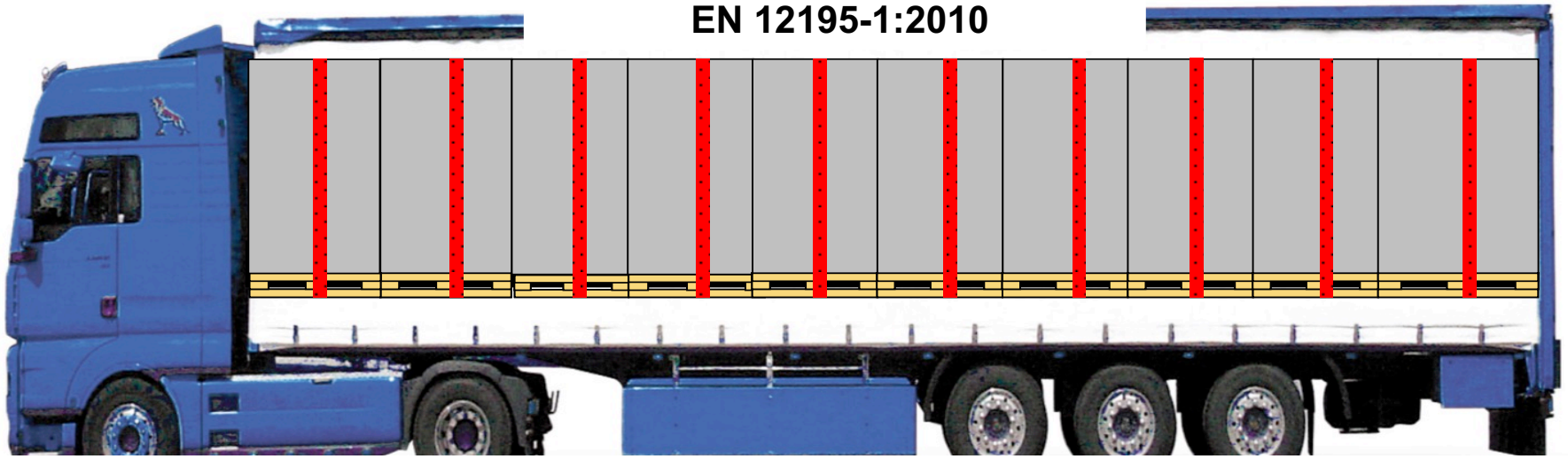
Discretion of inspection

Dangerous deficiency

A dangerous deficiency exists when traffic safety is directly endangered due to a risk of loss of cargo or parts thereof or a hazard deriving directly from the cargo or an immediate endangering of persons.

Standard	Subject
EN 12195-1	Calculation of lashing forces
EN 12640	Lashing points
EN 12642	Strength of vehicle body structure
EN 12195-2	Web lashings made from man-made fibres
EN 12195-3	Lashing chains
EN 12195-4	Lashing steel wire ropes
ISO 1161, ISO 1496	ISO container
EN 283	Swap bodies
EN 12641	Tarpaulins
EUMOS 40511	Poles — Stanchions
EUMOS 40509	Transport Packaging

Example for hazardous goods
EN 12195-1:2010



Assumptions for a calculation example (rearward cargo securing by down lashing):

$C_x = 0.5$; $\mu_s = 0.5$; $\mu = 0.46$; $m = 20{,}000$ kg; $f_s = 1.1$;
$S_{TF} = 500$ daN; k 2.0; $\sin\alpha = 0.5$

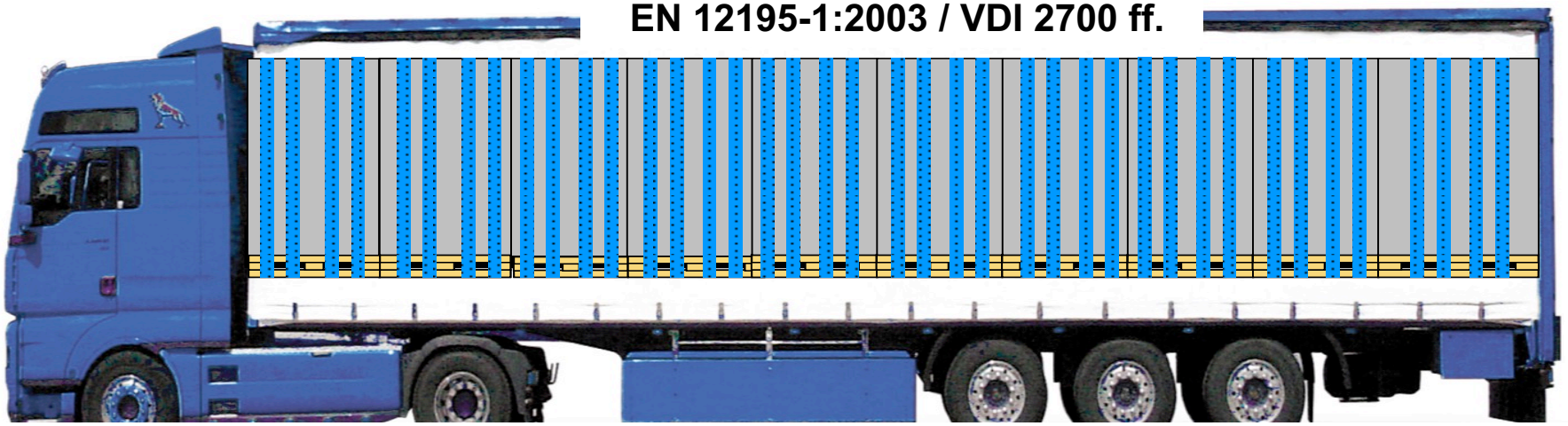
$$F_T = \frac{(C_{xy} - \mu) \times m \times f_s}{S_{TF} \times k \times \mu \times \sin\alpha}$$

$$F_T = \frac{(0.5 - 0.46) \times 20{,}000 \times 1.1}{500 \times 2 \times 0.46 \times 0.5}$$

$$F_T = \frac{800}{230}$$

~ 4 lashing straps

Example for non-hazardous goods
EN 12195-1:2003 / VDI 2700 ff.



Assumptions for a calculation example (rearward cargo securing by down lashing):

$C_x = 0.5$; $\mu_s = 0.5$; $\mu_D = 0.35$; $m = 20{,}000$ kg; $S_{TF} = 500$ daN;
$k = 1.5$; $\sin \alpha = 0.5$

$$F_T = \frac{(C_{xy} - \mu_D) \times m \times f_s}{S_{TF} \times k \times \mu_D \times \sin \alpha}$$

$$F_T = \frac{(0.5 - 0.35) \times 20{,}000}{500 \times 1.5 \times 0.35 \times 0.5}$$

$$F_T = \frac{3000}{131}$$

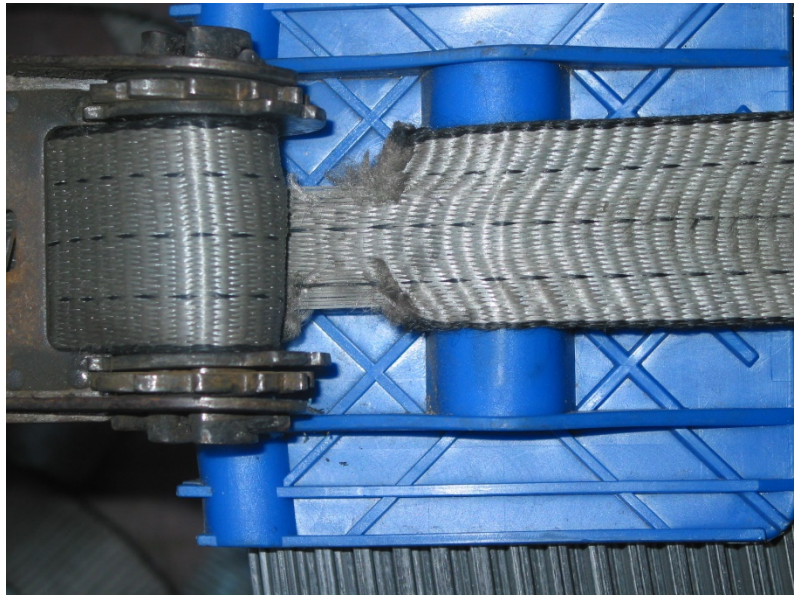
~ 23 lashing straps

“Special provisions” for certain types of goods with separate regulations, such as for example dangerous goods in the sense of the ADR, still remain valid.


VARTA

Item	Deficiencies	Deficiencies assessment		
		Minor	Major	Dangerous
A	Transport packaging does not allow proper load securing.	At discretion of inspector		
B	One or more load units are not properly positioned.	At discretion of inspector		
C	The vehicle is not suitable for the loaded cargo (deficiency other than those listed under item 10).	At discretion of inspector		
D	Obvious defects of the vehicle superstructure (deficiency other than those listed under item 10).	At discretion of inspector		
10.	**Suitability of the vehicle**			
10.1	Front wall (if used for the securing of cargo)			
10.1.1	Part-weakening rust damage or deformations		X	
	Part cracked risking the integrity of the cargo compartment			X
10.1.2	Insufficient strength (certificate or label if applicable)		X	
	Insufficient height relevant to cargo carried			X

Item	Deficiencies	Deficiencies assessment		
		Minor	Major	Dangerous
20.2	**Friction-lock securing**			
20.2.1	**Attainment of the required securing strengths**			
20.2.1.1	The required securing strengths are inadequate		X	
	Less than 2/3 of required strength			X
20.3	**Load-restraint devices used**			
20.3.1	Unsuitability of the load-restraint devices		X	
	Completely unsuitable device			X
20.3.2	Label (e.g. patch/test trailer) is missing/damaged but device still in good order	X		
	Label (e.g. patch/test trailer) is missing/damaged but device shows considerable deterioration		X	
20.3.3	Load-restraint devices damaged		X	
	Load-restraint devices seriously deteriorated and no longer suitable for use			X
30.	**Load entirely unsecured**			**X**



Inspection of cargo securing

During a roadside inspection a vehicle may be subject to an inspection of its cargo securing in accordance with Annex III, in order to ensure that the **cargo is secured in such a way** that it **does not interfere with safe driving**, or pose a **threat to life, health, property or the environment**.

Inspection of cargo securing

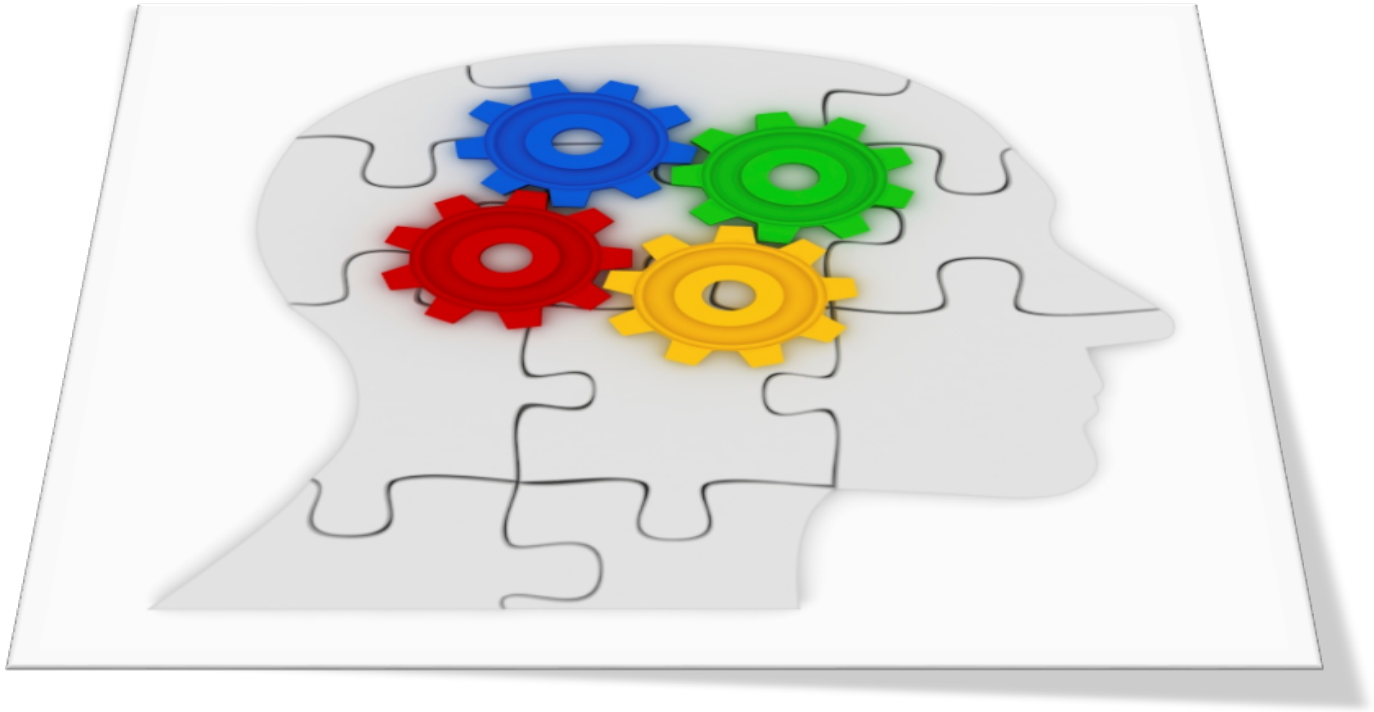
Checks may be carried out to verify that during **all kinds of operation of the vehicle**, **including emergency situations** or **uphill starting manoeuvres**:

— loads can **only minimally change** their position relative to each other, against walls or surfaces of the vehicle, and

— loads **cannot leave the cargo space** or move outside the loading surface.

Inspection of cargo securing

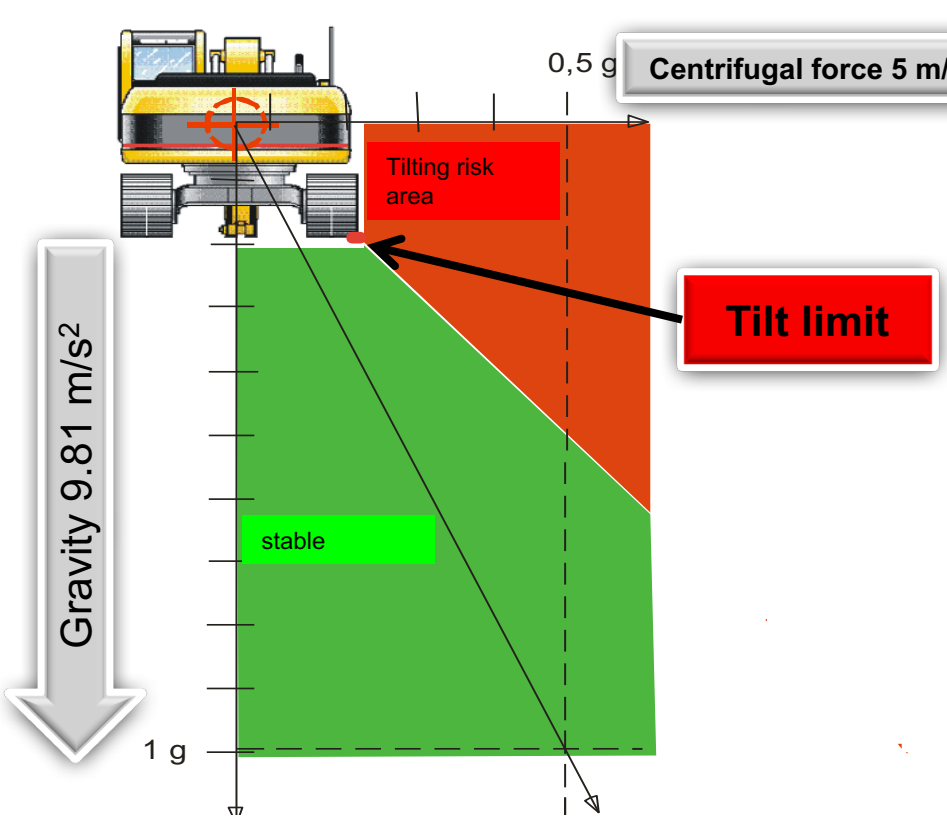
Without prejudice to the requirements applicable to transport of certain categories of goods, such as those covered by the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), **cargo securing and inspection of the securing of cargo may be carried out in accordance with the principles** and, where appropriate, **the standards laid down** in Section I of **Annex III**. The latest version of the standards laid down in point 5 of Section I of Annex III may be used.



2. Practical tips

Illustration of tilting risk according to DIN EN 12195-1

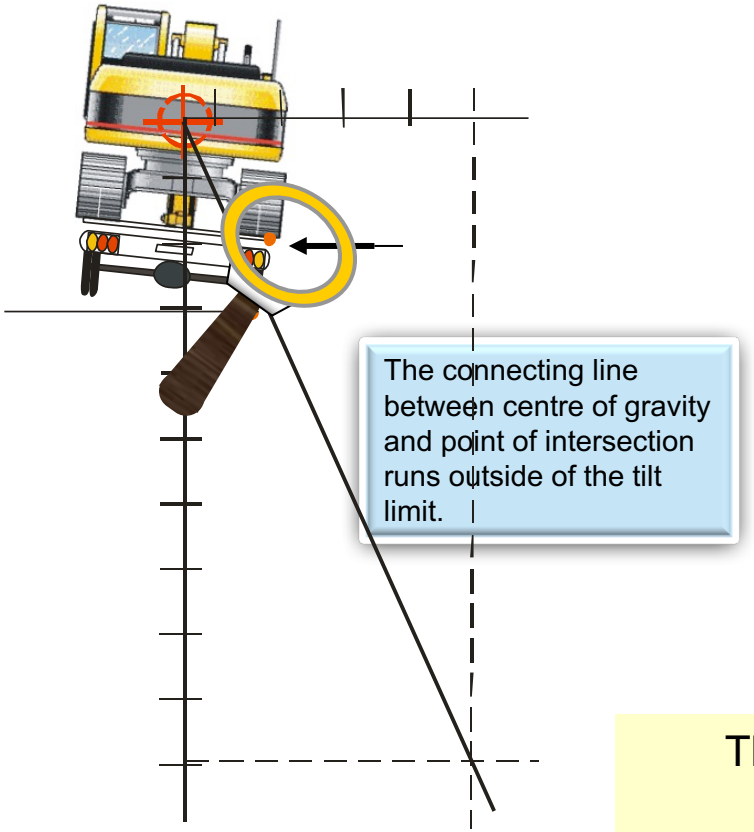
(statistical block model)



In order to determine tilting risk, we plot the acceleration forces (Gravity = 1 g = 10 m/s² (9.81 m/s²) = 10 cm) / lateral; maximum acceleration 0.5 g = 5 m/s² = 5 cm) using lines. Then, both lines are extended down and to the right until they meet (parallelogram of forces).

With the resulting point of intersection, a connecting line is drawn to the centre of gravity. If this line is within the tilt limit, the excavator is stable (green area). If it is however outside (red area), the excavator is at risk of tilting.

Tilting risk of a loaded vehicle during cornering



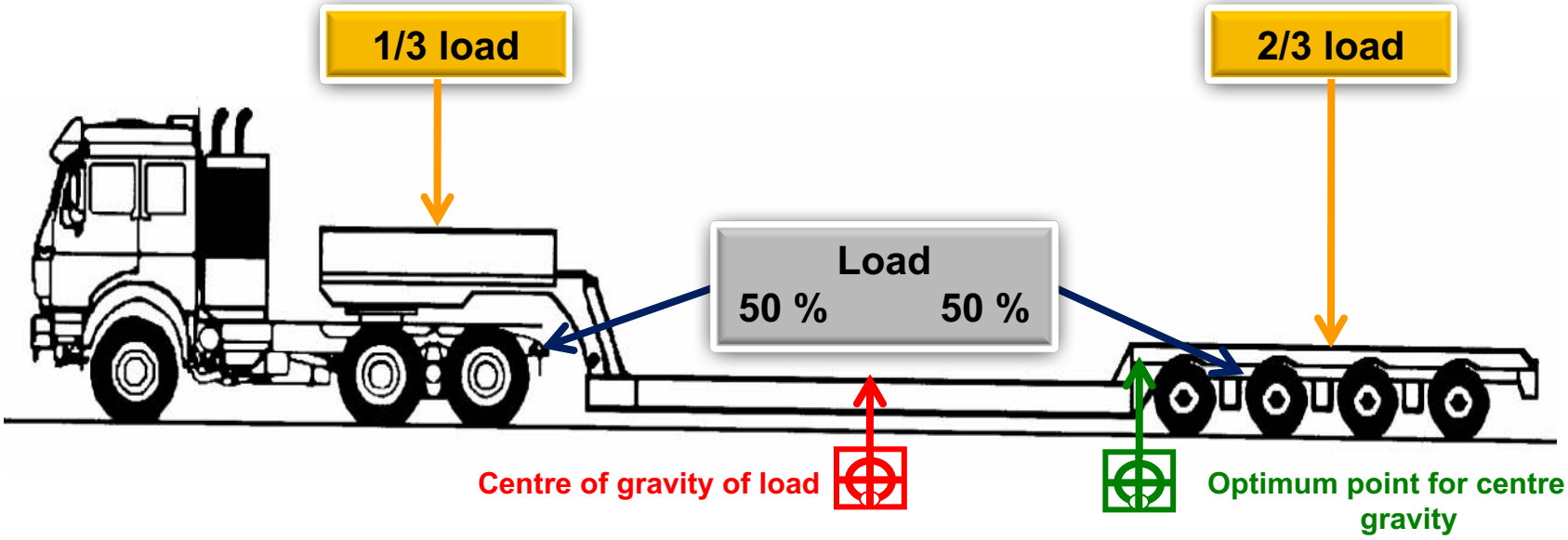
Through the loading of the crawler excavator, there is a shift of the tilt limit to the inside, towards the centre of gravity.

If the vehicle then dips slightly while taking a corner and the vehicle is additionally not very rigid, both it and the crawler excavator will tip over.

Through the deflection of the vehicle, the centre of gravity describes a circular orbit towards the centre of the curve and thus approaches the tilt limit.

The excavator, which was stable before, is now **at risk of tilting!**

Axle overloading in transfer trucks - drop-deck without interposed chassis



Particularly when using combinations with drop-deck trailers without interposed chassis, there is often a considerable exceedance of rear axle load of the transfer truck, even if the maximum total weight of the rig has not yet been exceeded.

The cause for this is that the construction vehicle sits in the middle on the drop-deck. As a consequence, the centre of gravity is not at the rear of the drop-deck, but in the middle.

Cargo securing and cargo distribution

Examples

Cargo cannot shift or fall off?

Physics are often underestimated

Cargo can shift and deform the vehicle body

Cargo securing?

Examples

Cargo securing and cargo distribution

- The cargo distribution on a vehicle must be followed at all times.
- Cargo is only stored in a way that is safe for transport if the load has been distributed correctly and the goods are correctly secured.
- The creation of a cargo distribution plan is absolutely necessary.
- Assumptions are in no way sufficient.
- The centre of gravity of the cargo should preferably lie on the longitudinal middle of the vehicle.
- The lower it is, the better this is for transport safety.

If cargo distribution is not followed

- **Exceedance of axle loads**
- **Lower deviation of the minimum axle load of the steering axle**
- **Difficulties when cornering if the cargo was loaded too far towards the front**
- **Difficulties when cornering if the cargo was loaded too far towards the rear**
- **The front axle can partially or fully lose contact with the road surface**


BR-SB-86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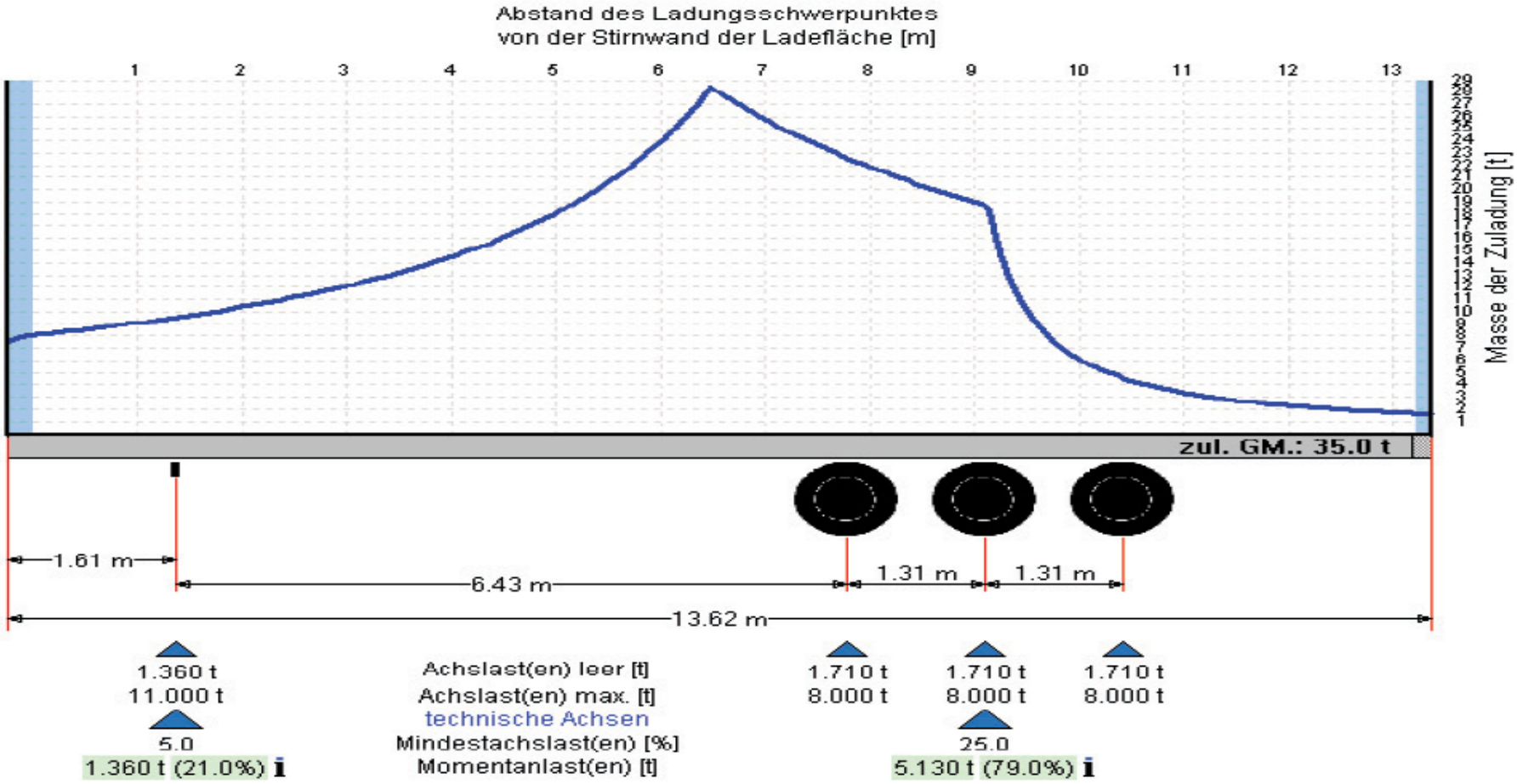
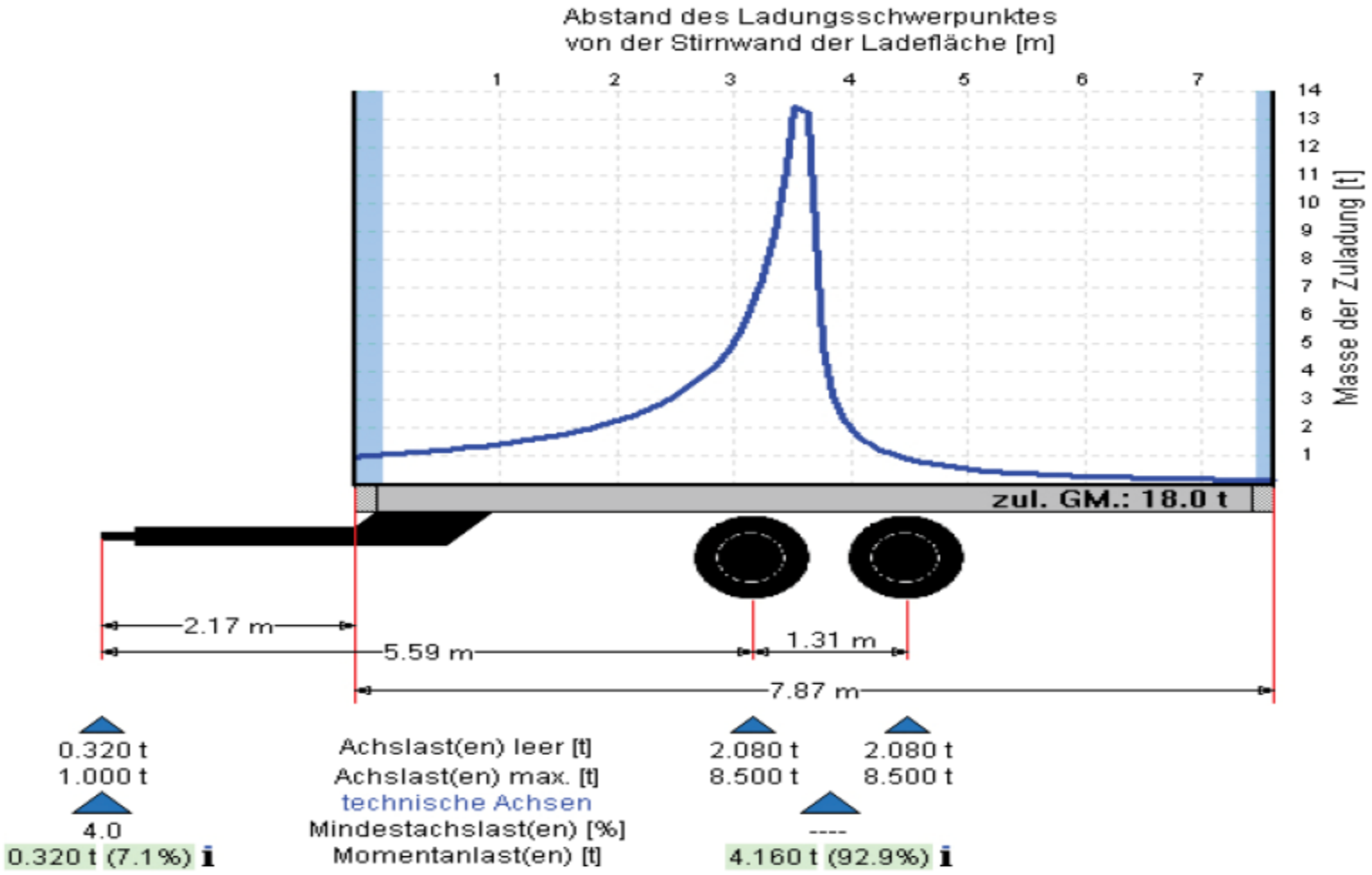
SATTELANHÄNGER



ANHÄNGER MIT STARRDEICHSEL



Vehicle body

Examples

DIN EN 12642 Code XL

Vehicle bodies can be certified according to DIN EN 12642 Code XL.

A lateral securing with 0.4 times the permitted payload can then be assumed.

A Curtainsider differs from other vehicles as follows:

- **additional struts in the roof**
- **other stiffening of the roof**
- **lateral pallet retaining bars**
- **additional full-length stanchions**
- **reinforced front wall**
- **stronger push-in bars and/or particularities of the tarpaulin**

Vehicle body

Examples

Proof of load capacity according to DIN EN 12642 (2017)

1. Angaben zum Fahrzeug
- Fahrzeughersteller:
- Fahrzeugtyp:
- Fahrzeug-Identifizierungsnummer:
- max. technische Nutzlast :
- lichte Abmessungen innen:
- Fahrzeugaufbau:

Der Fahrzeugaufbau erfüllt die Anforderungen der DIN EN 12642 Code L / XL DCE RL 9.5

2. Angaben zur Ausstattung des Fahrzeugs
Der Fahrzeugaufbau ist dann in der Lage, die unter Punkt 4 genannten Ladegüter bei Einhaltung der unter Punkt 3 genannten Ladebedingungen zu sichern, wenn folgende Ausstattungskomponenten vorhanden sind:

	Nachgewiesene max. Prüfkräfte (z.B. DIN EN 12642 Code XL)
Stirnwand	**z.B. 13.500 daN (kg)**
Seitenwände	**z.B. 10.800 daN (kg)**

Plane nach DIN EN 12641-2 / BKTex / DEKRA wenn nicht Beschreibung (Material, Gurtzahl, Spanner etc.)
- **Rückwand** **z.B. 8.100 daN (kg)**
- **Dach** Hersteller
- Hersteller der **Rungen** und Anzahl pro Seite
- Art und Anzahl der **Einsteckprofile** pro Rungenfeld

Der Zustand des Fahrzeugaufbaus ist gemäß VDI 2700 regelmäßig zu überprüfen.

3. Angaben zur Verladung
Der Fahrzeugaufbau ist in der Lage, die unter Punkt 4 genannten Ladegüter bei Einhaltung der unter Punkt 2 aufgelisteten Ausstattung unter folgenden Ladebedingungen zu sichern:
- Gleit-Reibbeiwert von mindestens $\mu_0 = 0{,}30$
- Formschlüssige Beladung in Fahrtrichtung
- Seitliche Ladelücken von bis zu max. ... cm auf gesamter Breite sind zulässig.
- Max. zulässiger Abstand Ladung / Rückwand ... cm

Dieses Zertifikat umfasst 2 Seiten und hat nur in vollständiger Form Gültigkeit.

4. Angaben zum Ladegut
Der Fahrzeugaufbau ist bei Einhaltung der unter Punkt 2 und 3 aufgelisteten Bedingungen in der Lage, folgende Ladegüter gemäß den Vorgaben der **anerkannten Regeln der Technik**, z.B. den Beschleunigungswerten gemäß **DIN EN 12195-1**, der **VDI-Richtlinien 2700 ff.** und den darauf basierenden Zertifikaten und Gutachten zu sichern.
- Stückgut (ggf. Beschreibung der benötigten Zusatzausstattung)
- Getränke (ggf. Beschreibung der benötigten Zusatzausstattung)
- .....

Wenn alle Vorgaben der Punkte 2, 3 und 4 erfüllt sind, wird die Ladungssicherung durch die Stabilität des Fahrzeugaufbaus gewährleistet. Zusätzliche Sicherungsmaßnahmen wie z.B. Niederzurren oder Direktzurren sind nicht mehr erforderlich.

Für abweichende Ladungsfälle sind zusätzliche Sicherungsmaßnahmen gemäß VDI 2700 erforderlich.

Prüfinstitut /Prüfbericht Nr.	**Fahrzeugbauer**
Ort, Datum	**Ort, Datum**
Unterschrift Prüfer	**Unterschrift des Firmenverantwortlichen**

Dieses Zertifikat hat nur in vollständiger Form Gültigkeit.

Proof in the form of a certificate should always be carried

“broom-clean” loading surface

Formation of cargo units

Examples

The cargo is safe for transport?!


1
2
3
44
Rade
1000 m


4
FOLIE DIE
04/09/2008

Form closure cargo securing

Examples

Sicherung einer Über-hang-palette

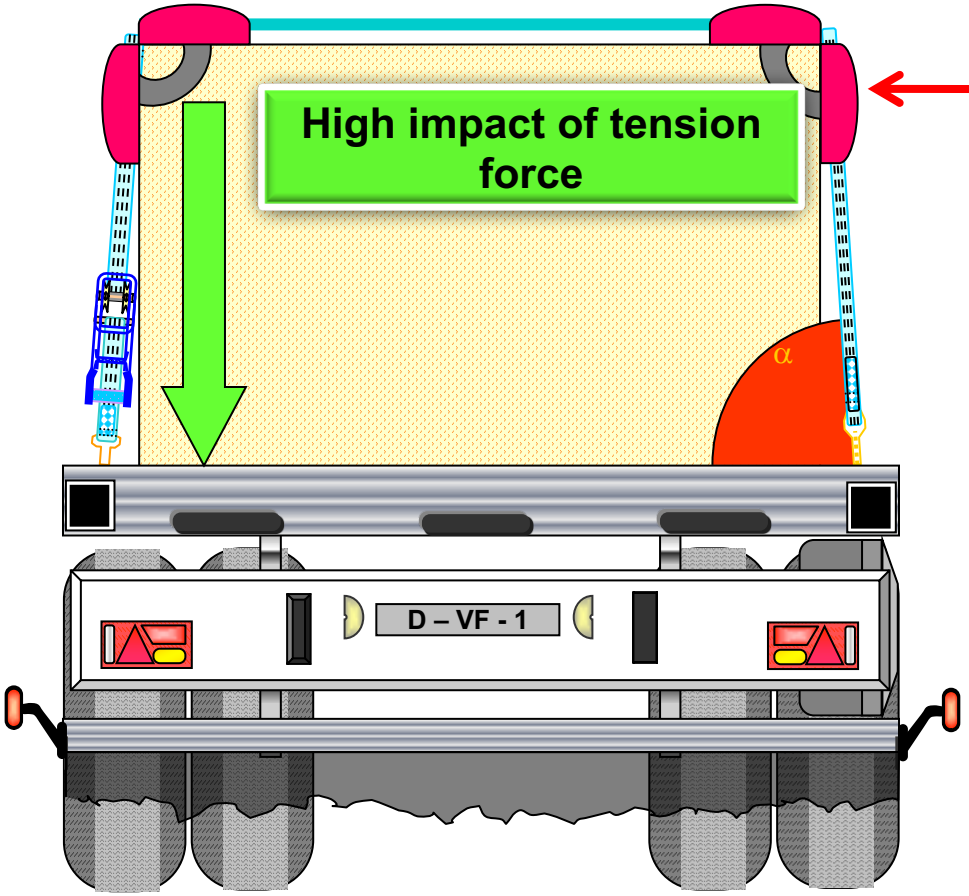
Form-schlüssige Gitter-Box-Sicherung

Friction lock cargo securing

Pay attention to the angles!

Friction lock cargo securing

Down lashing – impact of the angle on the distribution of force



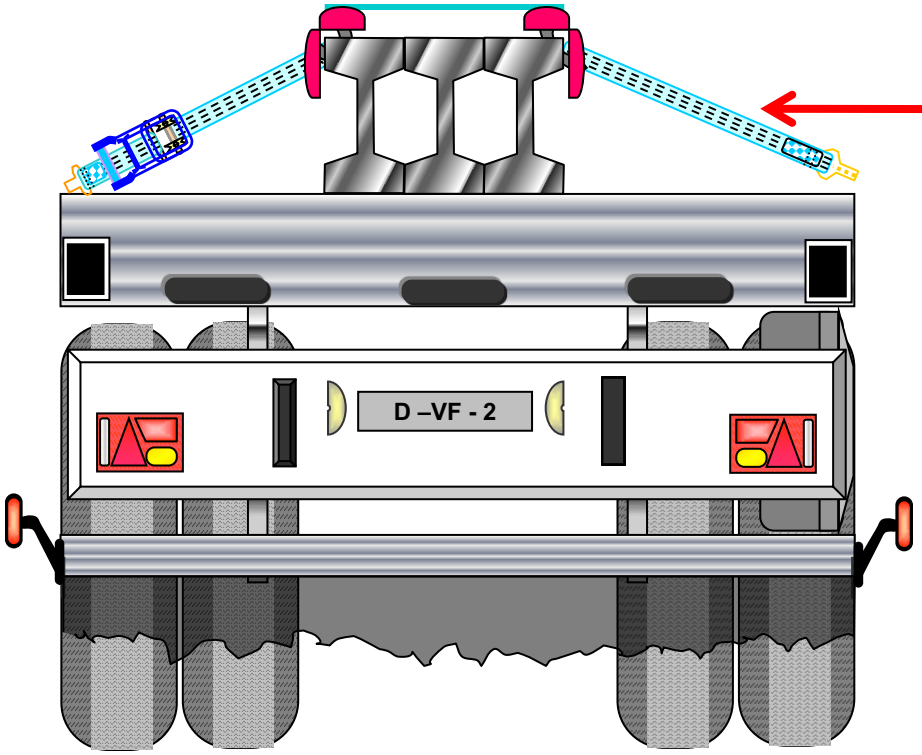
small component of loss

Angle α 80^0 – 90^0
Impactful proportion of the applied tension force:
95 % – 100 %

Friction lock securing

Example

Down lashing – impact of the angle on the distributio of force



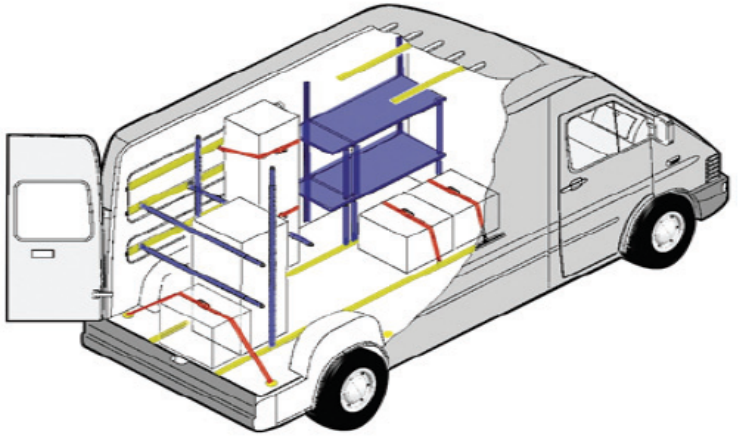
high component of loss

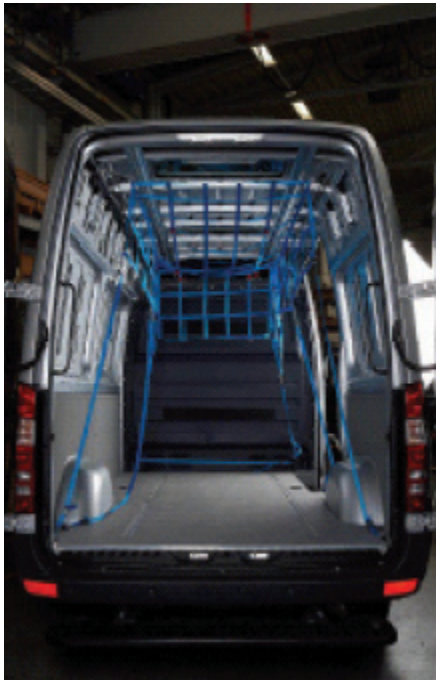
Angle α = 30⁰
Impactful proportion of the applied tension force:
50 %

Intelligent complete systems (double stack)

Intelligent systems (transporter)

Examples



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Many thanks for your attention

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