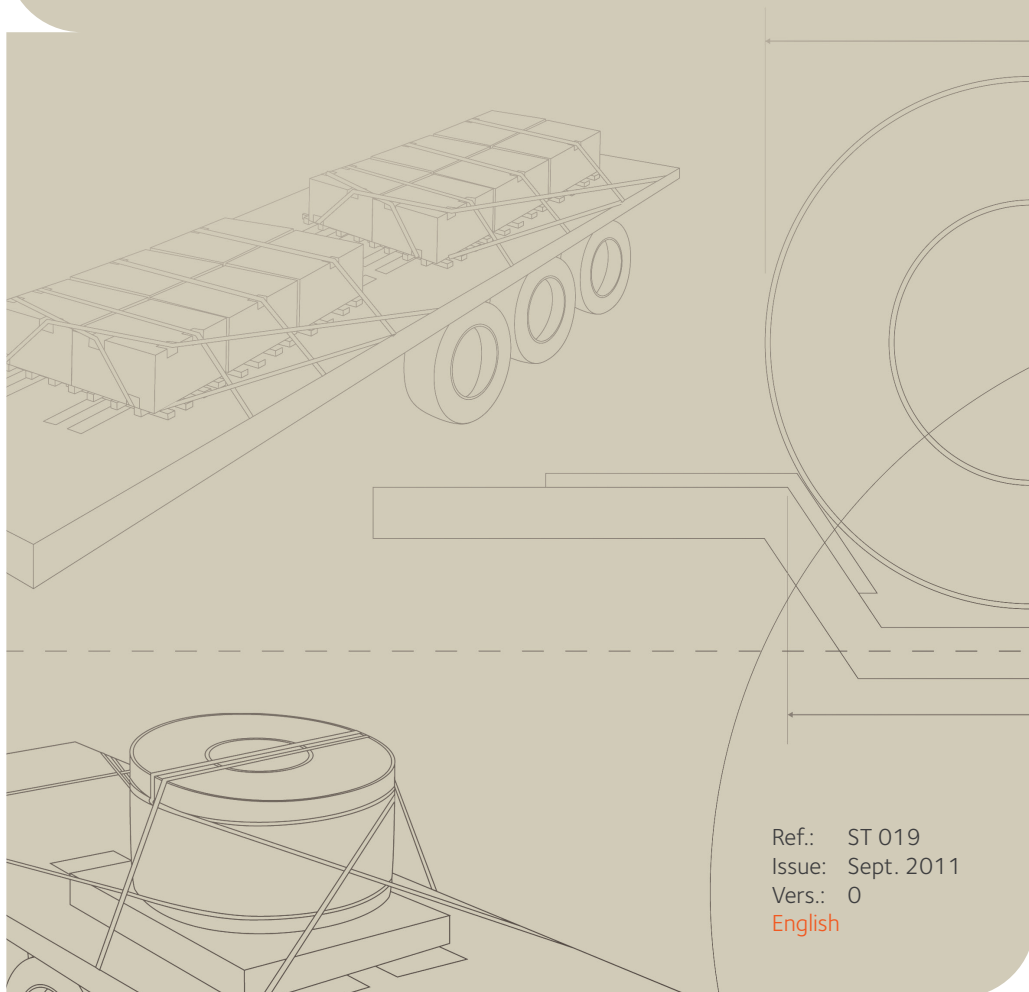




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# BOOKLET – minimum requirement for securing of steel flat products before shipment by road



Ref.: ST 019  
Issue: Sept. 2011  
Vers.: 0  
English



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Health & Safety	Standard		Ref.: ST 019 Issue: Sept. 2011 Vers.: 0
BOOKLET – minimum requirement for securing of steel flat products before shipment by road			
Controlled Circulation	Drawn up by:	Checked by:	Approved by:
Name :	Cargo securing project working teams	Cargo securing project steering committee	F. Haers

## Introduction

The UK English language version of this document shall be the official version.

This booklet is an appendix to the Health and Safety standard “**Minimum Safety Instructions for Cargo securing**” (ref. ST 018)

The local rules must be established in accordance with risk assessment and the European standard EN12195.

The only officially available version of this booklet is the one that can be found at the following web address:

[www.arcelormittal.com/fce/transportssafety](http://www.arcelormittal.com/fce/transportssafety)

This booklet has been created by internal and external experts and represents what ArcelorMittal believes to be the most suitable method for cargo securing. Nevertheless this does not exempt the driver, his/her supervisor or his/her company from alerting ArcelorMittal if he/she finds any possible irregularity in our requirements.

This document has been prepared by a working team:

Koen Gerres from ArcelorMittal Gent

Oliver Dzierko from ArcelorMittal Bremen

Patrick Camps from APERAM Genk

Walter Hitzgrath from Purchasing & Procurement department Esch sur Alzette

François Treillard from Flat Carbon Europe CTO department



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## Scope of application

Trucking companies, internal and external warehouses, transport departments within or outside ArcelorMittal.

This document is a standard in ArcelorMittal sites in Europe and a guideline in non-European sites of ArcelorMittal.

- This document applies to Flat products (coils, sheets).
- Slabs are not in the scope of this document.

# Vehicle requirements

Are in the scope of this booklet:



Truck



Tractor with semi-trailer



Lorry trailer

## 1.1. General provisions

Refer to the § 3.2 of the standard ST18 for details about the requirements for trucks



Fig. 1.1 and 1.2 – Photo of normal trailer lay-out equipped with grooves and support structure

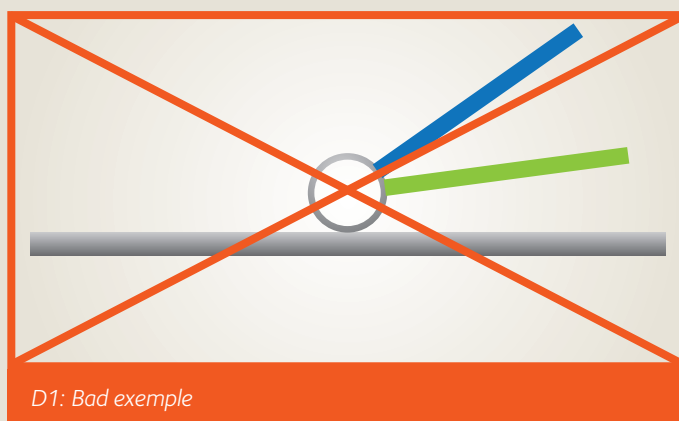


Fig. 1.3 and 1.4: Examples of a bad loading platform [waste, pallets, not clean, defects on the cover of the trailer,...]

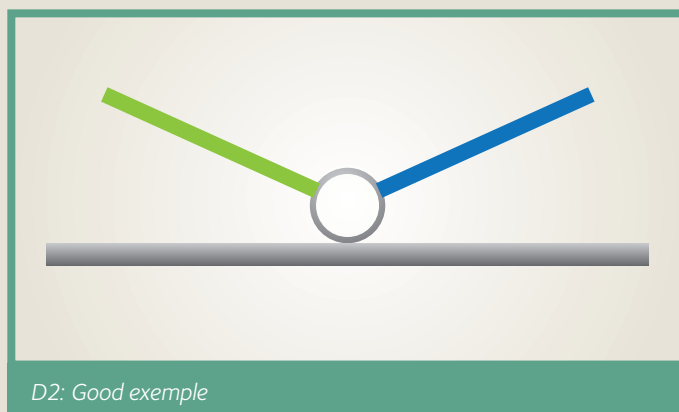
**Attachment points  
must resist a  
minimum 2t each**

Minimum number of  
attachment points:  
8 pairs (but if fewer  
attachment points  
suffice, truck will be  
loaded)

Maximum of 2  
straps can be on one  
attachment point.  
If 2, they cannot be in  
the same direction



*D1: Bad exemple*



*D2: Good exemple*



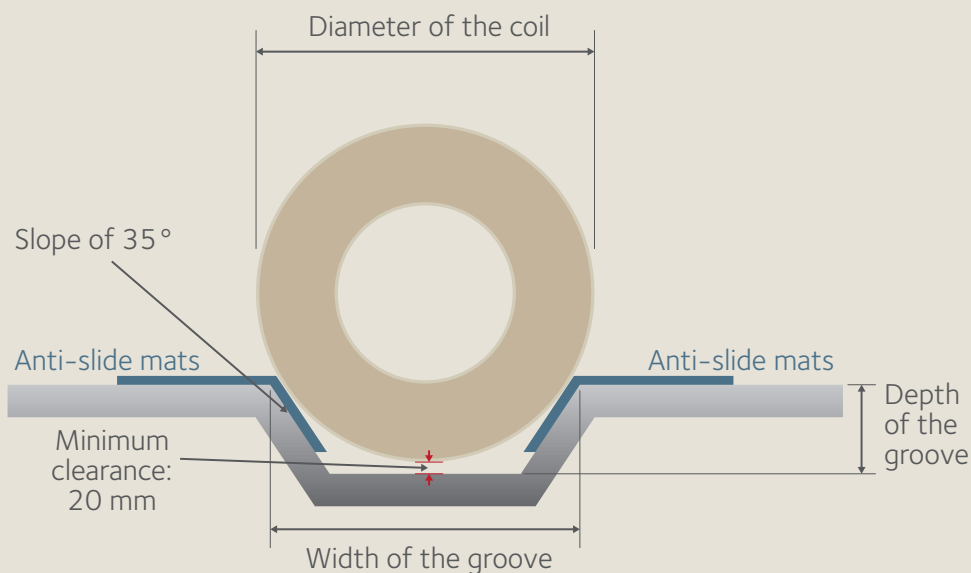


## 1.2 Trailer types for coil transport

### 1.2.1. Trailer with grooves

Groove coating must be rubber or wood

- The coils, if placed into groove, should have a minimum clearance of 20 mm from the bottom: this is for security and safety reasons.
- The sloping part should have a horizontal angle of 35 degrees
- The width of the groove should be at least 60 % of the diameter of the coil
- In general the use of stanchions is encouraged in all cases and is even mandatory in most sites: as a minimum, one pair must be used in front of the first coil and these stanchions must be embedded in the loading surface.



D3 – Coil groove layout of normal trailer or tipper

See also fig. 1.1 and 1.2 Normal trailer lay-out equipped with grooves and support structures.

## 1.2.2. Tipper



Fig. 1.5 and 1.6 Complete views of a tipper truck

If this device is accepted by the mill, here are the corresponding requirements.  
(in addition to instructions for normal trailer type)

See D3

The groove must be equipped with rubber for the whole width of the coil.

The coils should have a minimum clearance of 20 mm from the bottom: this is for safety reasons.

The use of support structure is mandatory.

If no traditional vertical stanchion is used, the horizontal support structure must be embedded in the side panels of the tipper



Fig. 1.7 Support structure in front of the coil with lashings;



Fig. 1.8 Support structure in front and back of the coil without lashings

**⚠ Take care!**

Two horizontal bars without extra lashings can only be used with licensed bars and licensed attachment points.



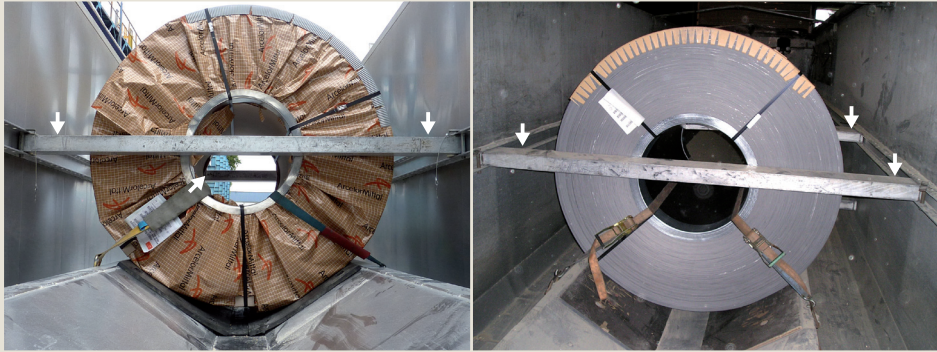


Fig. 1.9 – Best solution support structure in front and back of the coil **with lashings**

See §3.1 for details of securing operations.

## 1.3. Trailer types for skidded/palletised material

### 1.3.1. Flat trailer (full wooden floor)

- General provisions are valid (§1.1)

### 1.3.2. Trailer with grooves

- The grooves should be closed in such a way that the loading platform remains stable and flat.
- The cover of the groove should be flat and give the same support to the load as the rest of the loading platform (the cover must not sag).

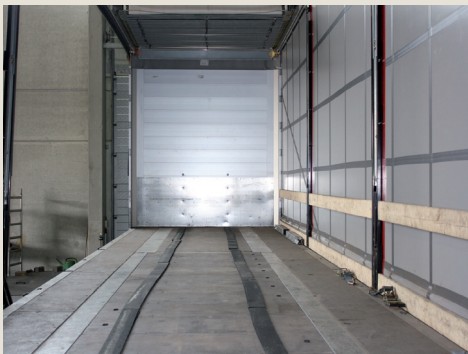


Fig. 1.10 – Example of trailer with groove covers in place.



## 1.4. Special loading facilities

### 1.4.1 Swap bodies



Fig. 1.11 – Swap body



Fig. 1.12 – Swap body loaded on a trailer



Fig. 1.13 – Case of swap body equipped for receiving the coils with axis transversal to the driving direction; securing is made with two belts and using four corner protections. On both sides, a pair of stanchions must be put.



Fig. 1.14 – Same belts as for current trailers

Swap body can also be designed for loading coils in longitudinal direction. In that case, the securing must be done according to normal coil trailer requirements.

### 1.4.2 Maritime containers

Securing in maritime containers is out of scope:

See prescriptions in guideline from ArcelorMittal Logistics in Antwerp

In the document “recommendations for stuffing/loading of containers” which is to be stored at following address (link only valid for ArcelorMittal people)

<https://www.mycarcelormittal.com/1intranet/home/BA/corporate/publications/Logistics/Pages/Publist.aspx>



## Securing devices

### 2.1. Corner protections

Synthetic or similar covered **side corner protections** must be available in the vehicle as their use is compulsory except in specific cases to be decided by mill (depending on the quality and/or on the packaging of the product) e.g.: if the packaging material already contains corner protections.

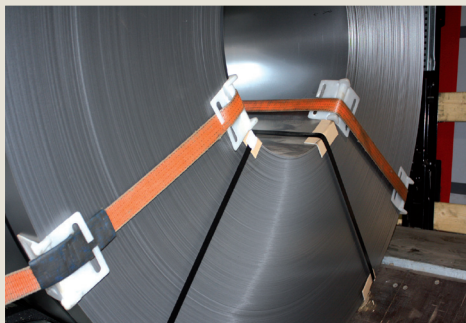


Fig. 2.01 - Corner protection necessary



Fig 2.02 - Corner protection not necessary

Haulier must define which type is appropriate - see some recommended types below



Fig. 2.03-1, 2.03-2, 2.03-3



Fig. 2.03-4, 2.03-5, 2.03-6

## 2.2. Stanchions

Stanchions must be in aluminium or steel and must belong to the original equipment provided by the certified trailer manufacturer.

They must be in good condition.



Fig 2.04 and Fig. 2.05 Stanchions

Compulsory minimum: 2 pairs, minimum of 3 pairs recommended.

Use as many pairs of stanchions as you have.

Minimum dimensions should be:

- width 70x70 mm
- height 1200 mm (maximum height must be defined by each plant, with regard to local crane constraints) we suggest a height between 1200 and 1500 mm





## 2.3. Groove covers

If use of stanchions is not possible, groove-cover can be used as distance - holder in the groove. Then the groove covers must belong to the original equipment provided by the certified trailer manufacturer.

They must be piled up level with the bottom of the eye of the coil and **secured**.



Fig. 2.06 Fig. 2.07 Fig. 2.08



Fig. 2.09-1, 2.09-2, 2.09-3, 2.09-4, 2.09-5, 2.09-6 Examples of recommended types of groove-covers if used as distance holders

## 2.4. Lashings

It is compulsory to use lashings with a **minimum** strength of:

- $LC^a \geq 2000 \text{ daN}$
- $STF^b \geq 300 \text{ daN}$
- If nylon straps are used they must comply with EN12195-2
- If chains are used they must comply with EN12195-3
- If cables are used they must comply with EN12195-4 (the use of cables is left to the decision of mills)

Straps / chains / cables must be in good condition **and** labelled (with a readable label)

Fig. 2.10



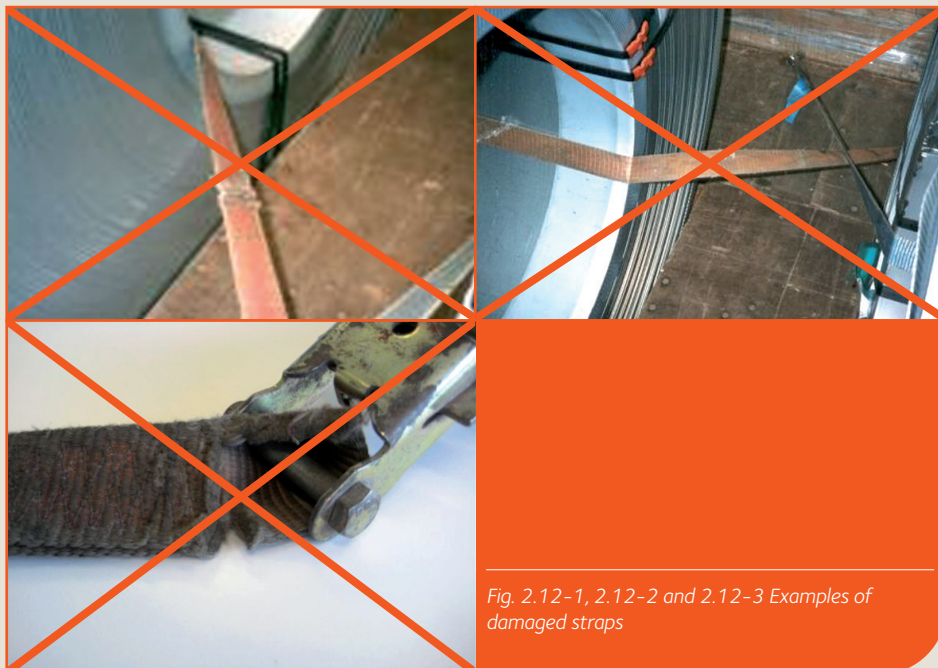
### Nylon straps



Fig. 2.11 Good Nylon straps

<sup>a</sup> LC : Lashing Capacity: maximum allowable direct force that a lashing may sustain in use (EN 12195-1)

<sup>b</sup> Standard Tension Force = residual force after physical release of the handle of the tensioning device (EN 12195-1). It is a characteristic of the tensioner (which is marked for a certain STF).



*Fig. 2.12-1, 2.12-2 and 2.12-3 Examples of damaged straps*

## Chains



*Fig. 2.13 Chain in good condition*



*Fig. 2.14 Chain hook in bad state  
Safety device does not operate properly*



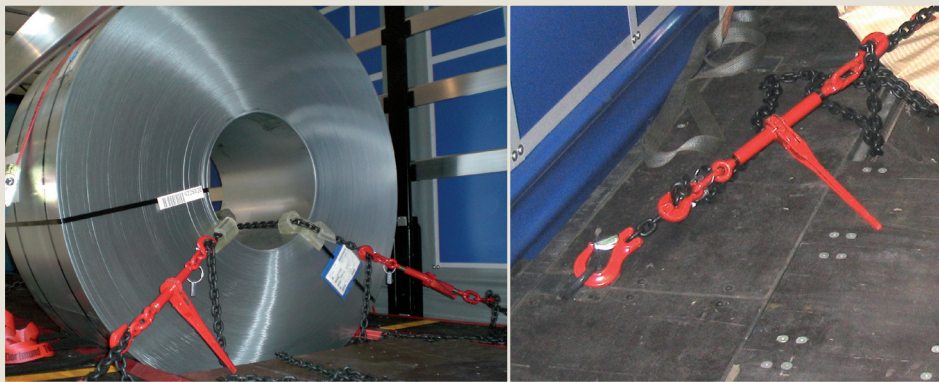


## Cables



*Fig. 2.15-1, 2.15-2 Cables in bad conditions*

## 2.5. Ratchets



*Fig. 2.16-1 and 2.16-2 Ratchet in good condition*



## 2.6. Anti-slide mats

The use of anti-slide mats is compulsory

They must be visible after the loading

The role of the anti-slide mats is to increase the coefficient of friction.

They must be in good condition.



Fig. 2.17 Example of a good anti-slide mat



Fig. 2.18 Example of a bad anti-slide mat (torn)

Required characteristics of anti-slide mats:

- slide coefficient  $\geq 0,6$
- they must withstand a pressure of  $125 \text{ t/m}^2$
- width  $\geq 100 \text{ mm}$
- thickness
  - Normal trailer:  $\geq 6 \text{ mm}$
  - tipper trucks: around  $20 \text{ mm}$  (see local requirements for those cases)



Fig. 2.19 Anti-slide mats in a "normal" groove trailer

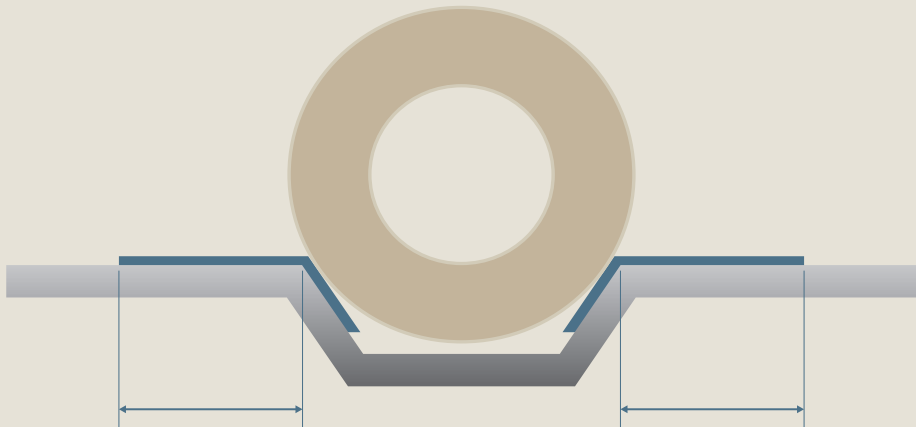


Fig. 2.20 Anti-slide mats for tipper



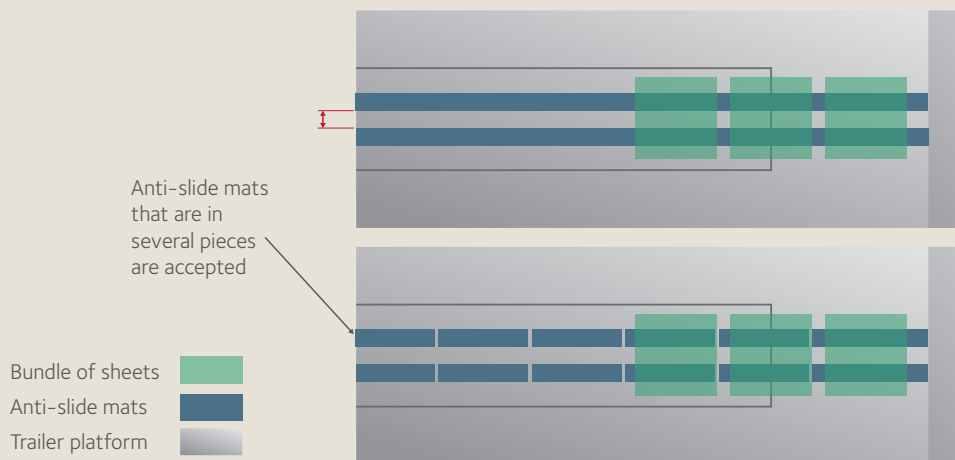


- Length:
  - coils: length > width of groove/slope



D4: Anti-slide mat in the groove with the dimensions

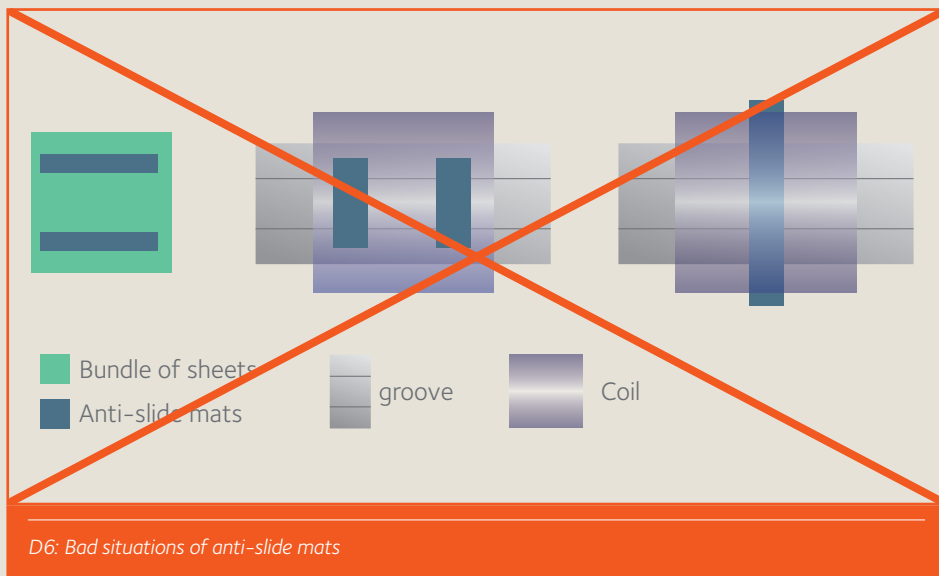
- sheets: anti-slide mats: 2 x length of loading floor
- pallets: 2 x length groove



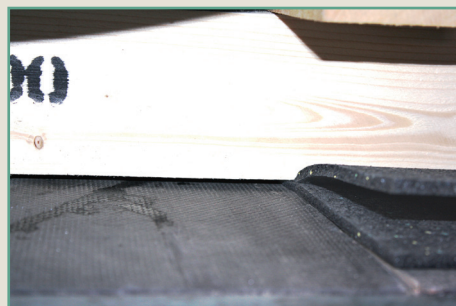
D5: Anti-slide mats used with pallets/skids



For the anti-slide mats to be efficient, it is compulsory to avoid contact between the cargo (coil, pallet, skid, lattice box, cases ...) and the loading floor.

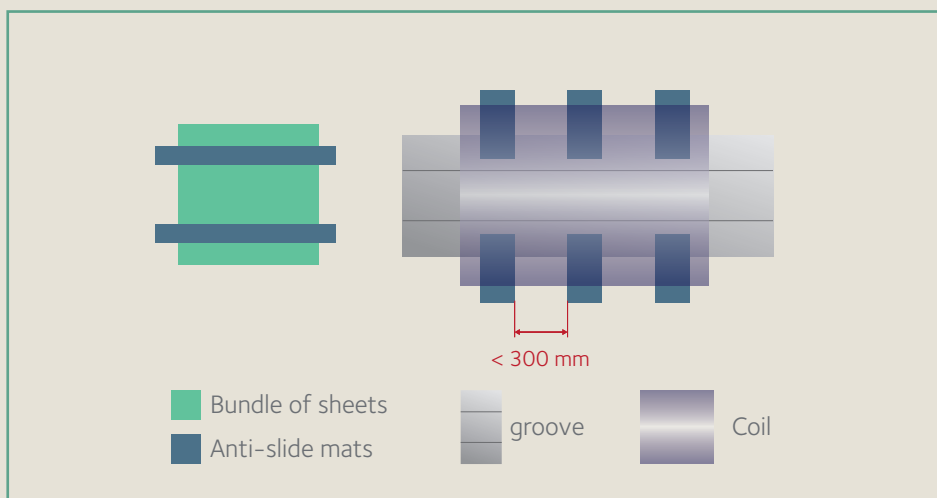


*Fig. 2.21 (Bad)*  
The cargo is in contact with the trailer surface  
(here groove cover)



*Fig. 2.22 (Good)*  
The cargo is not in contact with the trailer surface

We recommend that a mat be placed every 300 mm maximum



D7: Good situations of anti slide mats



Fig. 2.23

Note the anti-slide mats, which are visible after the loading.



## 2.7. Ladders (if provided by the truck company)

They must be in good condition.



Fig. 2.24-1, 2.24-2, 2.24-3 -Good ladder examples

## 2.8. Roof pole

- Roof pole must be in good condition
- Always open roof with appropriate equipment



## Securing rules for steel products

### 3.0. General remark

The following drawings illustrate the principles of securing, but truck drivers and mills must refer to calculation formulas that give the number of lashings, taking into account the weight of products, friction coefficient of the anti-slide mats, LC, STF of the lashings, ...

Please refer to bibliography

#### Key for drawings in the following pages



Stanchion



Lashings



Anti-slide mat



Corner protections



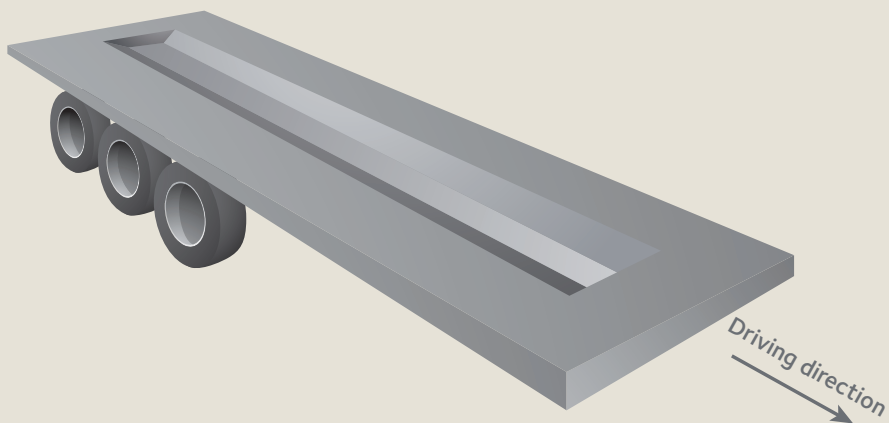
## 3.1. Non-skidded coils

### 3.1.1 Coil with width/height ratio $\geq 0.66$

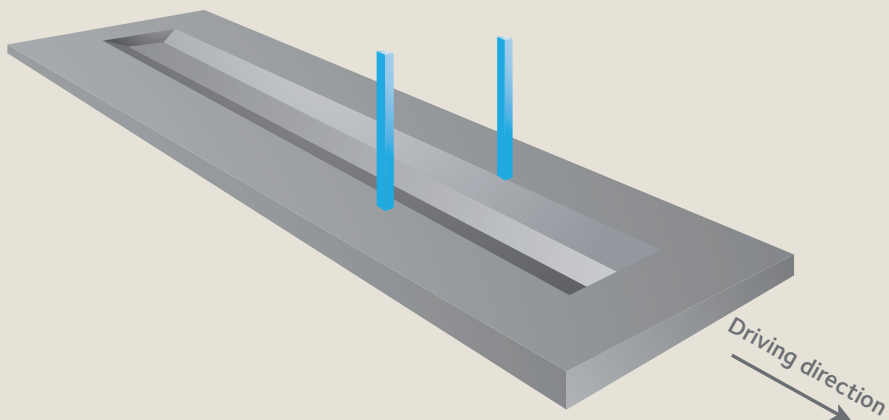
On a groove trailer

*CS01 Securing of a coil with ratio  $\geq 0.66$  on a groove trailer*

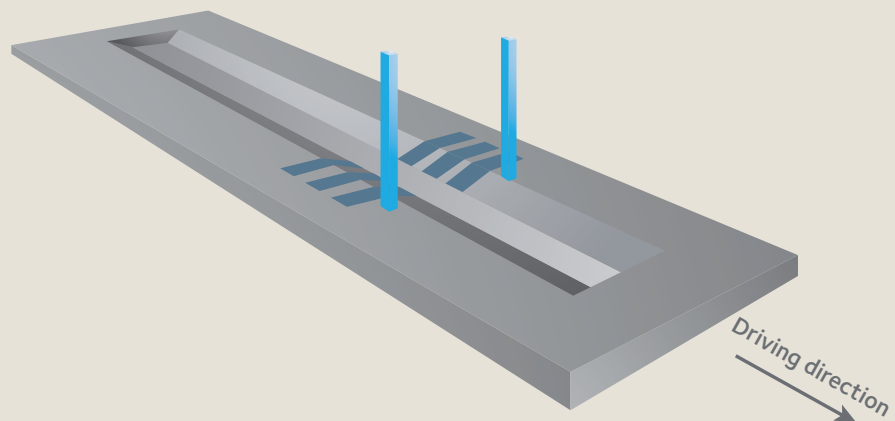
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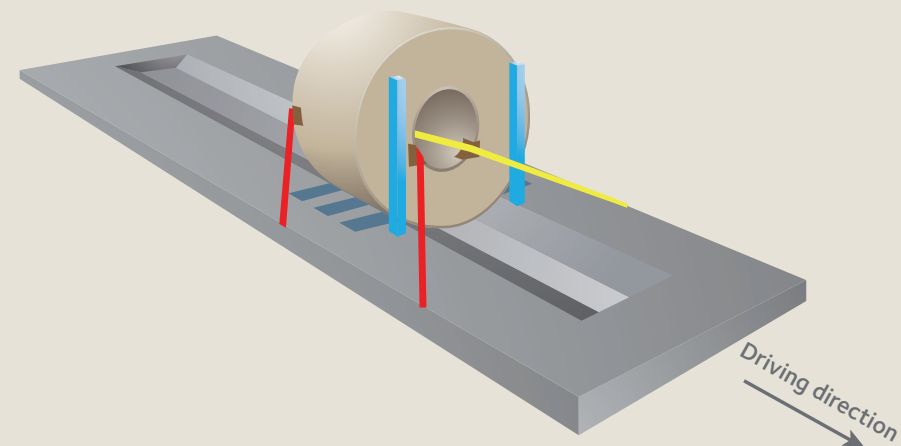
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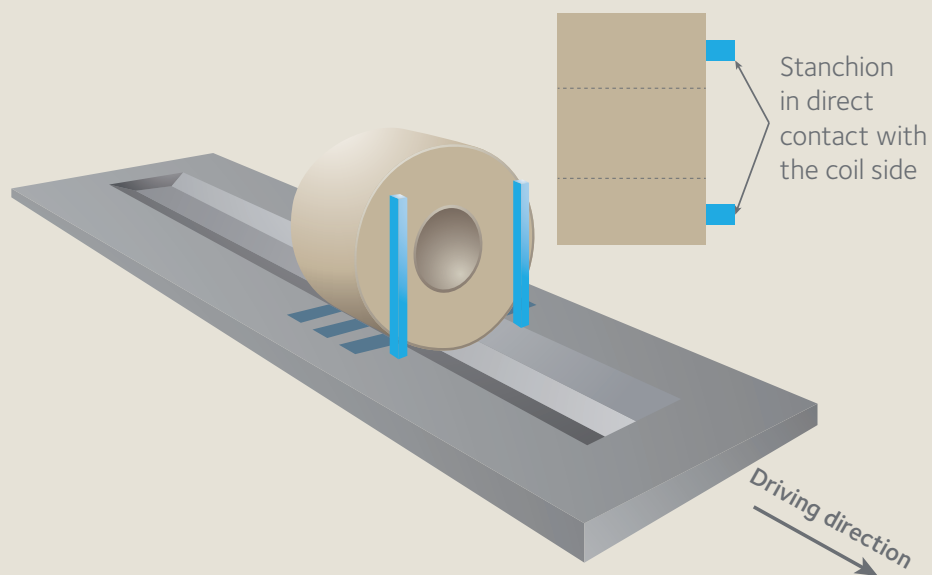
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This solution can be duplicated for loading more coils on the trailer (see next pages)

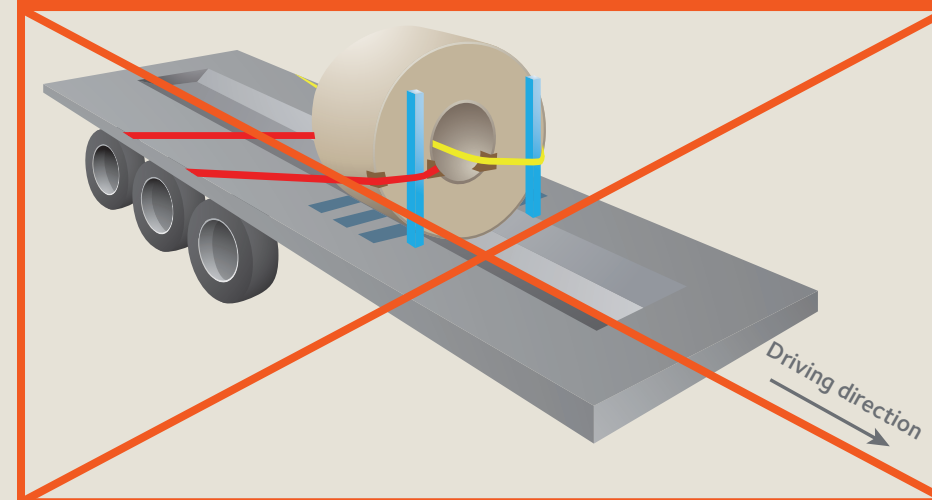
4

Upside view:



Make sure that the lashings are oriented towards the front!

CS01 Bad

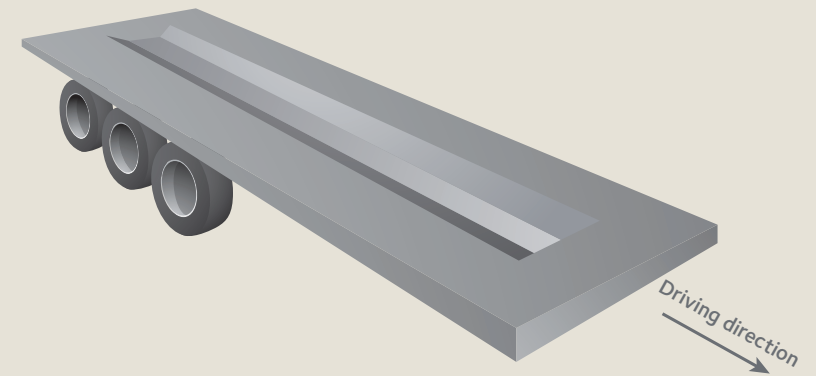




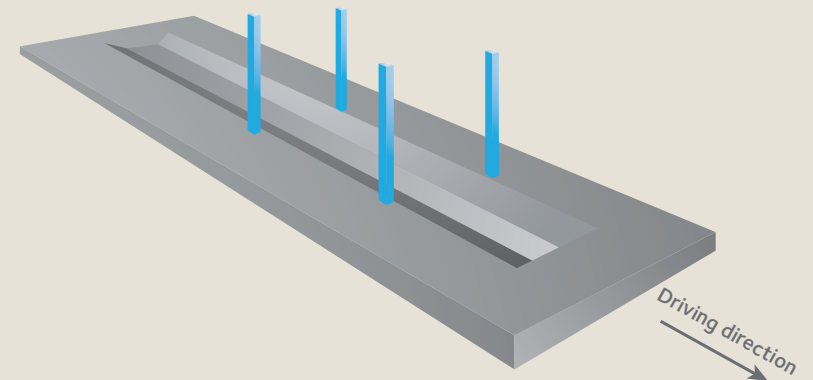
### A further example

CS02 Several coils on groove

1



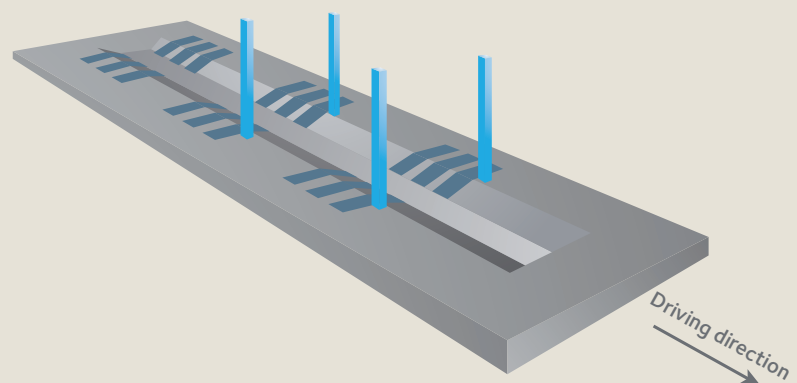
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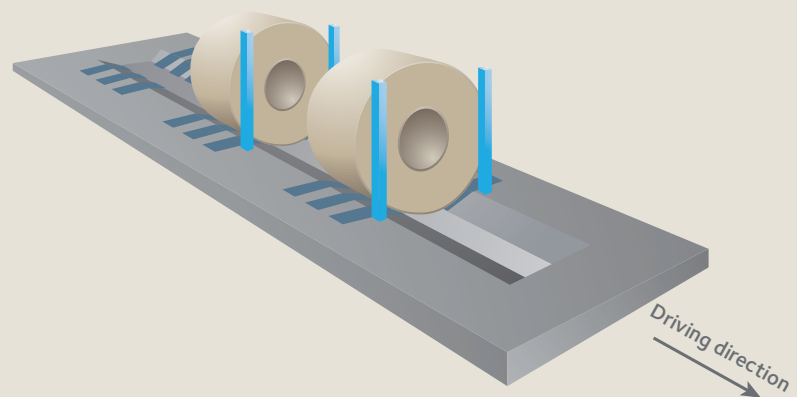




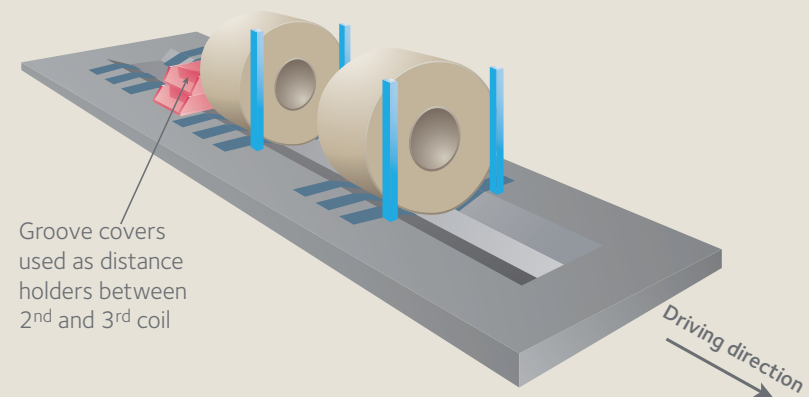
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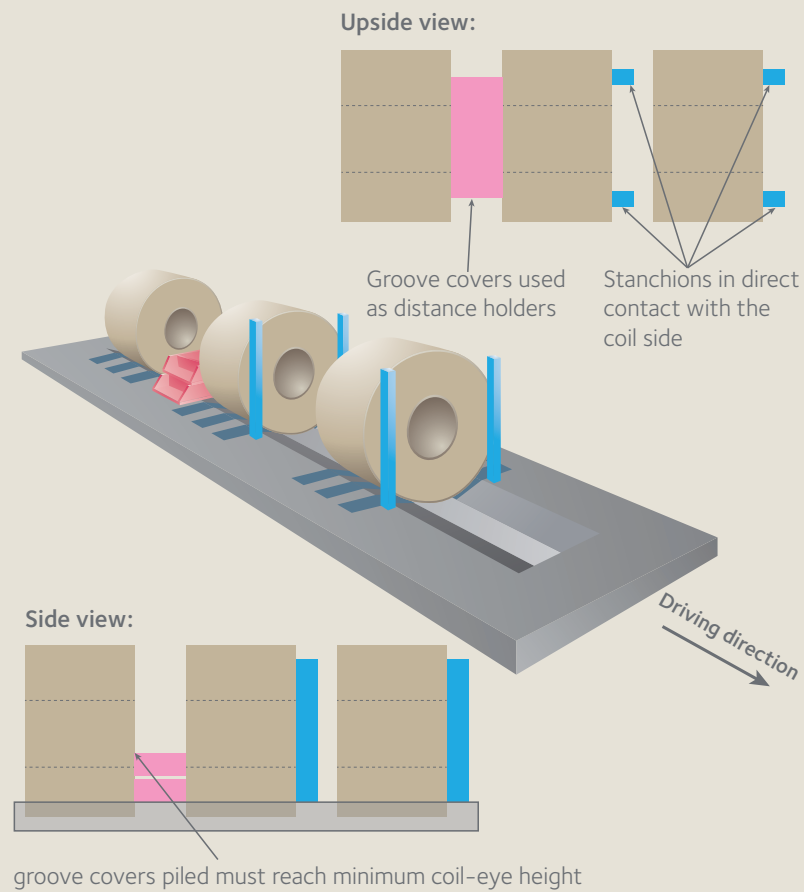


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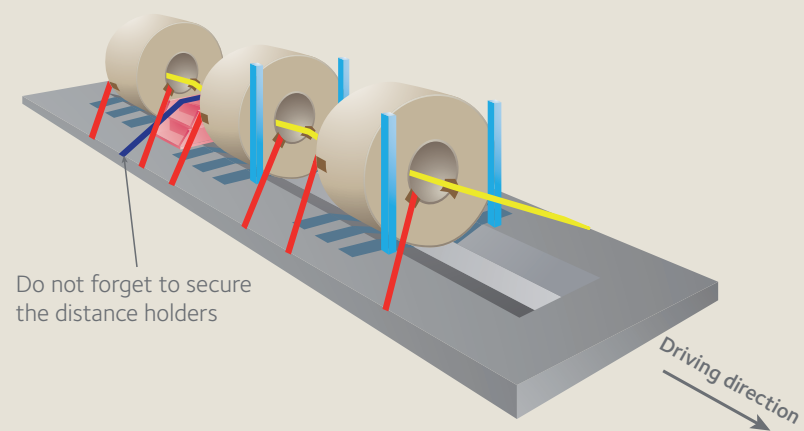


Groove covers used as distance holders between 2<sup>nd</sup> and 3<sup>rd</sup> coil

6



7

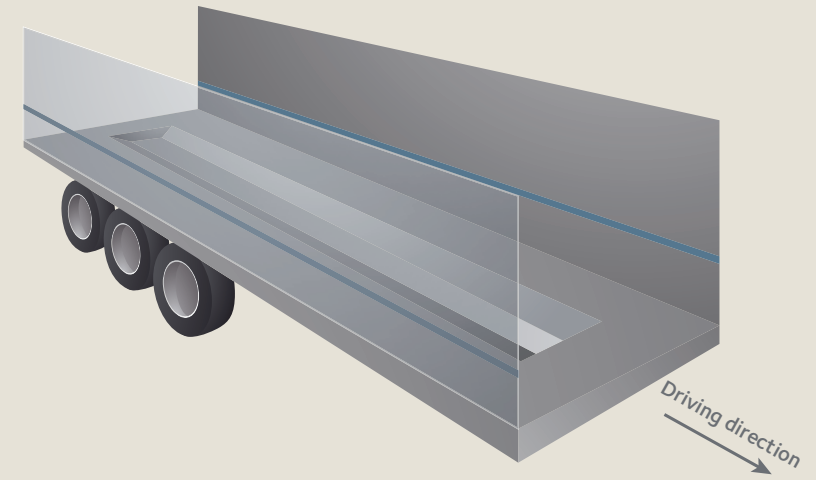




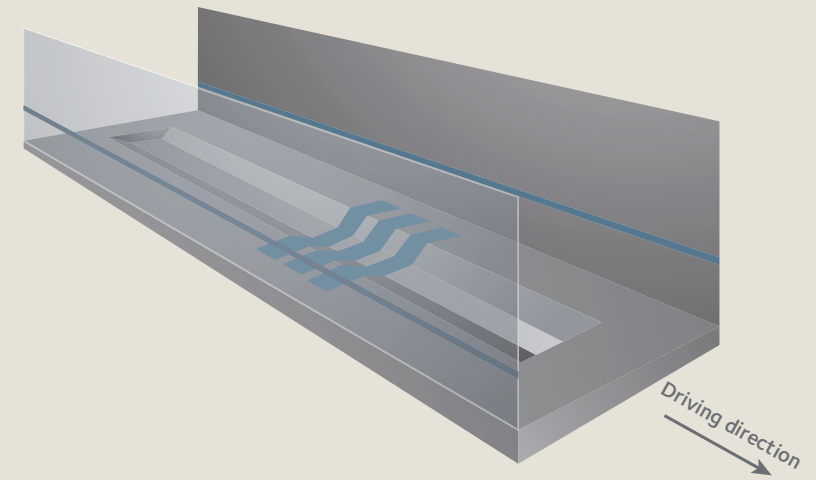
## On a tipper truck

CS03 Coils on tipper

1

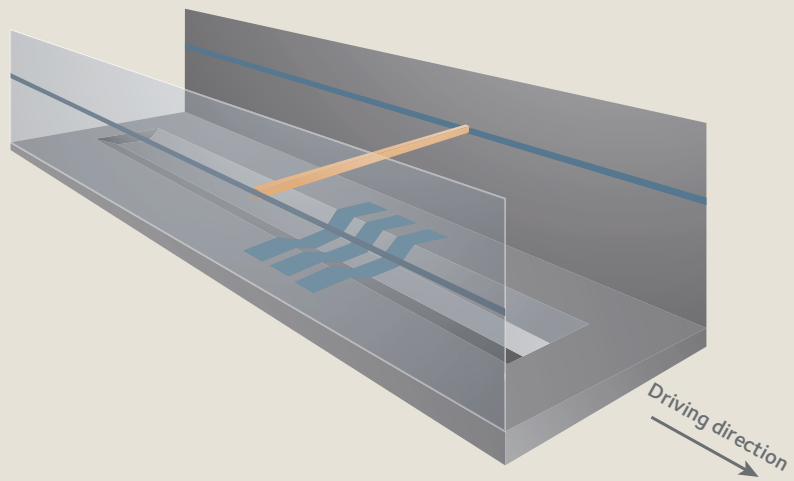


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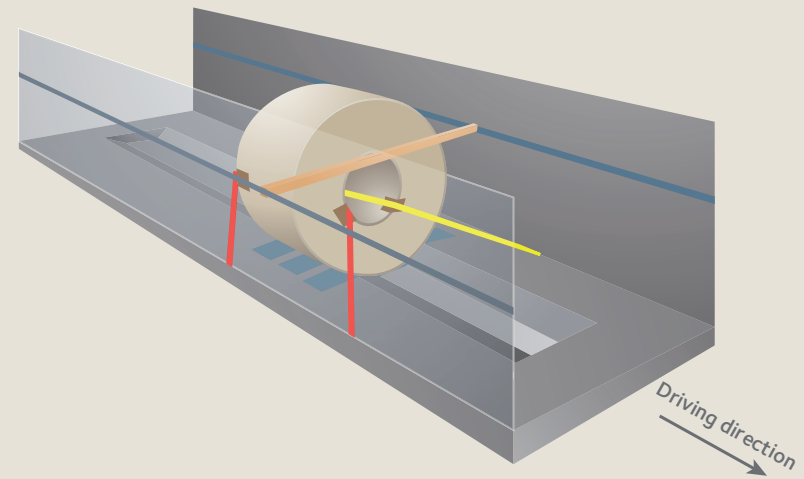




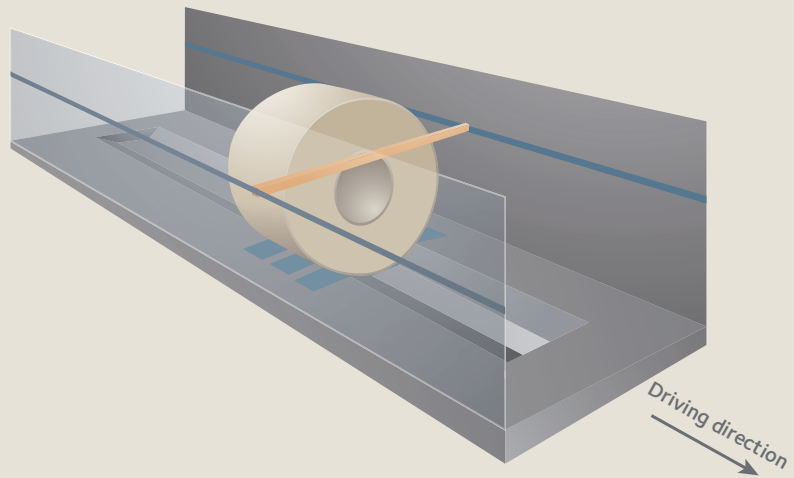
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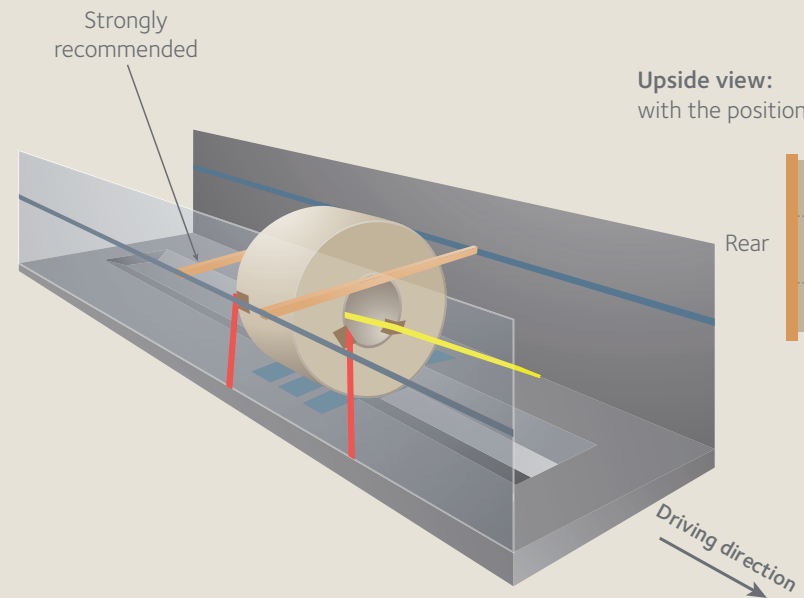
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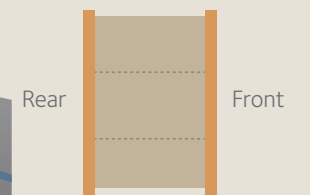
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6



Upside view:  
with the position of the stanchions

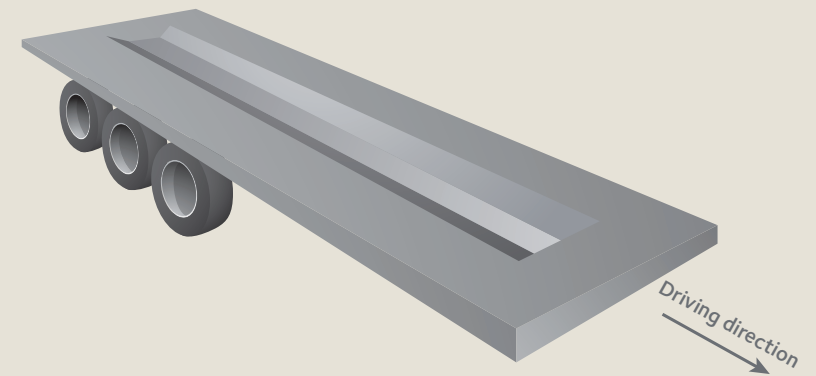




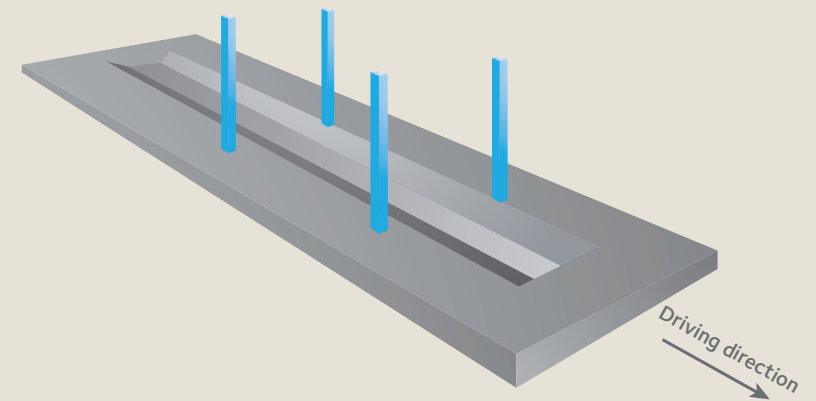
### 3.1.2 Coils with width/height ratio $< 0.66$ on a groove trailer danger of tipping over

CS04 Coils with ratio  $< 0.66$  on a groove trailer

1

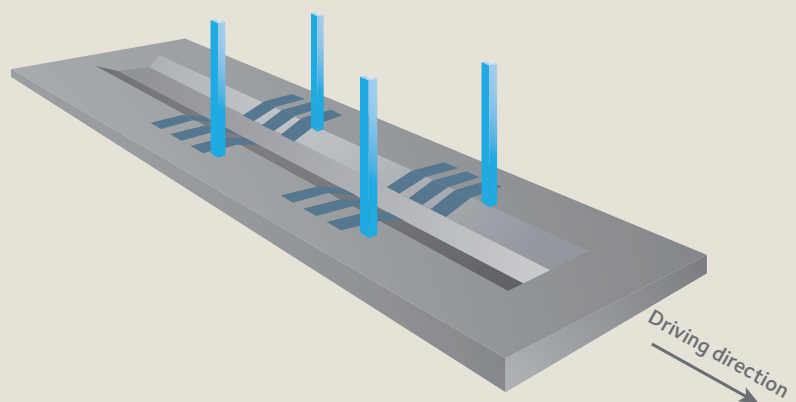


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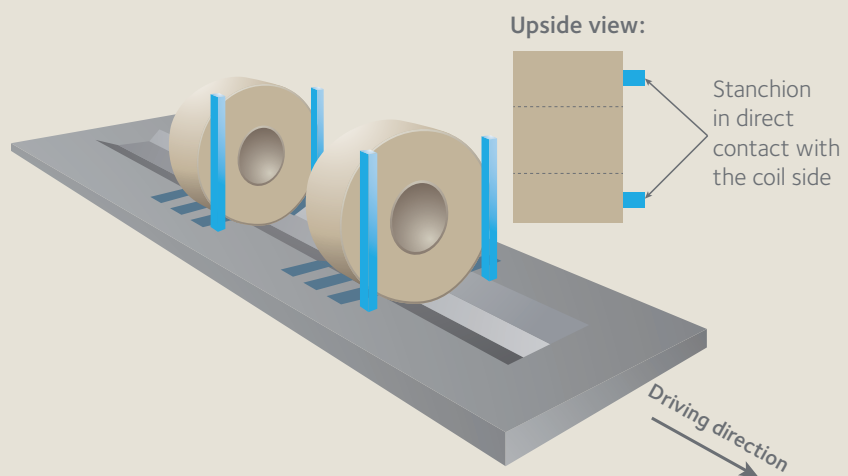




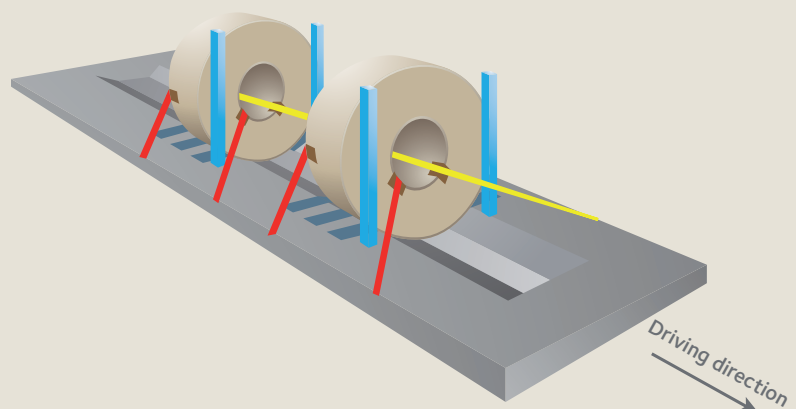
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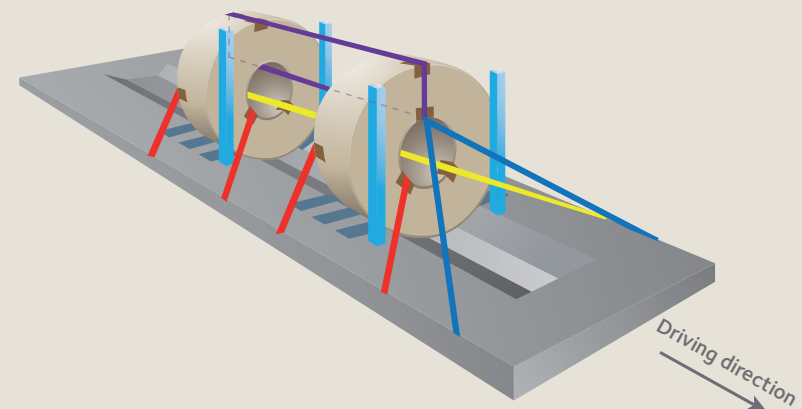
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Examples: Fig. 3.1 and 3.2 from Bremen loading instruction.



Good alternative: See also another possibility contained in the bibliography

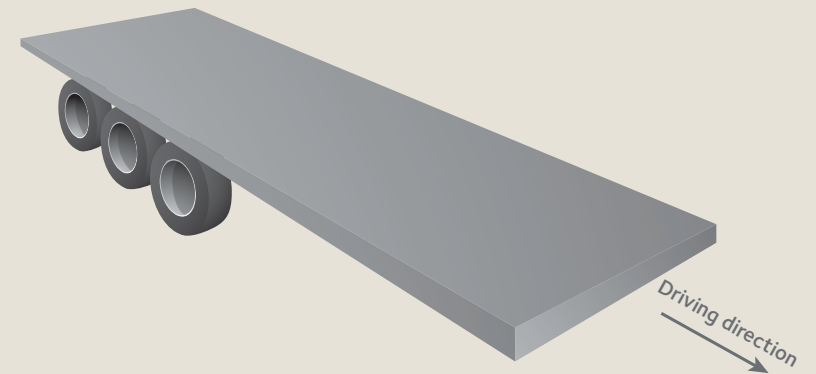


## 3.2. Coils on skids or on pallets

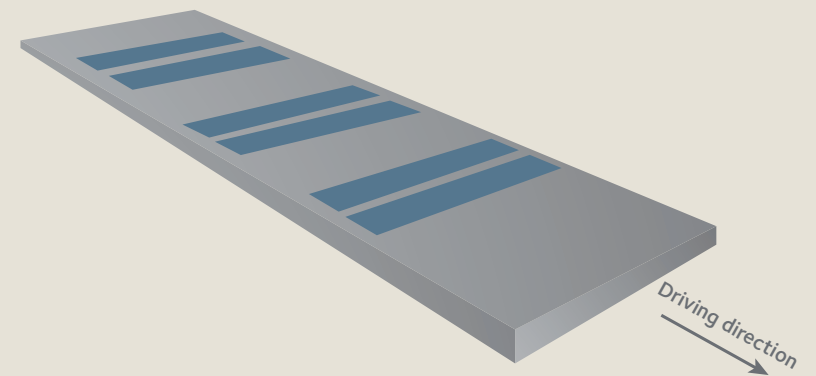
### 3.2.1. Coils with horizontal axis

CS05 Coils - Horizontal axis  
eye to the side

1

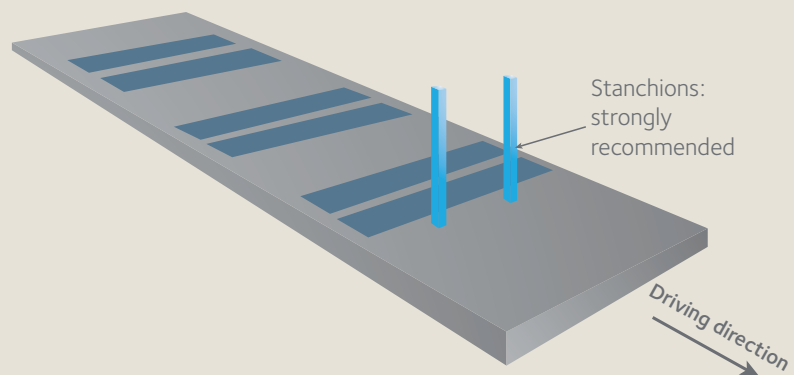


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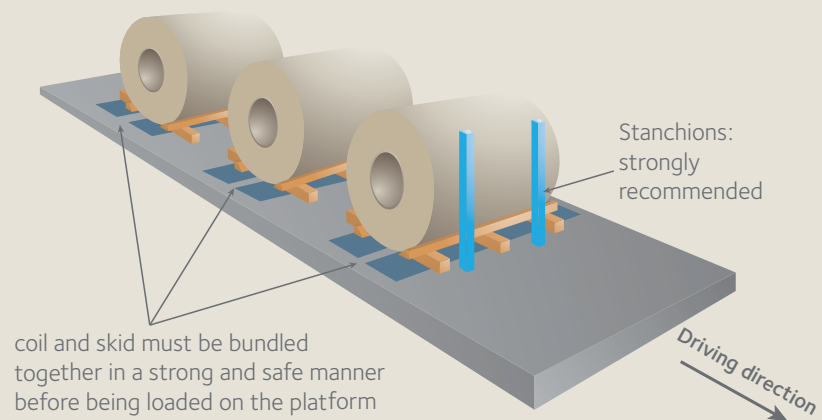




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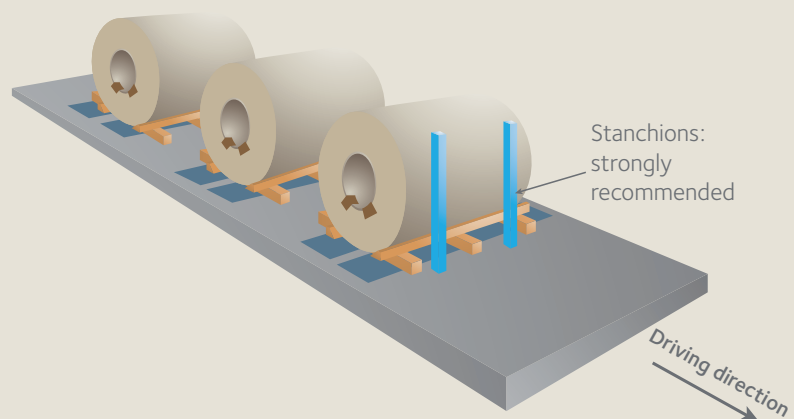
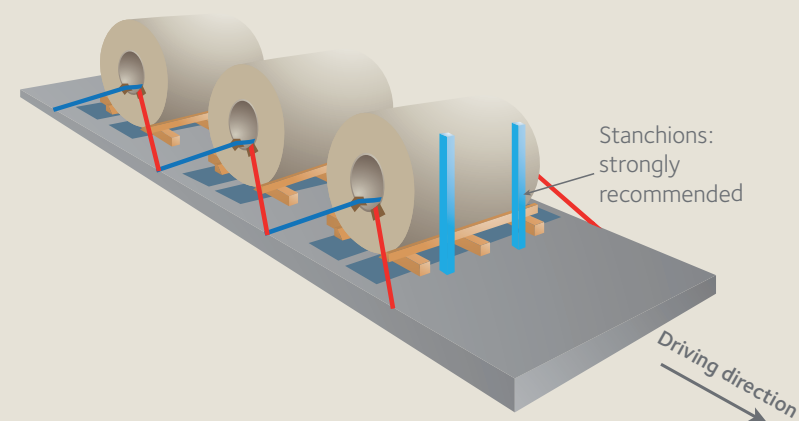


Fig. 3.3

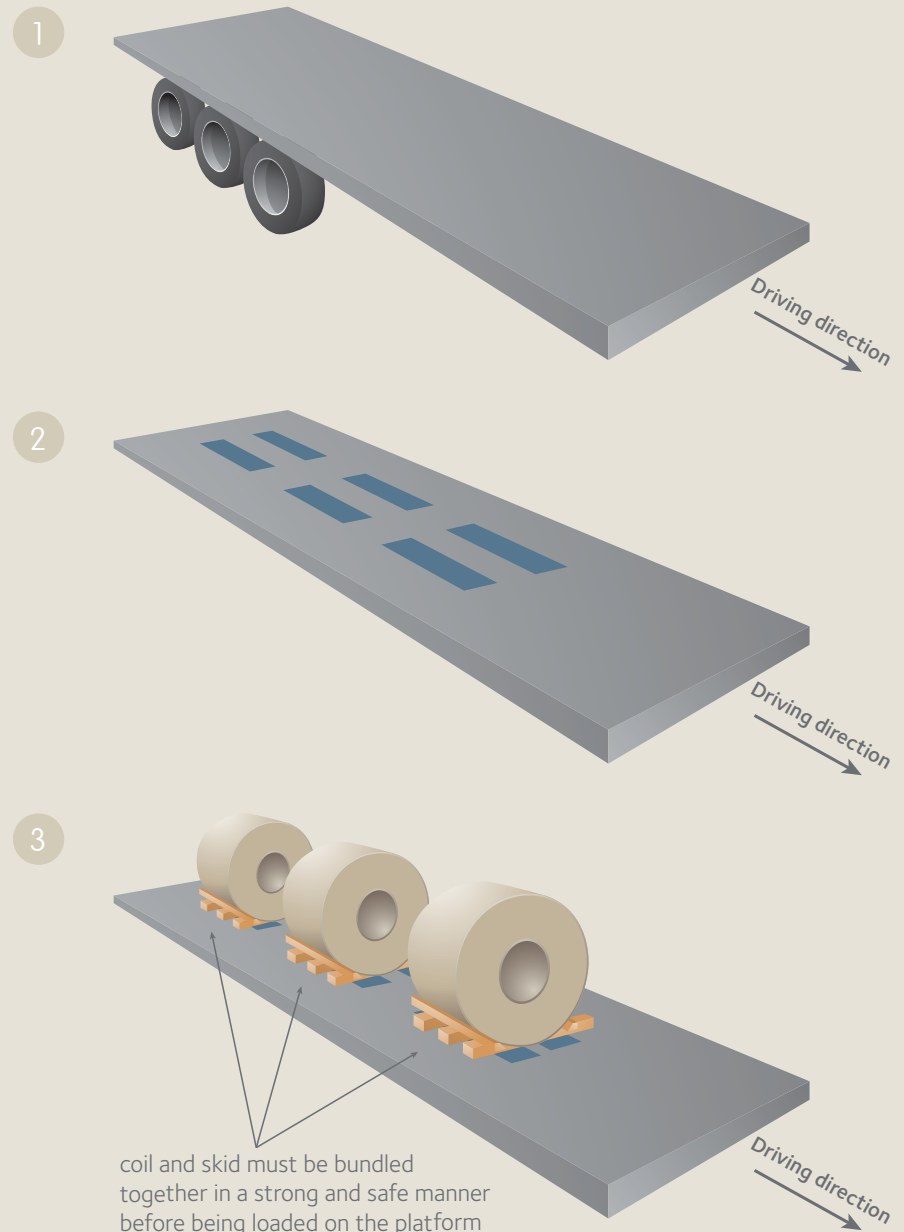
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*CS06 Coils - Horizontal axis*  
**eye to the Front**

This situation makes it possible to discharge from the side with a forklift.



coil and skid must be bundled together in a strong and safe manner before being loaded on the platform





4

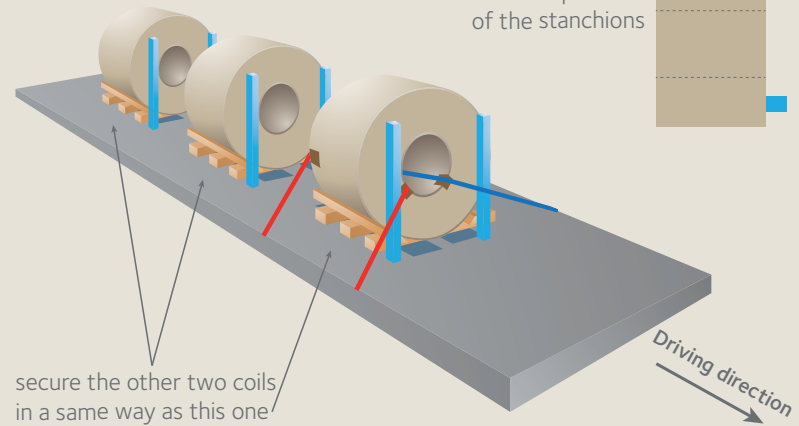
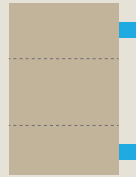
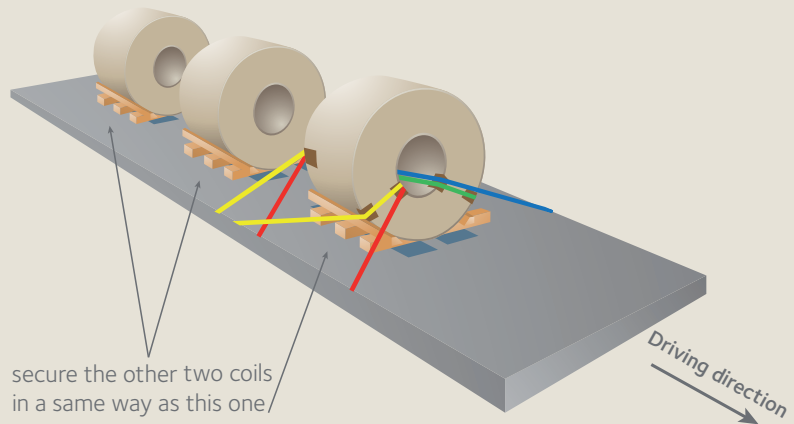
**Option 1: using stanchions  
(strongly recommended)**Upside view:  
with the position  
of the stanchions

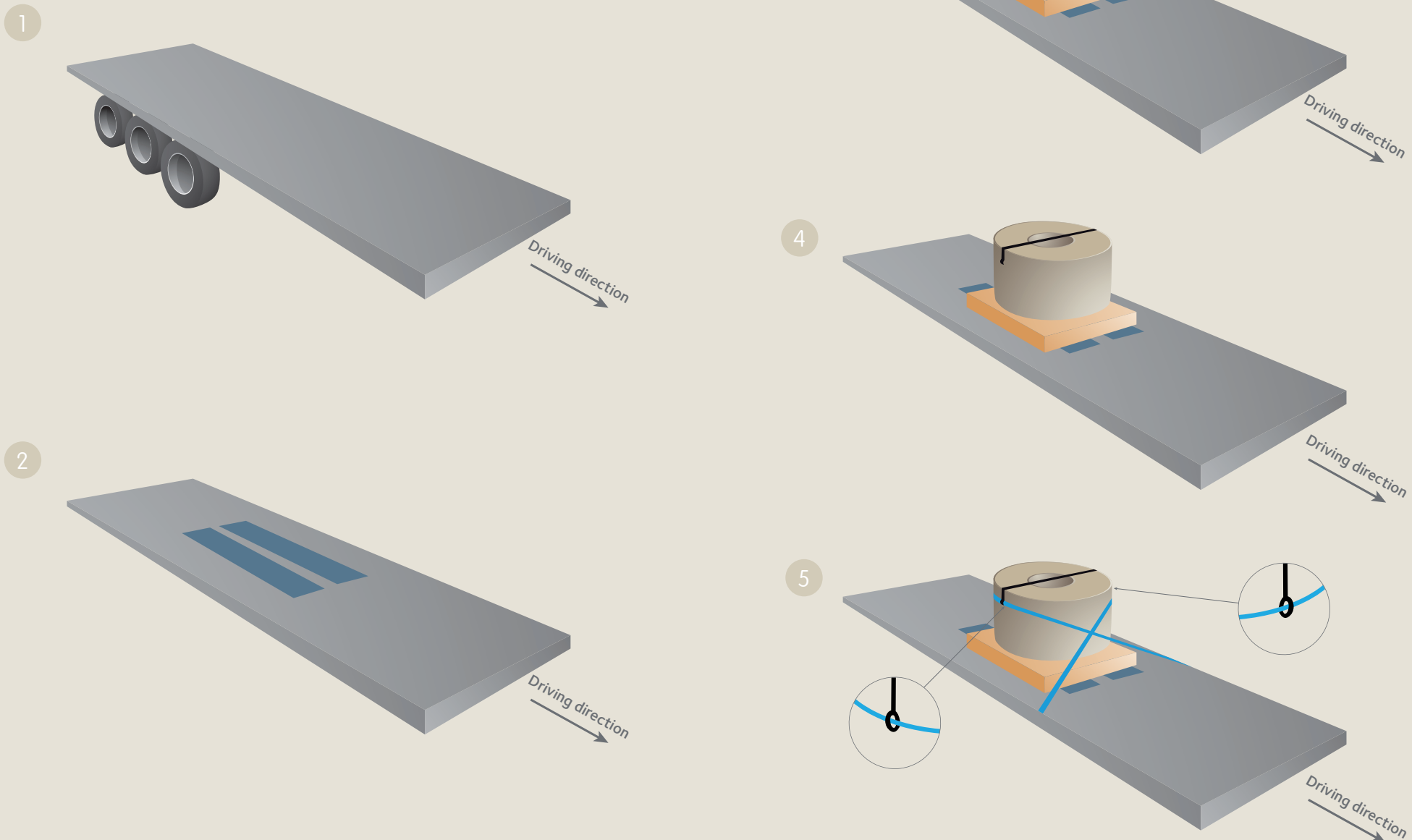
Fig. 3.5

**Option 2: without stanchions**



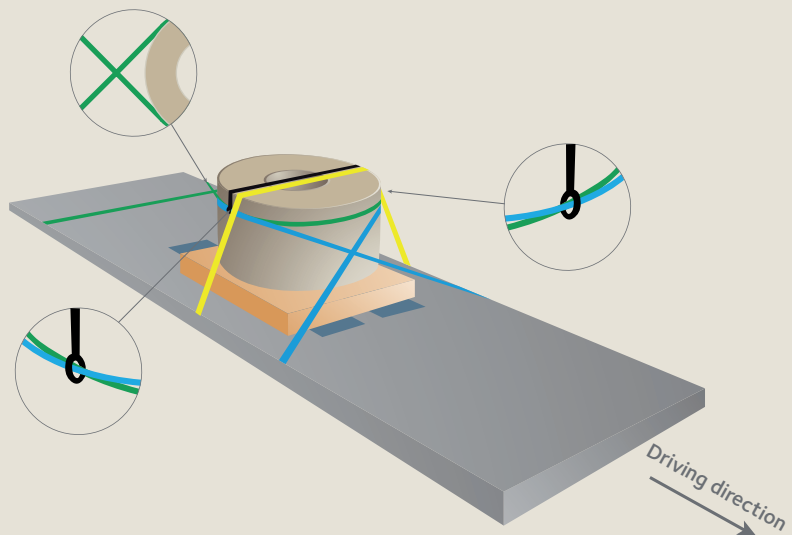
### 3.2.2. Coils with vertical axis

CS07 Coils - Vertical axis

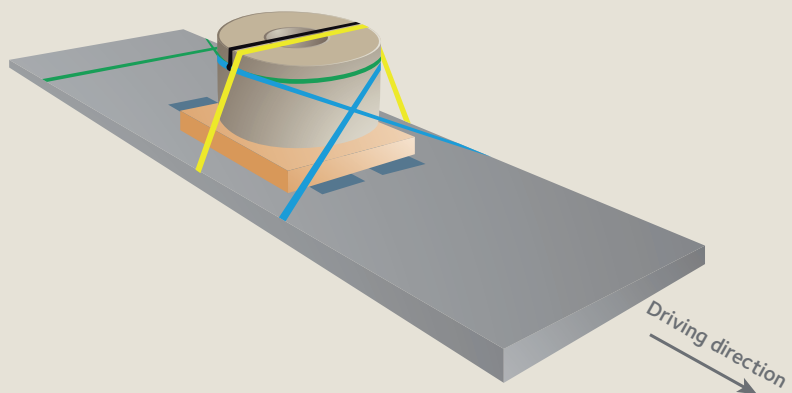




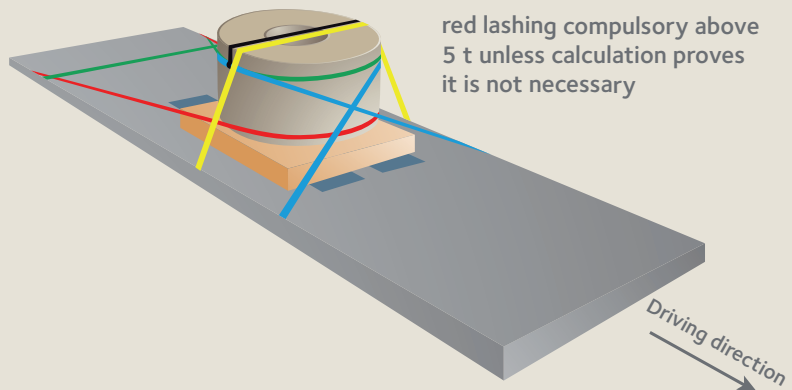
6



7



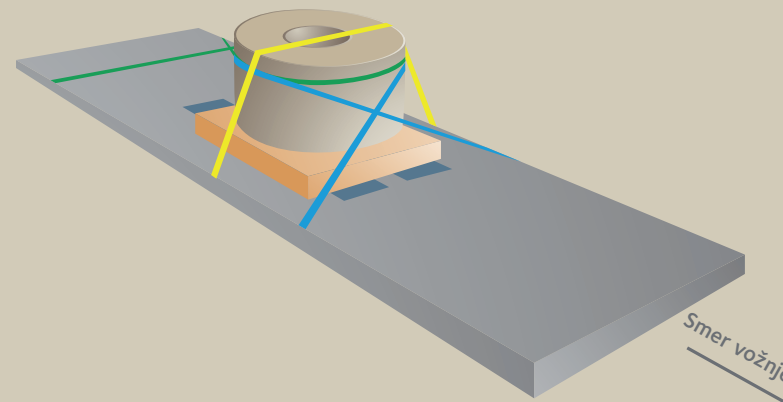
8



red lashing compulsory above  
5 t unless calculation proves  
it is not necessary

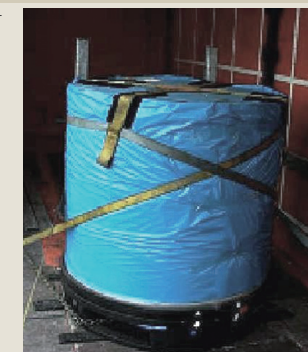
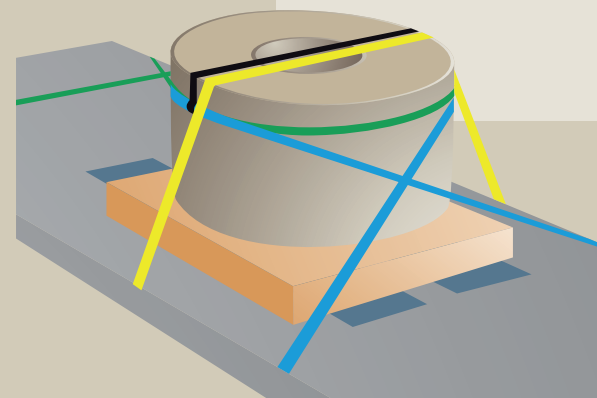
**Remark**

The principle for securing such coils must be as below:

**D8**

**...but with a device for preventing blue and green lashings from falling down.** One possibility for achieving this is to add a special lashing with two loops as illustrated by the black lashing shown below:

See on Fig. 3.6  
From "European Best Practice  
Guidelines  
on Cargo Securing for Road Trans-  
port" (p 175)

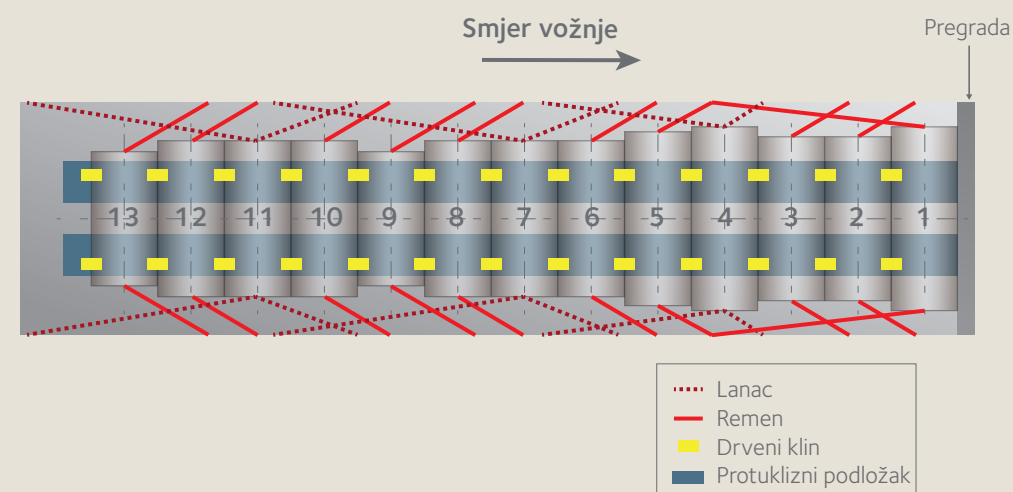
**D9**



### 3.3. Rest coils (less than 3 tons) that will be loaded transversally to the driving direction

N.B: "Rest coil" can be different one from the others on a same trailer  
Solutions presented below are some of the possibilities but others can be required by local procedures of the mills.

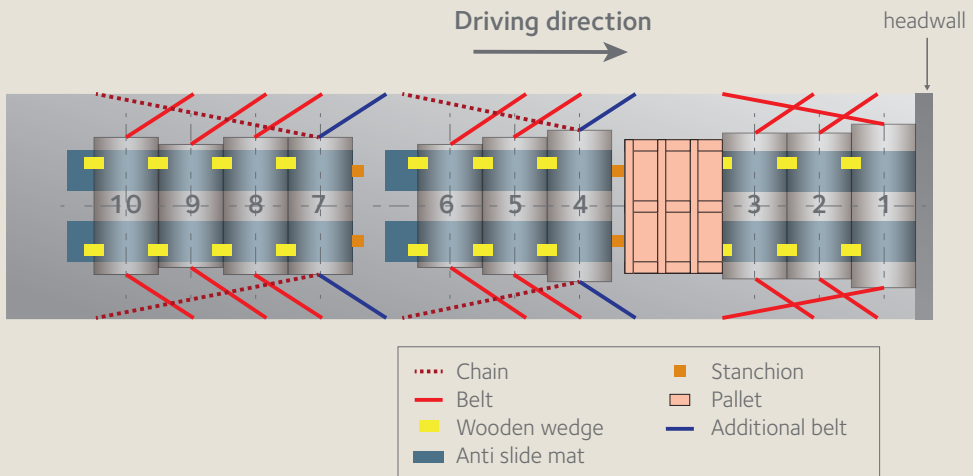
- To avoid slipping, rest coils should be loaded close against the stanchion or against the headwall.
- The rest coils should be loaded on Anti-slide Mats over the whole required length of the trailer.
- Each rest coil (see below) should be secured against rolling with 2 wedges (not nailed).



D10 Rest coils upside view

Additional recommendation is to put heavier coils close to the support device (headwall or stanchions).

Note that the chains cannot be replaced by lashings because otherwise the lashings would stretch (the problem is that we do not know the real weight of the coil)



*D11 Rest coils upside view – another possibility*

We will not consider other possibilities for securing rest coils (as the possibilities are very numerous).

Dedicated securing methods and trailers can also be used after approval by the mill.



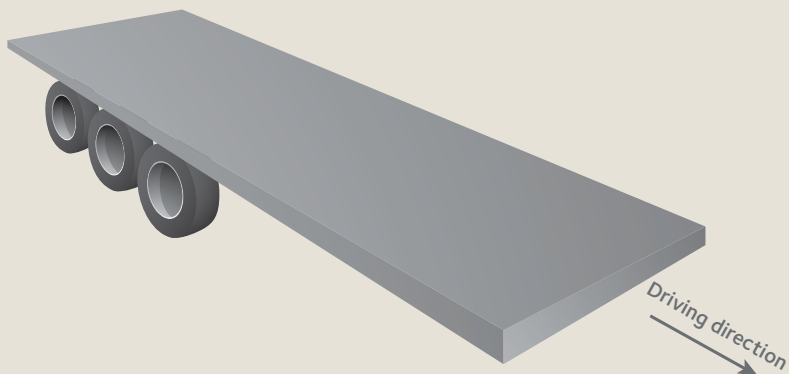
## 3.4 Bundled sheets on pallets

Here “bundle” means the grouping of several sheets or packages being put together as one handling unit by several metallic straps.

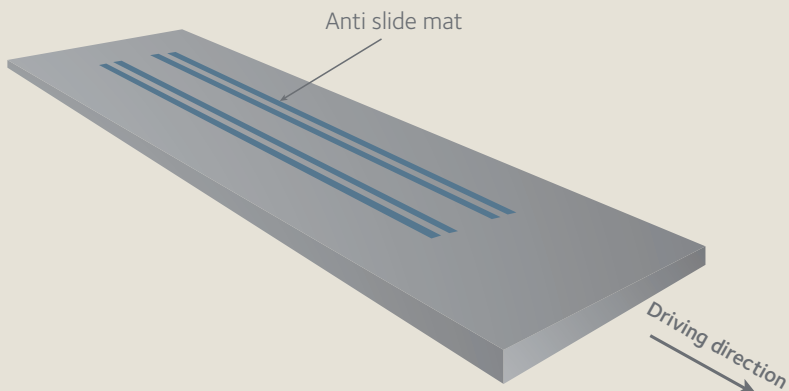
### 3.4.1 One row of bundled sheets on pallets

*CS08 One row of bundled sheets on pallets*

1

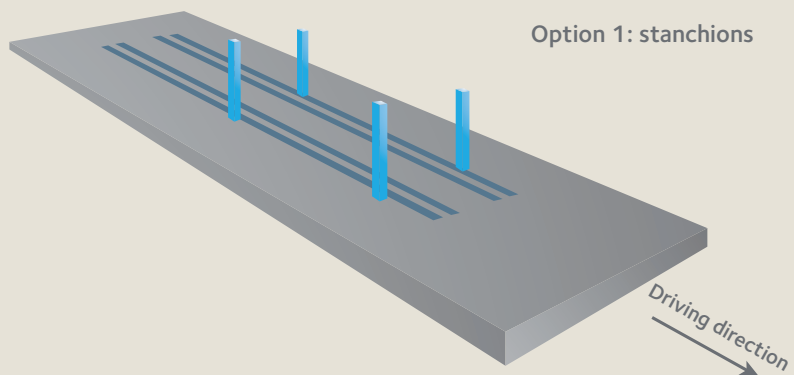


2



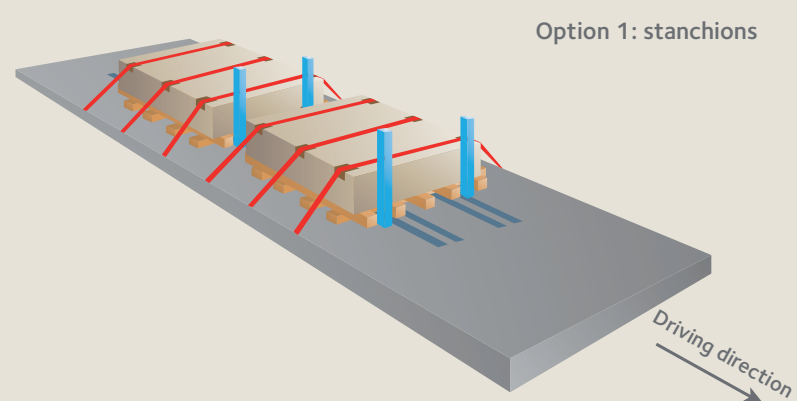


3



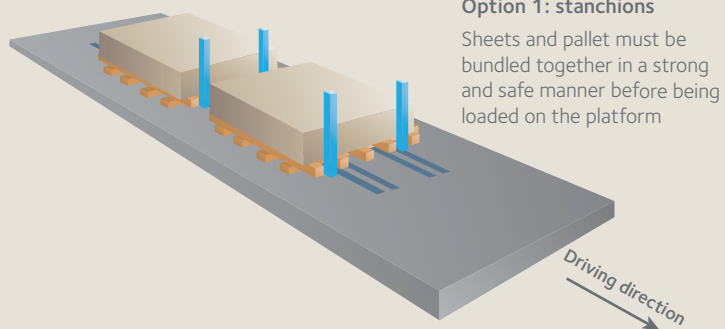
Option 1: stanchions

6



Option 1: stanchions

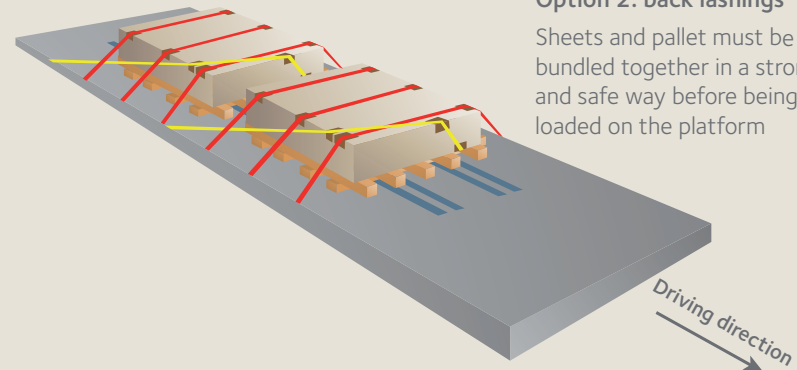
4



Option 1: stanchions

Sheets and pallet must be bundled together in a strong and safe manner before being loaded on the platform

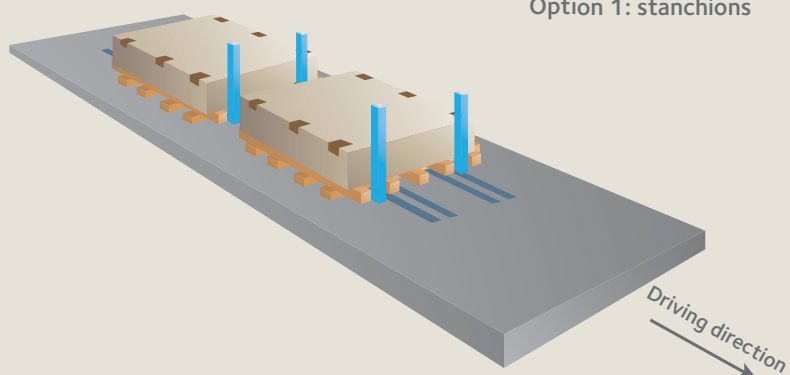
7



Option 2: back lashings

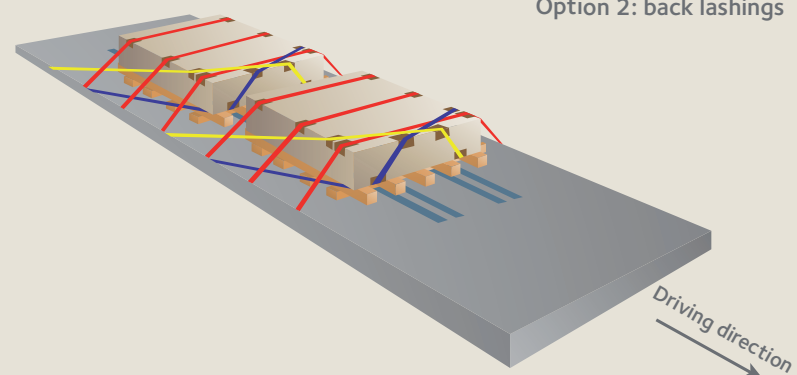
Sheets and pallet must be bundled together in a strong and safe way before being loaded on the platform

5



Option 1: stanchions

8



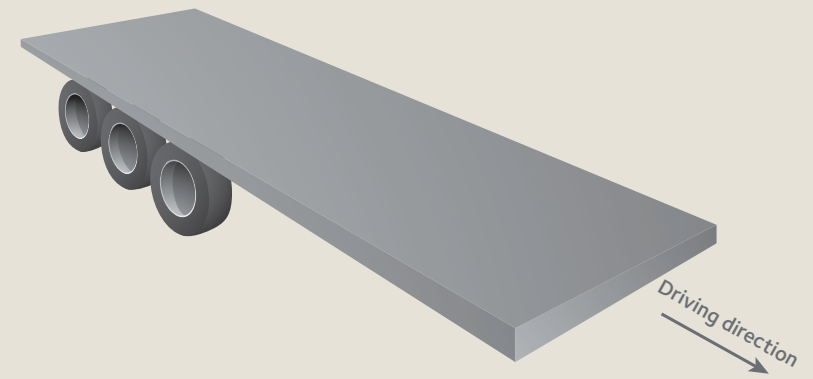
Option 2: back lashings



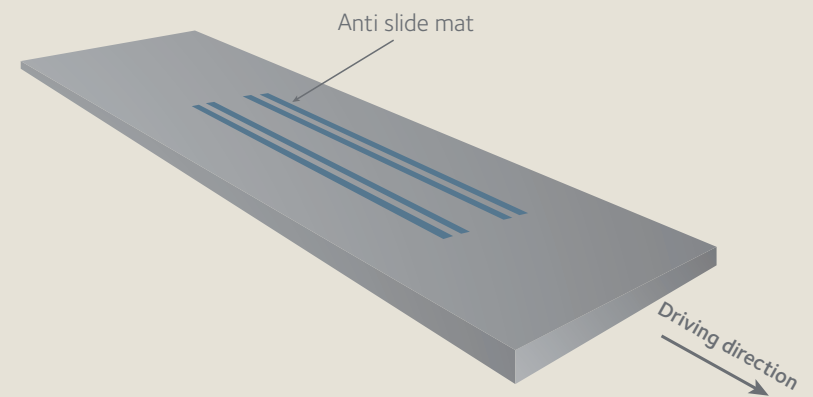
### 3.4.2 Bundled sheets on pallets piled up

CS09 Bundled sheets on pallets piled up

1



2





3

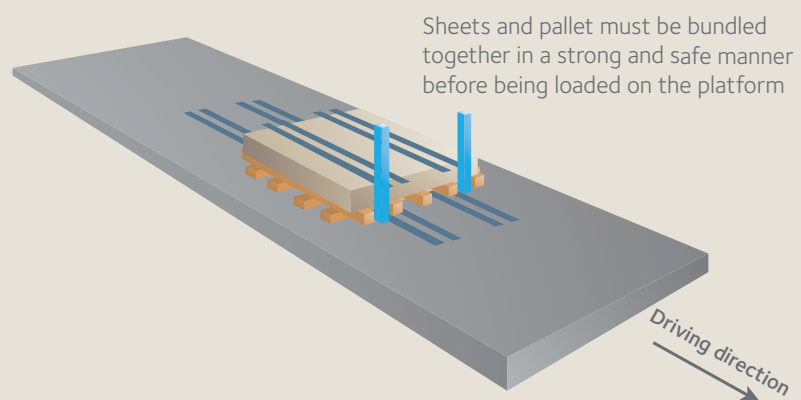
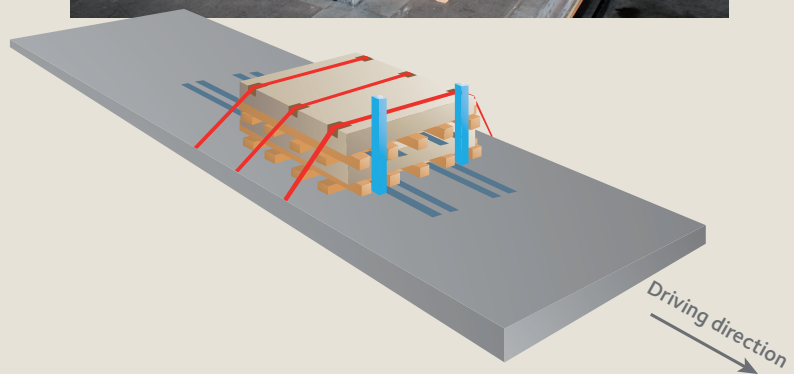


Fig. 3.7



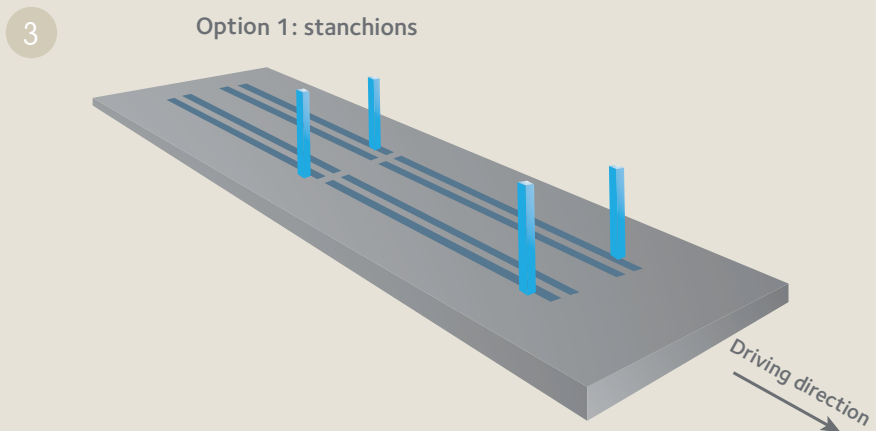
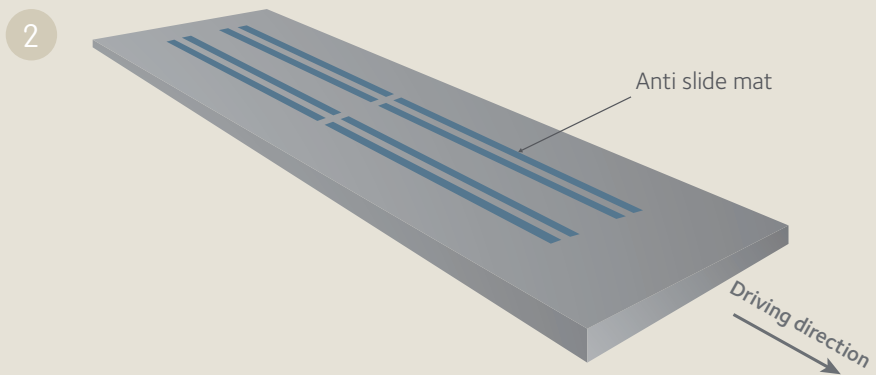
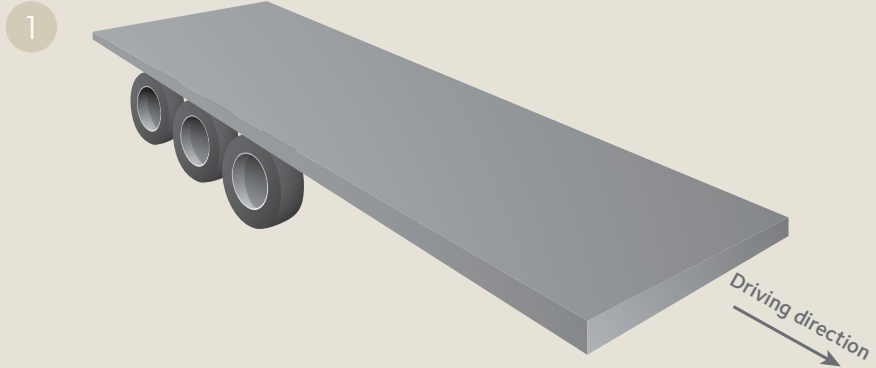
4





### 3.4.3 Two rows of bundled sheets on pallets

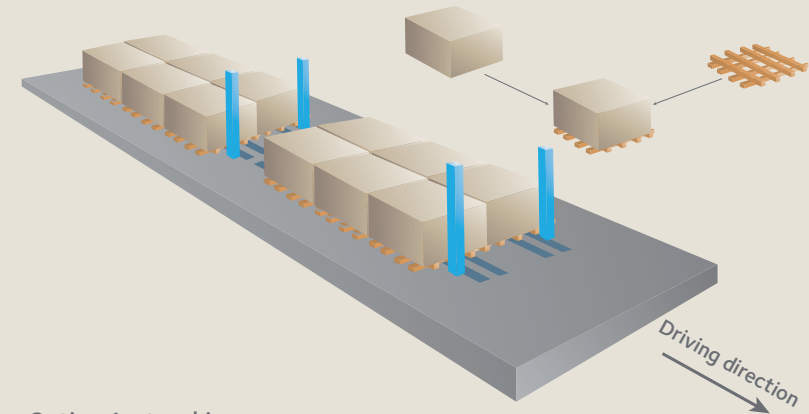
CS10 Two rows of bundled sheets on pallets



4

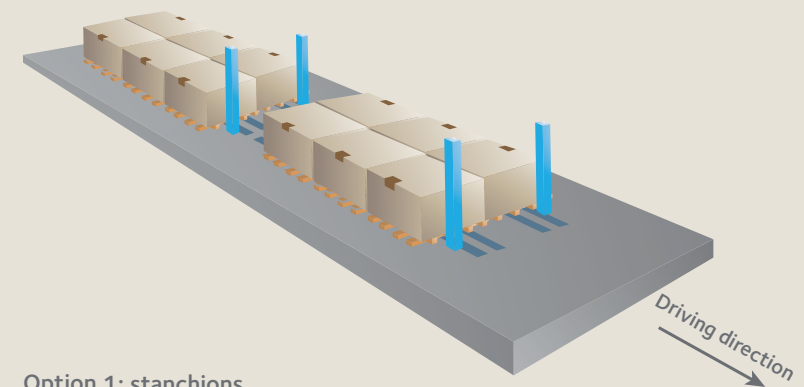
#### Option 1: stanchions

Sheets and pallet must be bundled together in a strong and safe manner before being loaded on the platform



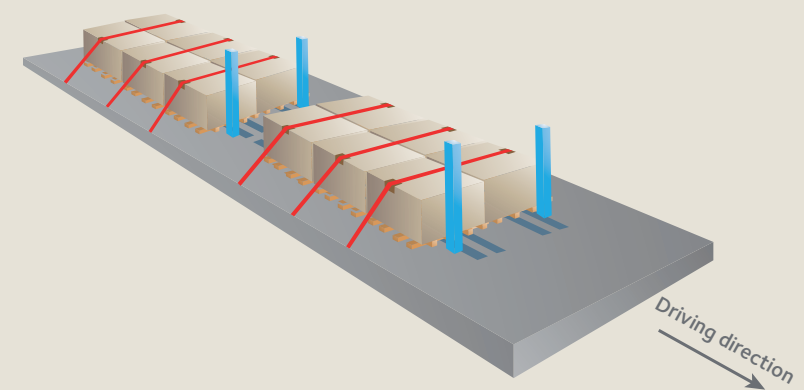
5

#### Option 1: stanchions



6

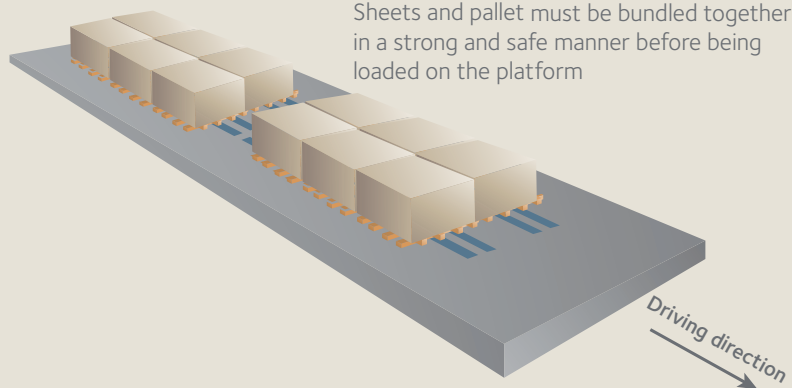
#### Option 1: stanchions



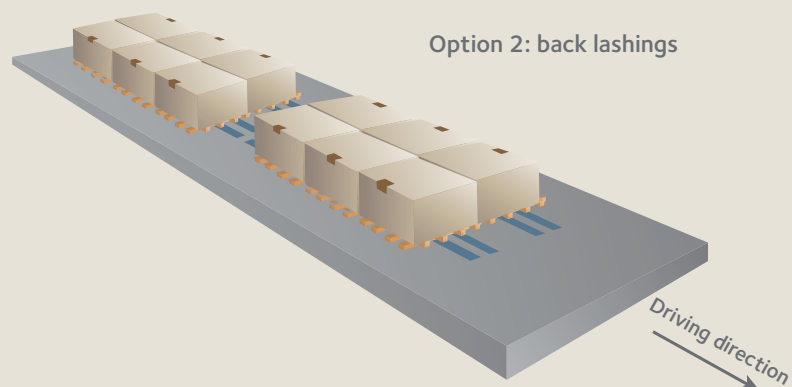
7

**Option 2: back lashings**

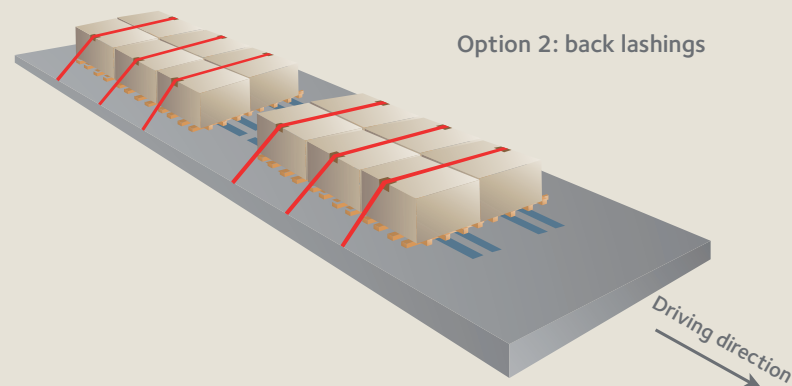
Sheets and pallet must be bundled together in a strong and safe manner before being loaded on the platform



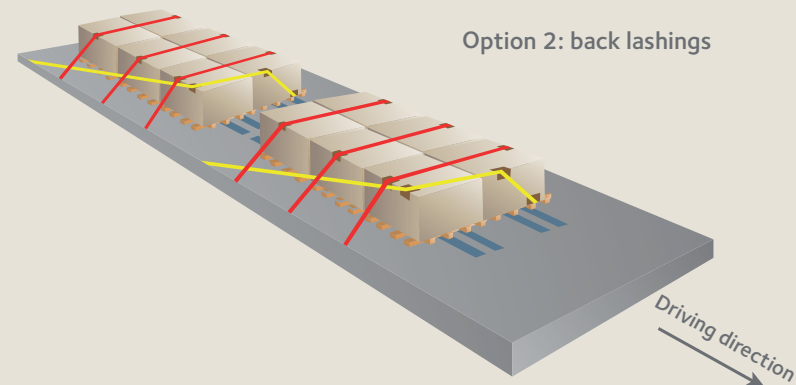
8

**Option 2: back lashings**

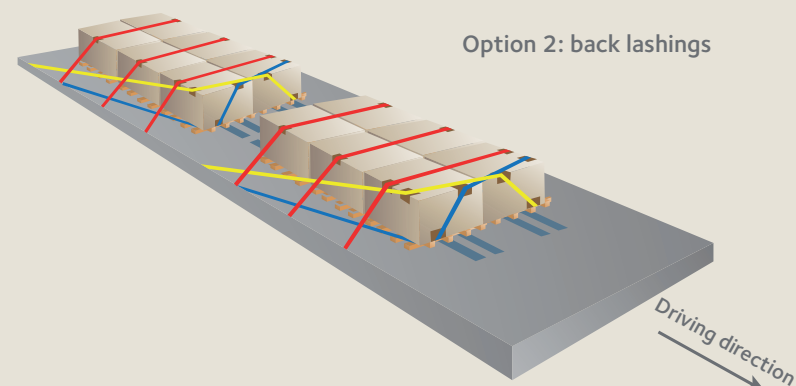
9

**Option 2: back lashings**

10

**Option 2: back lashings**

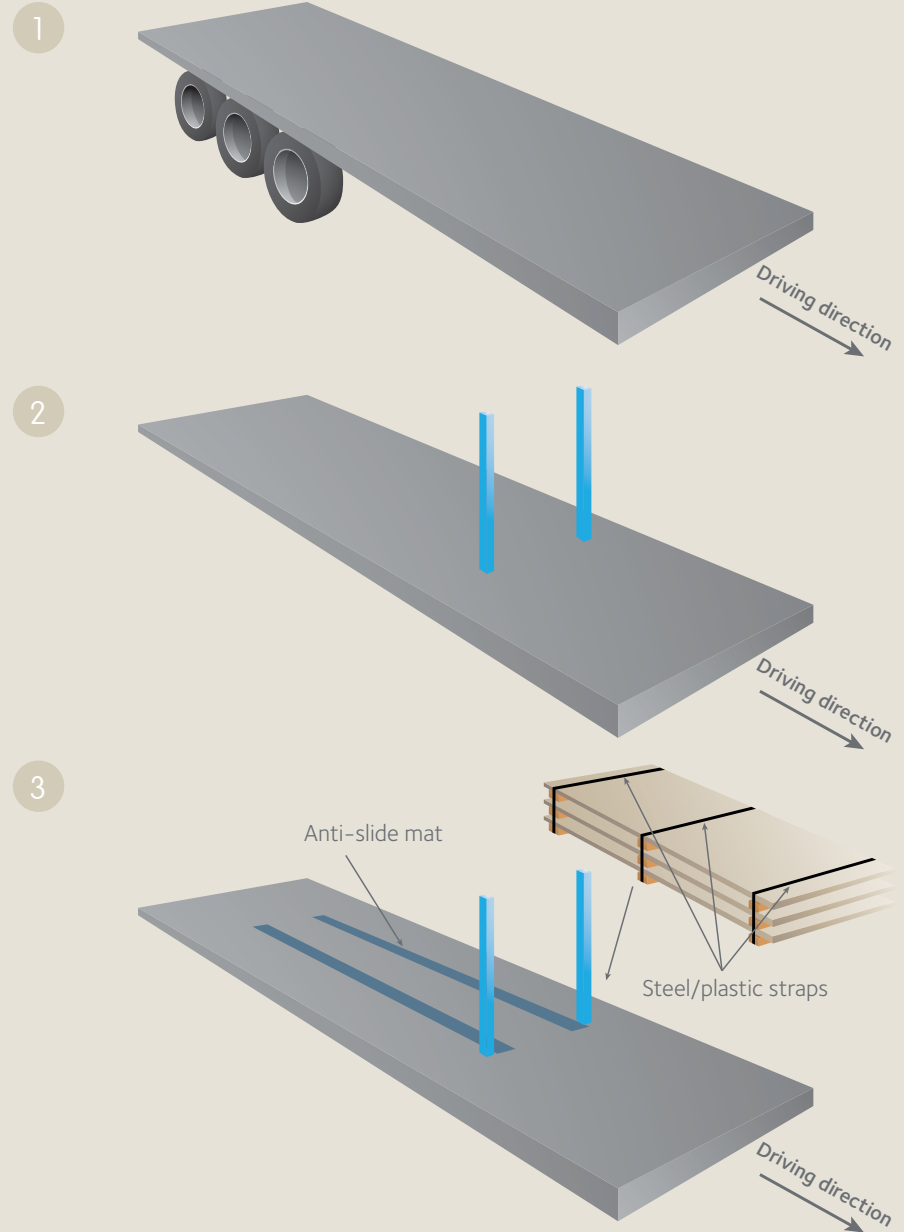
11

**Option 2: back lashings**



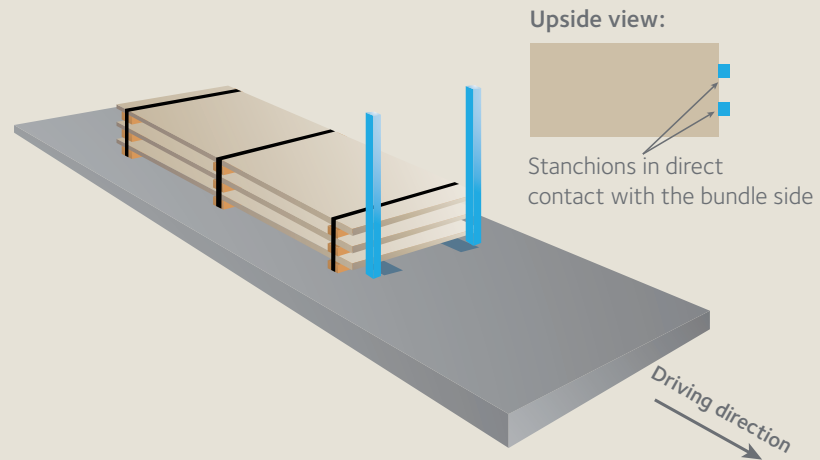
### 3.4.4 Complex cargo of bundled sheets

CS11 Complex cargo of bundled sheets

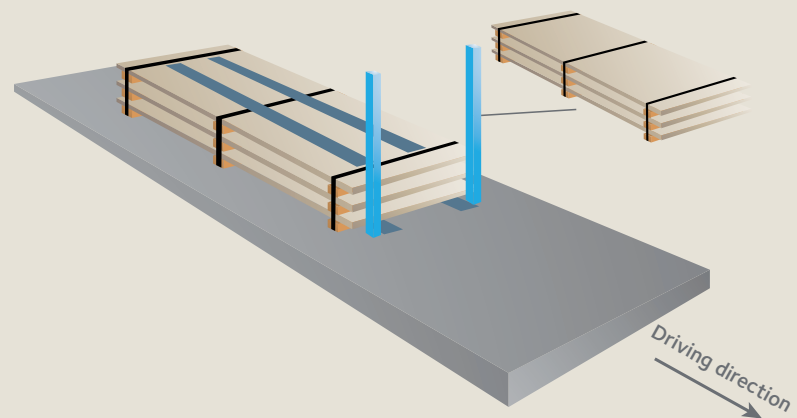




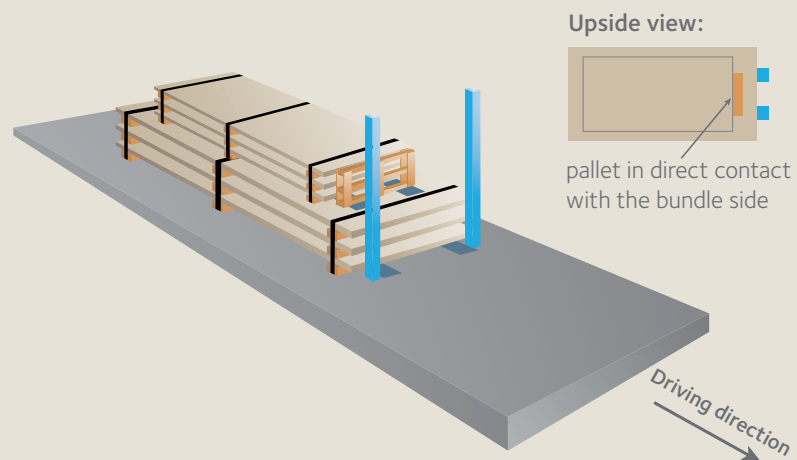
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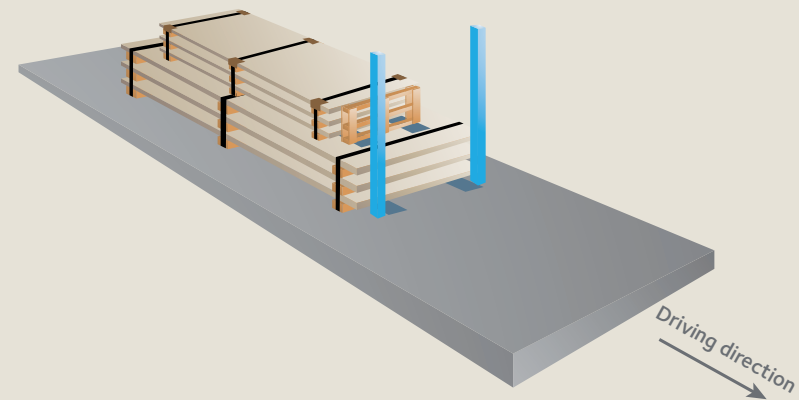
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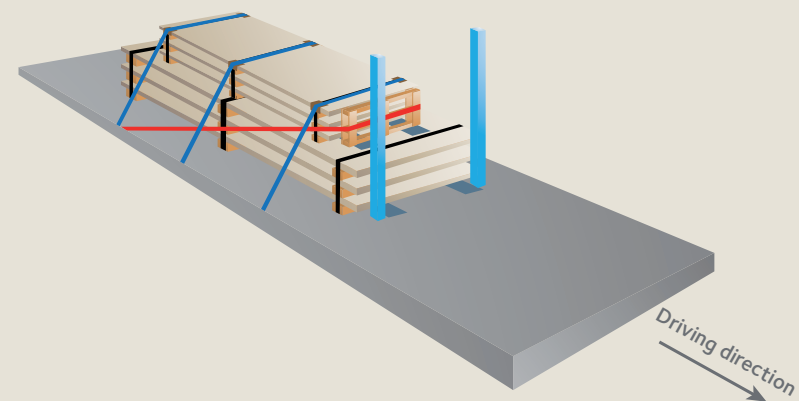
6



7



8





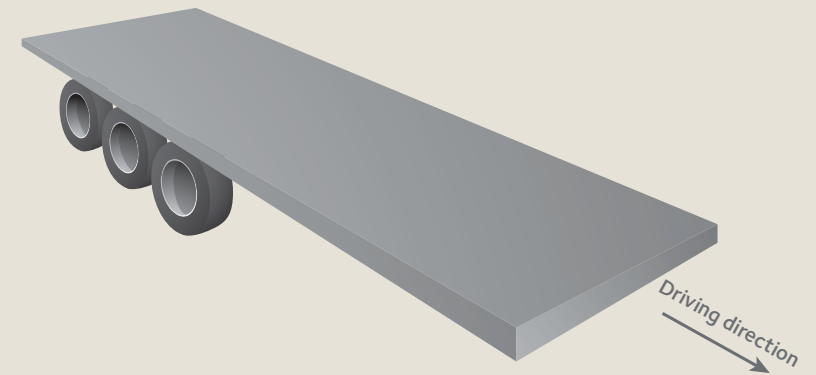
### 3.5 Sheets without pallets

All sheets loaded at once (strapped before the loading)

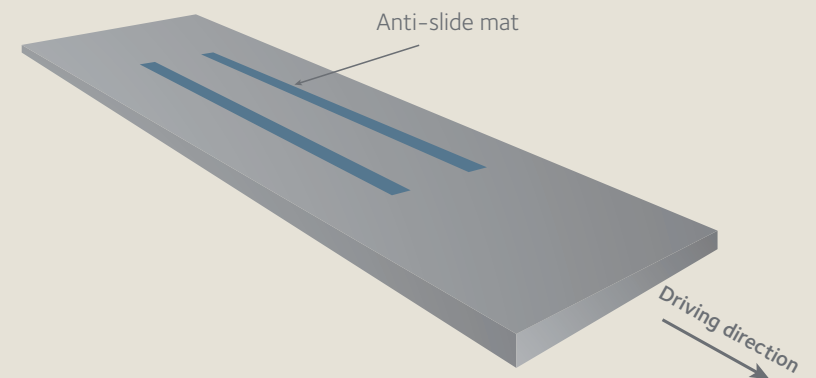
*CS 12 Sheets without pallets*

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1

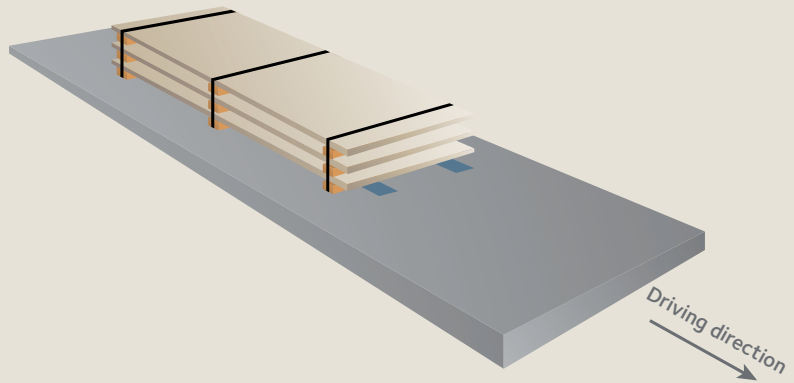


2

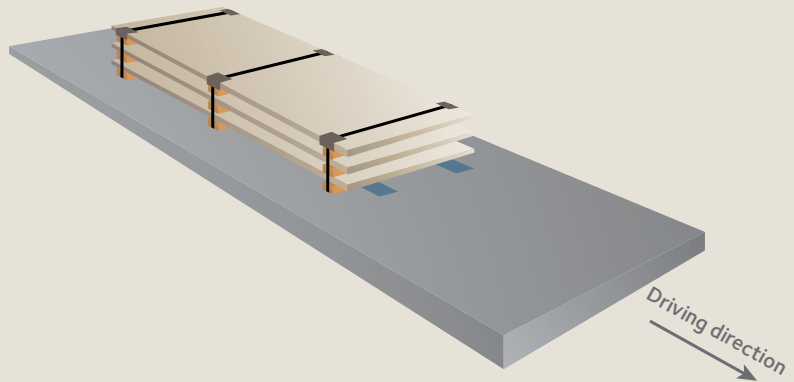




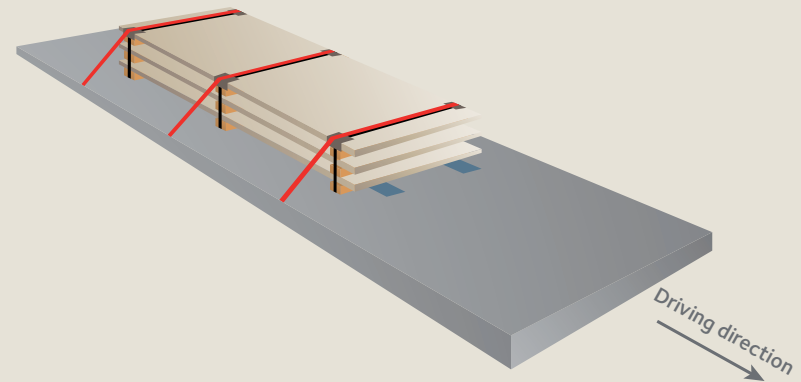
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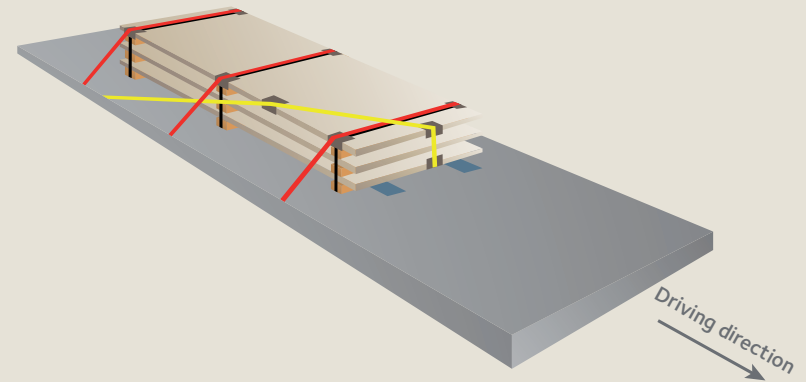
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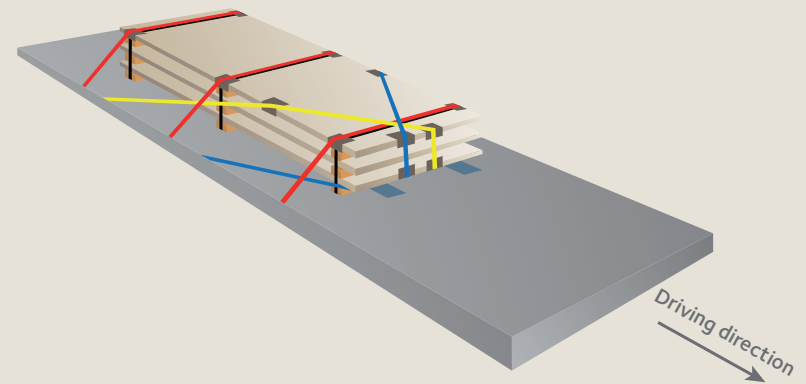
5



6



7



No obligation to have head lashing done before down lashing or opposite.



ArcelorMittal

## Bibliography

### General reference:

BGL handbook  
[http://www.bgl-ev.de/web/service/angebote\\_publicationen.htm](http://www.bgl-ev.de/web/service/angebote_publicationen.htm)

Ref 3.0 «latest information about load securing» Nov 2006 by Alfred Lampen-Verlag Günter Hendrich GmbH & Co. KG

<http://www.ladungssicherung.de>

(which gives the formulas for calculating number of down-lashings in § 6 calculating load securing)

Ref 3.1.2 Solution for securing a coil with width/height ratio  $< 0.66$  on a groove trailer CargoPin role system

<http://www.eversgmbh.com/Homepage/Securing/Load-safety/Rolls-of-metal-tarpaulin-covers/AA-Metal-rolls-and-plan-trailers/Securing-of-rolls-of-metal.aspx>







