

The number of lashings shall be selected by the following Rule of Thumb method.

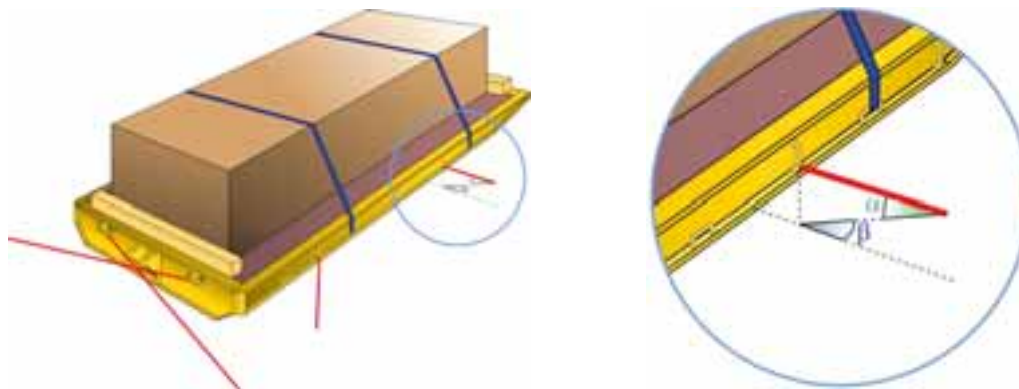
## **RULE OF THUMB METHOD FOR THE SECURING OF CARGOES ON BOARD SHIPS UNDER HÖEGH AUTOLINERS OPERATION**

**THE TOTAL OF THE MSL VALUES IN TON OF THE SECURING DEVICES  
ON EACH SIDE OF A UNIT OF CARGO (PORT AS WELL AS STARBOARD)  
SHOULD EQUAL THE WEIGHT OF THE UNIT IN TON**

The rule of thumb is not valid for over the top lashings.

### **The rule of thumb method is valid under the following conditions:**

1. Good friction between the contact surfaces. At least one of the surfaces should consist of wood or rubber.
2. Lashings working together should be of about equal length.
3. Lashings should be placed symmetrically on both sides of the units.
4. Lashings with a vertical angle ( $\alpha$ ) towards the ships deck larger than 60 degrees may not be taken into account.



5. Lashings with a horizontal angle ( $\beta$ ) towards the ships transverse axle larger than 60 degrees may not be taken into account.
6. For units which are not rigid in form or which has a high centre of gravity the number of lashings may have to be increased.

## MINIMUM NUMBER OF ROLL LASH

The following number of lashings shall be used:

Unit weight (kg)	Number of lashings per side	Total number of lashings
3 000 – 5 000	2	4
5 000 – 7 500	3	6
7 500 – 10 000	4	8

The lashings shall be placed symmetrically on both sides of the unit.

## MINIMUM NUMBER OF HEAVY DUTY WEB LASH

Unit weight	Number of lashings per side	Total number of lashings
10 000 – 20 000	4	8
20 000 – 40 000	8	16
40 000 – 60 000	12	24
60 000 – 80 000	16	32
80 000 – 100 000	20	40

The lashings shall be placed symmetrically on both sides of the unit.

## STOWAGE AND SECURING OF ROLL TRAILERs ON BOARD

ROLL TRAILERs should always be stowed in longitudinal direction on board with rubber mats or dunnage under the forward support of the ROLL TRAILER.

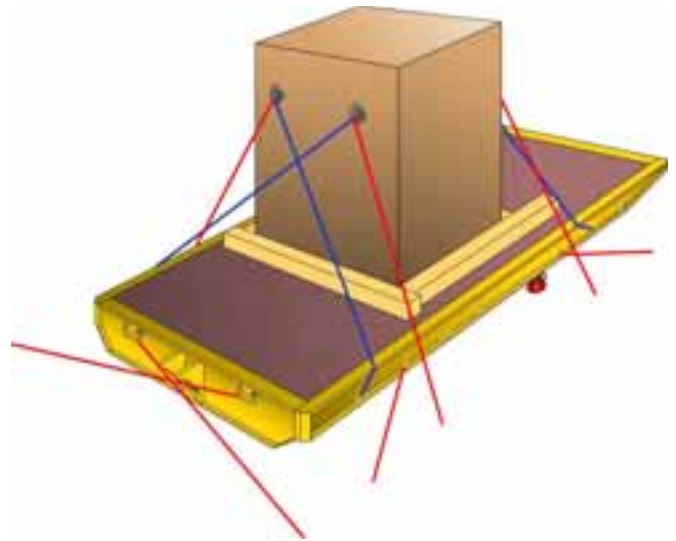
Minimum number of lashings shall be taken according to the above rule of thumb.

Most efficient prevention of sliding and tipping in different directions appears for the following values of  $\alpha$  and  $\beta$ :

Value of $\alpha$	Value of $\beta$	Most efficient in preventing
Small	Small	Transverse sliding
Large	Small	Transverse tipping
Small	Large	Longitudinal sliding
Large	Large	Longitudinal tipping

For goods in boxes exceeding 10 tons it should be possible to fix the lashings directly to the goods by external lashing points or by access to the goods.

On board the ships, lashings should as far as possible be drawn from the goods to the ship's deck and not only from the ROLL TRAILER to the ship's deck.



# Securing of Static, Roll trailer, Excavators and other H/H not on rubber tyres



In the forward end of the ROLL TRAILER tipping will take place around the outer edges A of the support.

In the wheel end of the ROLL TRAILER tipping will take place around the centres B of the wheel boggies.



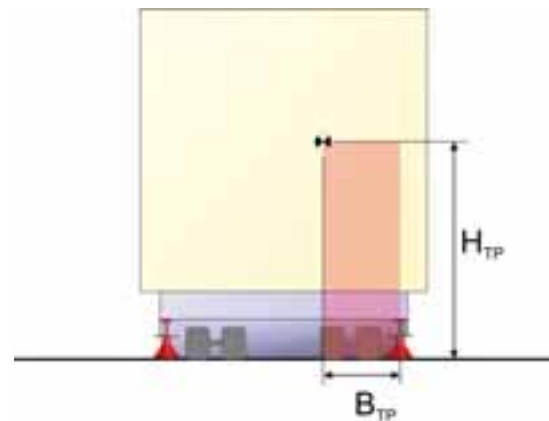
Since the support width in the forward end is larger than in the wheel end, the tipping risk of the ROLL TRAILER is increasing by the amount of load placed on the bogie end of the unit.

High cargo stowed on ROLL TRAILERS is thus sensitive to tipping in transverse direction.

To investigate if there is a risk of tipping of a ROLL TRAILER, the vertical distance  $H_{TP}$  from the tipping point to the Centre of Gravity (COG), must be compared to the horizontal distance  $B_{TP}$  from the tipping point to COG.

There is a risk of transverse tipping on main deck or below on board the Höegh Autoliners' ships if:

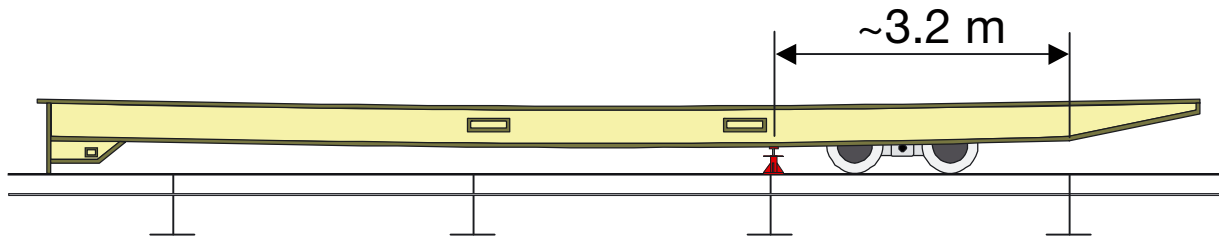
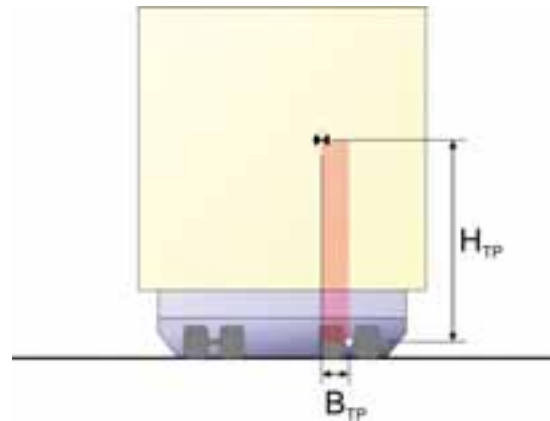
$$H_{TP}/B_{TP} \geq 1.6$$



## Securing of Static, Roll trailer, Excavators and other H/H not on rubber tyres

When there is a risk of tipping the number of lashings preventing tipping must be increased alternatively supporting jacks or timber can be used to increase the tipping width of the ROLL TRAILER.

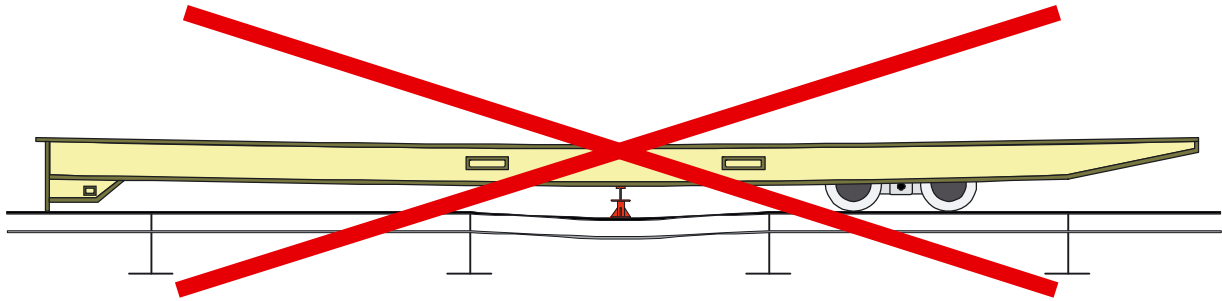
By this means the tipping point is changed and thereby the relation ( $H_{TP}/B_{TP}$ ) is reduced.



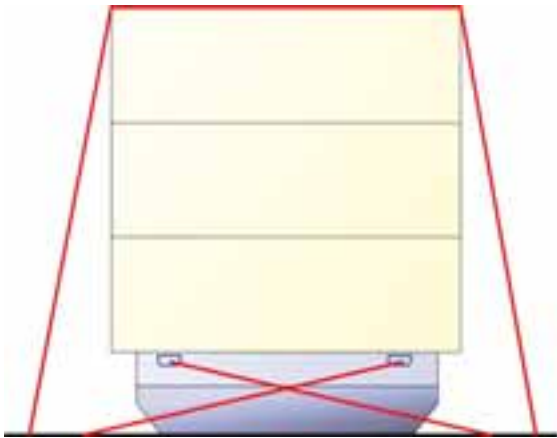
As the tipping width is least in the bogie end of the ROLL TRAILER and the centre of gravity of the cargo on the ROLL TRAILERs should be located at half length of the unit, the supporting jacks or timber should be placed close to one of the ship's web frames just in front of the wheels on the ROLL TRAILER.

The distance of the web frames are normally around or just above 3 metres. If it is difficult to identify the web frames on the deck, look to the nearest ship's side where the web frames normally can be seen.

## Securing of Static, Roll trailer, Excavators and other H/H not on rubber tyres



If the jacks are placed in between the bogie and the forward support on the ROLL TRAILER and away from a web frame, there is a risk that the deck will be nuckled when the ROLL TRAILER deflects in hard weather at sea.



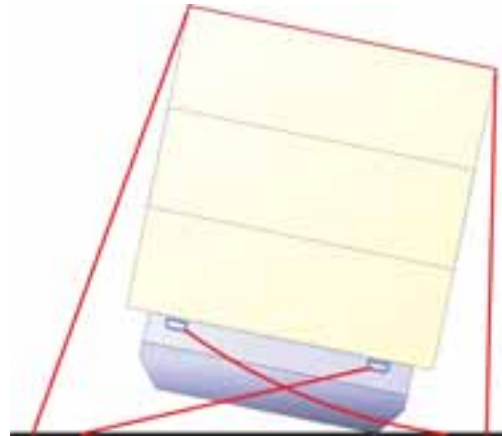
Sideways tipping can in some cases be prevented by top-over lashings from deck to deck over the cargo.



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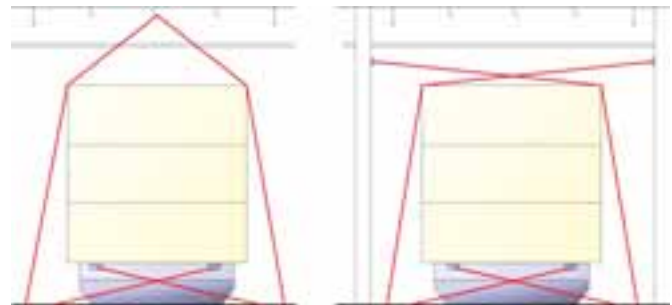
However, such lashings are not very efficient as tipping can take place inside the lashing.

This effect is larger for lashing equipment with large elasticity such as web lashings and less for more stiff lashings like chains.



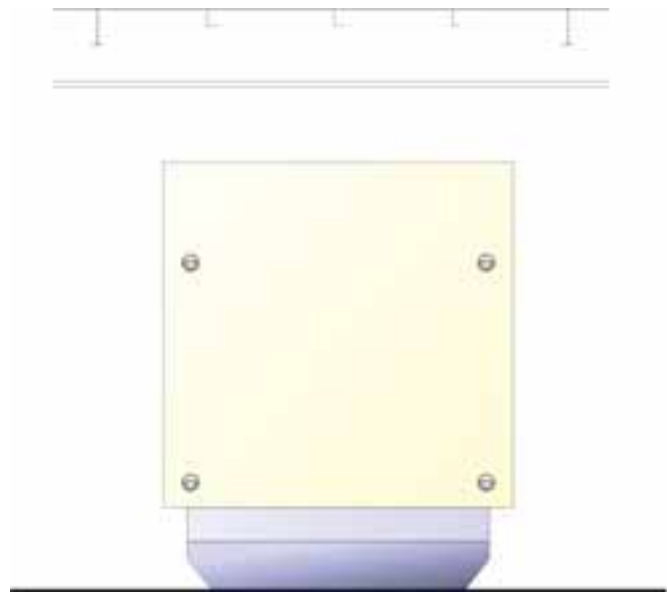
A better way of preventing transverse tipping is by fixing the lashings below the deck above or on pillars or other structures beside the stowage position.

Great care should be taken if the lashings are fixed to hanging car decks and this should be done only if the decks above are designed for such forces.



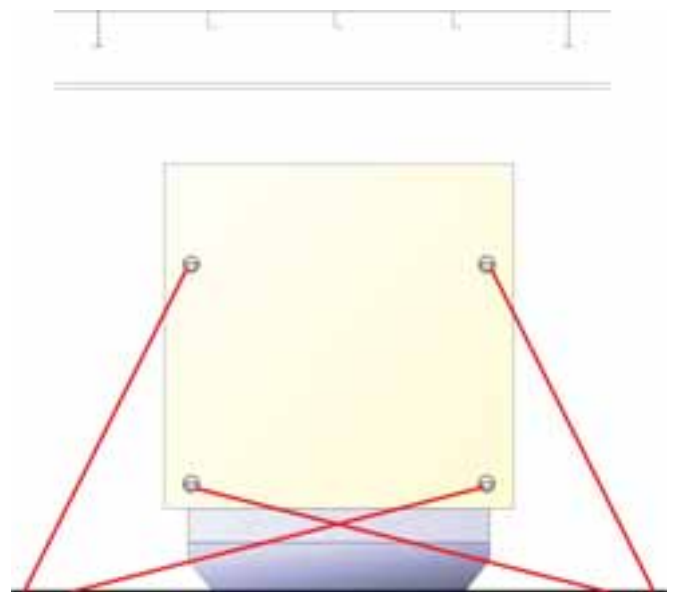
## Securing of Static, Roll trailer, Excavators and other H/H not on rubber tyres

Securing points on the goods stowed on ROLL TRAILERS should be used as far as possible to prevent sliding and tipping of the entire unit (ROLL TRAILER plus goods) when stowed on board the ships.



Sliding is best prevented by low horizontal lashings and tipping by vertical lashings as shown in the figure.

Sometimes a combination of lashings preventing sliding and lashings preventing tipping will be required.



## Boats

Boats on cradles must have a sturdy cradle in order to avoid damages during handling and sea voyage.

In order not to damage the cradle and boat, dunnage must be placed under the cradle to give clearance for forklift handling.

Boats on trailers must be properly secured to the trailer.

Number and type of lashing according to units weight.



## Tracked units

Old ropes must be used in ramps when loading or discharging steel tracked units. Once in final stowage position, all steel pieces should rest on rubber mats. Excavators arm should rest on rubber mat and be lashed with Höegh Autoliners standard lashing. Use chain extension if needed when lashing in unit tracks.



**Use Höegh Autoliners  
Rubber Mat**



## Units on spikes

All units with spikes on the wheels are restricted to Roll trailer Cargo only.

