TATA STEEL

LOAD RESTRAINT GUIDELINE

High friction sheet packs

1000 mm minimum length
700 mm minimum width

1. This guideline applies to:

- Road transport of high friction banded steel sheet packs and fully unitized low friction sheet packs (see Section 6).

- High friction sheet packs consist of hot rolled coil sheet with mill finish only, *not* pickled and oiled.

The lowest friction factor for these products, determined as per EN 12195:2010-1 Annex B.1.2, is µ = 0.5.

⚠️ ***Mixed loads, where the load includes non-unitized low friction material - use LRG-0015-SP.***

2. Essential requirements

- Packs must be banded with a minimum of 2 lateral bands.

- Transport chains must be compliant with EN 12195-3, minimum 8 mm Grade 8, LC 40 kN.

- Web lashings must be compliant with EN 12195-2, minimum lashing capacity LC 2000 daN.

- Web lashings must be protected from all sharp edges and abrasive surfaces, including trailer side raves.

3. Overview of tie down restraint system

✓ Minimum of 2 over-the-top chains or 2 over-the-top web lashings per stack - see Table 1.

✓ Minimum lashing angle of 30° required (see Section 4.4), alternatively refer to blocking options (see Section 5).

Direction of travel →
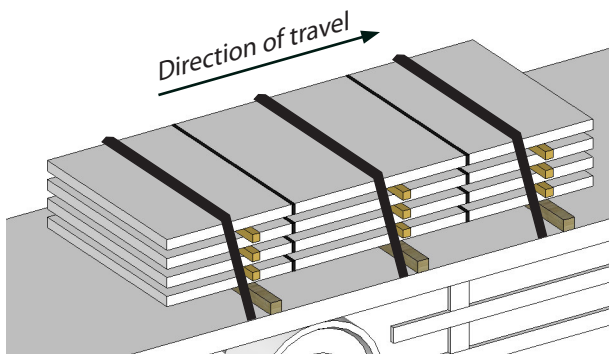
Shown for an 8 tonne stack with 3 over-the-top chains.

Table 1: Number of over-the-top lashings per stack

Stack weight	8 mm transport chain (LC 40kN)	Web lashing (LC 2000daN)
up to 4 tonnes	2	2
4 - 6 tonnes	2	3
6 - 8 tonnes	3	4
8 - 12 tonnes	4	6
12 - 16 tonnes	5	8
16 - 22 tonnes	6	9
22 - 28 tonnes	7	11

⚠️ ***Sea crossings: all packs must be unitized (see Section 6); anti-slip matting between packs; one additional over-the-top restraint over each stack. Alternatively use LRG-0015-SP .***

This Load Restraint Guideline has been designed and tested to meet the forces for road transport only as stated in EN 12195-1:2010 and VDI 2700.

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4. Load configuration

4.1 Maximum load height by stack weight

Table 2: Maximum height per stack

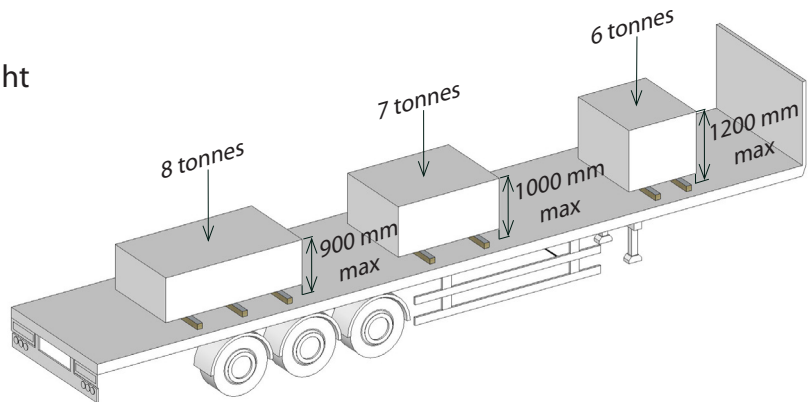| Stack weight	Max. height
6 t	1200 mm
7 t	1000 mm
8 t or greater	900 mm

Diagram and table illustrating max height to weight ratio per stack. **Maximum height must never exceed 1200 mm from bed of trailer**.

4.2 Pyramid stacking

Sheet packs of different sizes can be stacked together:

• If using the restraint options in section 5 the front of the packs must be aligned to allow restraints to be applied.

• Apply additional straps to the longer packs if they are more than 1.5 times the length of the shorter packs (see illustration in Section 5.2).
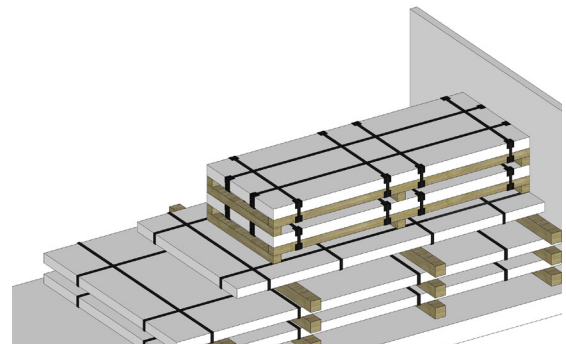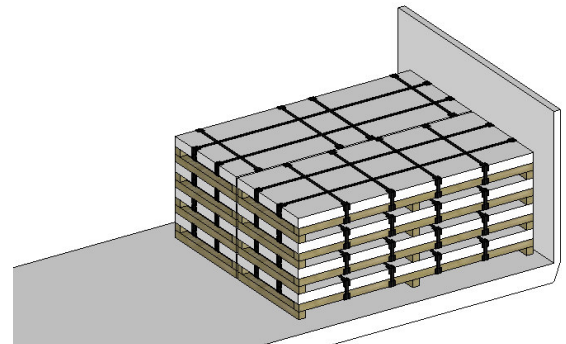

Pyramid stack aligned at front and blocked to headboard.

4.3 Side by side stacks

Sheet packs can be stacked side by side:

• Gaps must be closed between different stacks, or secure vertical timbers must be inserted to chock gap.

Side by side stacks loaded tight together to close gap.

4.4 Tie down restraint

Minimum lashing angle of 30°

• When lashing angle is less than 30° refer to load restraint options in Section 5.

• When lashing angle is greater than 30° load can be restrained with tie down restraints - see Table 1.
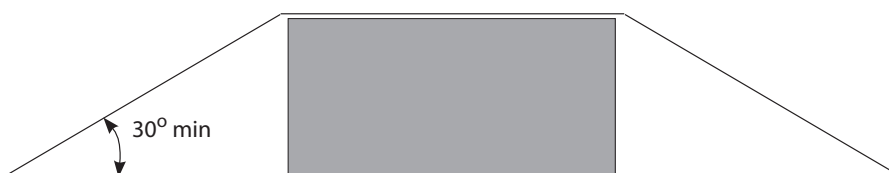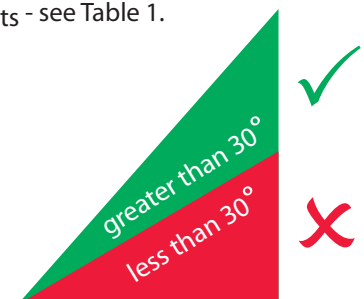

Diagram illustrating an over-the-top restraint with shallow lashing angle.
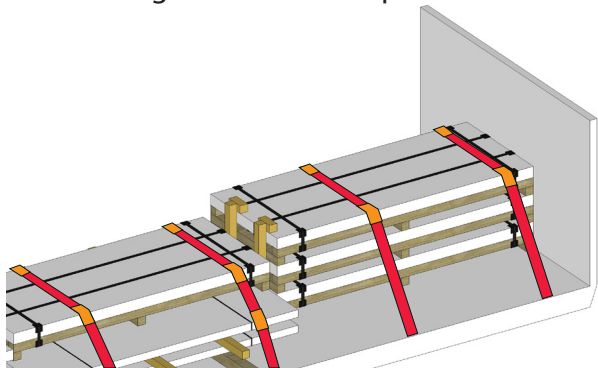
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High friction sheet packs

## 5. Additional load restraint options

5.1 Blocking to headboard option

Table 3: Trailer headboard - EN12642

Trailer type	Permissible payload	
	Without Anti-slip	With Anti-slip
Code L or equivalent*	18 t	28 t
Code XL or equivalent*	28 t	28 t

* See Technical Information Sheet TIS-0010

Material blocked forward, 2 over-the-top restraints per stack. Gaps between stacks must be either closed or chocked with timbers.

5.2 Cross-over straps option

Direction of travel
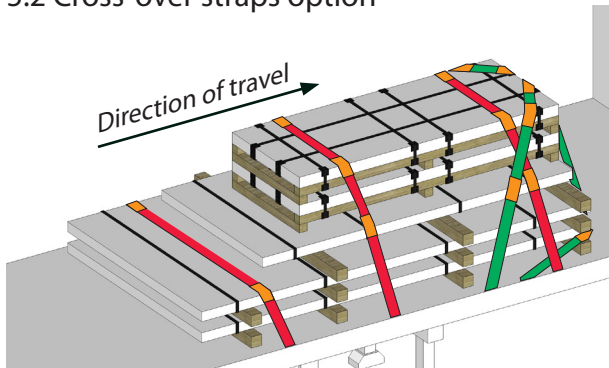
Table 4: Cross-over restraint capacities

Qty. of restraints	Permissible payload	
	Without Anti-slip	With Anti-slip
1 pair of web lashings	12 t	28 t
1 pair 8 mm chains	20 t	28 t

Front of packs aligned with cross-over restraints covering all packs , additional restraints to be added when longer sheet packs overhang.
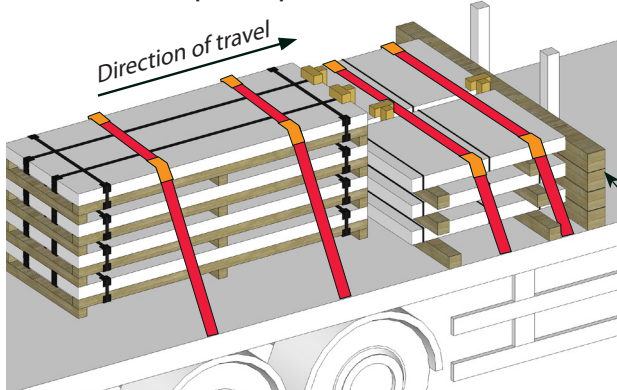
5.3 Timber 'H' frames option

Direction of travel
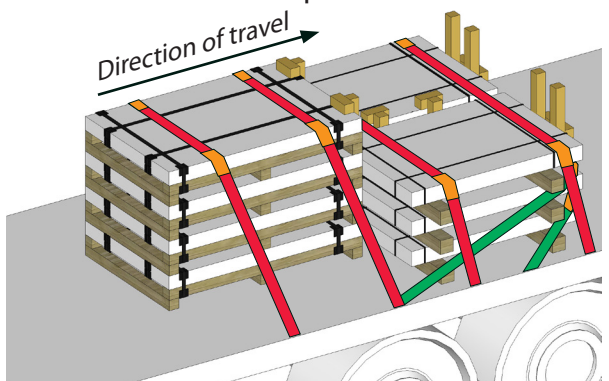
Table 5: Timber 'H' frame

Qty. of restraints LC 2000 daN	Permissible payload	
	Without Anti-slip	With Anti-slip
2	12 t	28 t
3	20 t	28 t

Timber 'H' frame used to restrain against forward forces and lashed back with a minimum of 2 straps.

5.4 Stanchion post option

Direction of travel

Table 6: Stanchion post option

Stanchion size	Permissible payload behind each pair of posts	
	Without Anti-slip	With Anti-slip
80 x 80 x 5 mm	16 t	28 t
100 x 100 x 4 mm	20 t	28 t

Apply timbers if necessary to create suitable forward blocking

6. Unitizing sheet packs

Additional banding or packaging can be used to fully unitize a sheet pack so that it acts as single unit. When low friction sheet packs are not unitized LRG-0015-SP must be used.

Tables 6 and 7 below show the number of packaging bands (steel or plastic) required to unitize low friction and high friction sheet packs:
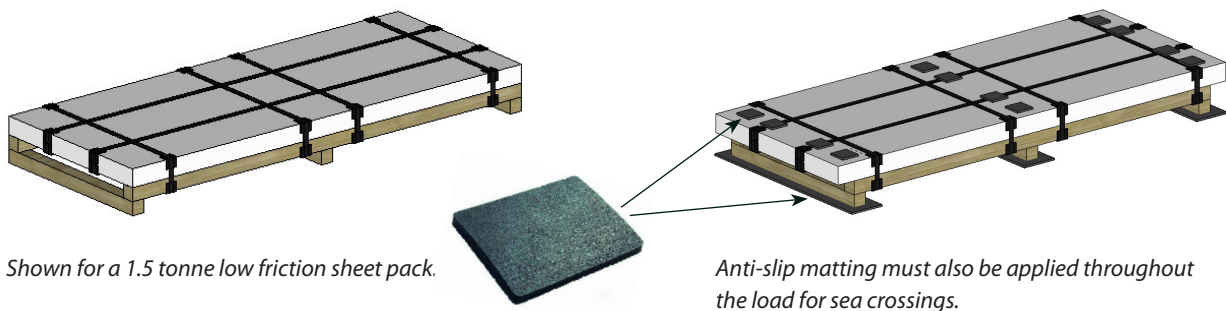
Table 7: Banding to unitize low friction sheet packs

Weight of sheet pack	Number of bands
1 tonne	4
1.5 tonnes	6
2 tonnes	8
2.5 tonnes	10
3 tonnes	11

Table 8: Banding to unitize high friction sheet packs

Weight of sheet pack	Number of bands
up to 2.5 tonnes	2
3 tonnes	3
4 tonnes	4
5 tonnes	5
6 tonnes	6

Calculated for banding pre-tension of 175daN.

Shown for a 1.5 tonne low friction sheet pack.

Anti-slip matting: see TIS-0008

*Anti-slip matting must also be applied throughout the load for sea crossings.*

⚠️ **When low friction sheet packs are not unitized LRG-0015-SP must be used.**

7. Equipment
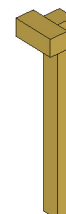
7.1 Timber 'H' frame

- Frame height must cover the height of the stack being restrained.

- 2 optional sizes are shown opposite - select the most appropriate size for the stack being restrained.

- Note that the 'H' frames can be used either way up to provide the best strap positions depending on stack heights.
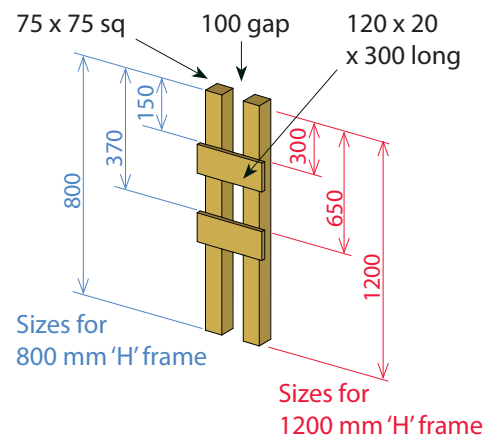
7.2 Timber 'T' block

- Used for chocking gaps between stacks, can be positioned from floor removing the need to access the bed of trailer.

- Minimum timber section 75 x 75 mm, length dependant on the height of material stack.

75 x 75 sq   100 gap   120 x 20 x 300 long

Sizes for 800 mm 'H' frame

Sizes for 1200 mm 'H' frame