

# LOAD RESTRAINT GUIDELINE

## Low friction sheet packs

1000 mm minimum length  
700 mm minimum width

### 1. This guideline applies to:

- Low friction banded steel sheet packs (not fully unitized - see Section 6). Low friction products are:
  - Pickled and oiled sheets
  - Cold reduced sheets
  - Coated sheet products.

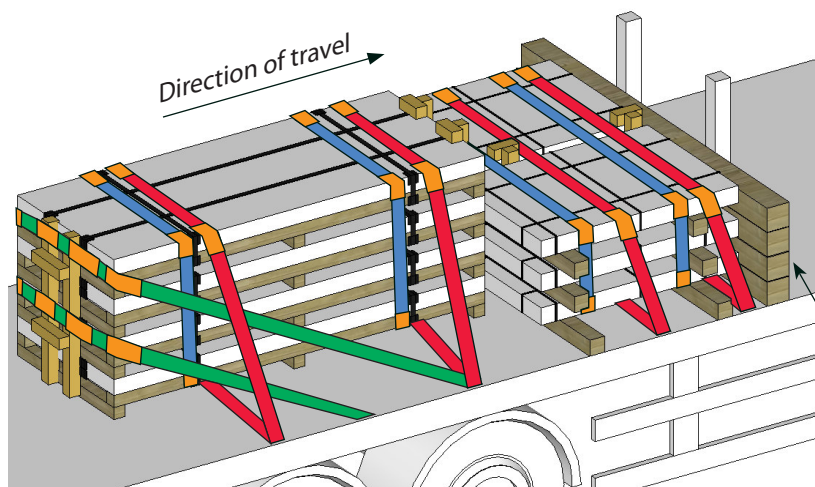
The lowest friction factor for these products, determined as per EN 12195:2010-1 Annex B.1.2, is  $\mu = 0.31$ .

### 2. Essential requirements

- Packs must be banded with a minimum of 2 longitudinal and 2 lateral bands.
- All restraints must be web lashings 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 rails.

### 3. Overview of restraint system

- ✓ Blocked forward (see Section 5 for alternative options).
- ✓ 2 pairs of opposing loops per stack for sideways restraint.
- ✓ Restrained in rearward direction.



**Table 1: Stanchion post option**

| Stanchion post size | Permissible payload against each pair of posts |
|---------------------|--|
| 80 x 80 x 5 mm      | 10 t   |
| 100 x 100 x 4 mm    | 12 t   |

Apply timbers as necessary to create suitable forward blocking

Shown with stanchion posts option blocking forward and timber 'H' frame option for rearward restraint.

This Load Restraint Guideline has been designed and tested to meet the forces for road and sea transport 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          | 900 mm      |

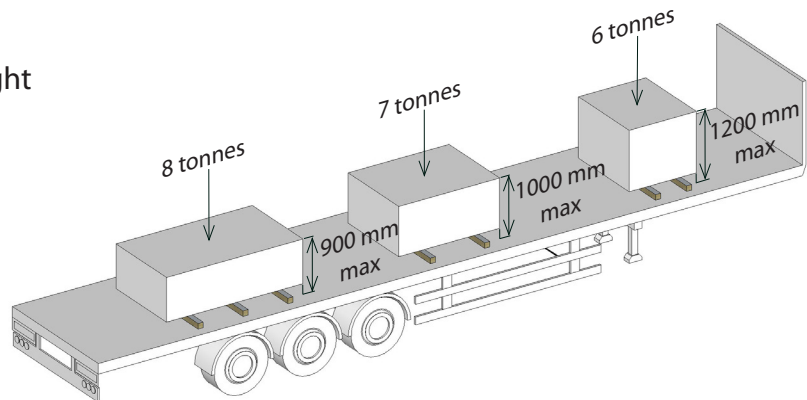
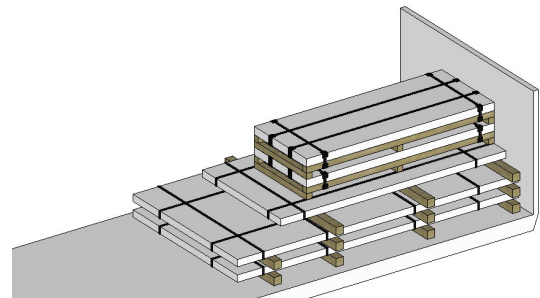


Diagram and table illustrating max. height to weight ratio per stack. **Maximum height must never exceed 1200 mm from bed of trailer.**

#### 4.2 Pyramid stacking

Sheet packs of different sizes can be stacked together:

- Align stacks at the front to allow restraints to be applied for forward forces.
- 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).
- Top packs must be restrained for sideways and rearward forces (see Section 5.2 opposite).

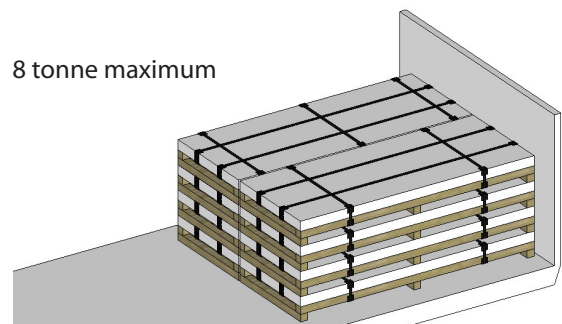


Pyramid stack showing alignment of packs at the front.

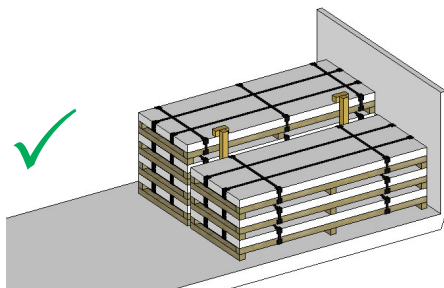
#### 4.3 Side by side stacks

Sheet packs can be stacked side by side:

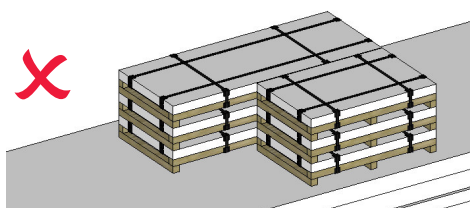
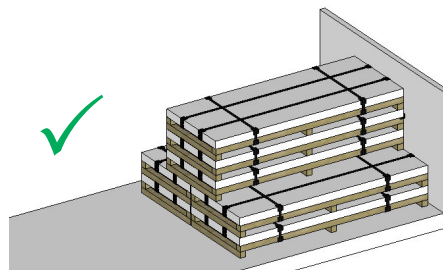
- Total combined weight of both stacks must not exceed 8 tonnes.
- Gaps must be closed between stacks, or secure vertical timbers must be inserted.
- Align stacks at the front.



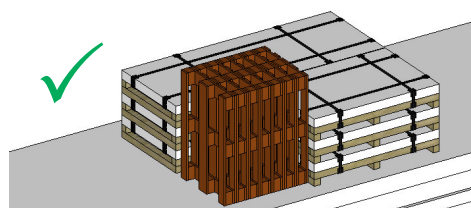
Side by side stacks loaded tight together to close gap.



Stacks of different heights must be restrained against sideways forces by applying timbers between stacks or building in a pyramid.



Direction of travel →



Stacks of different lengths must have the rear gap filled to allow rearward restraint to be applied.

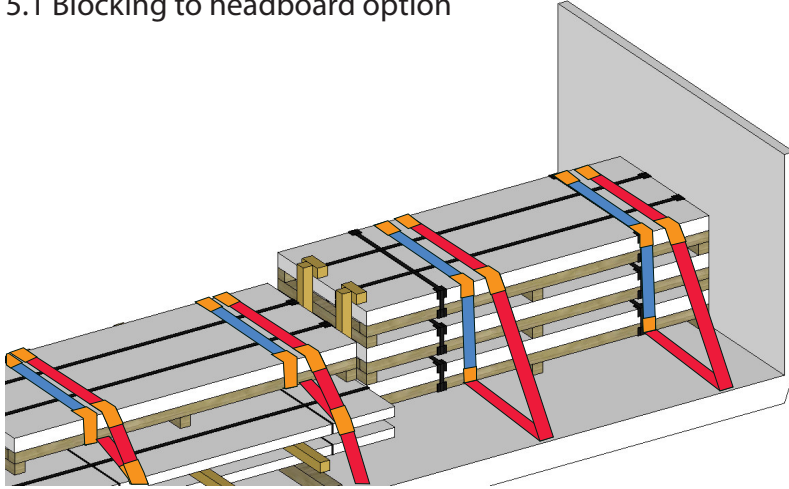
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### 5. Load restraint options

In addition to the stanchion post option shown in Section 3, the following alternative methods may also be used.

#### 5.1 Blocking to headboard option



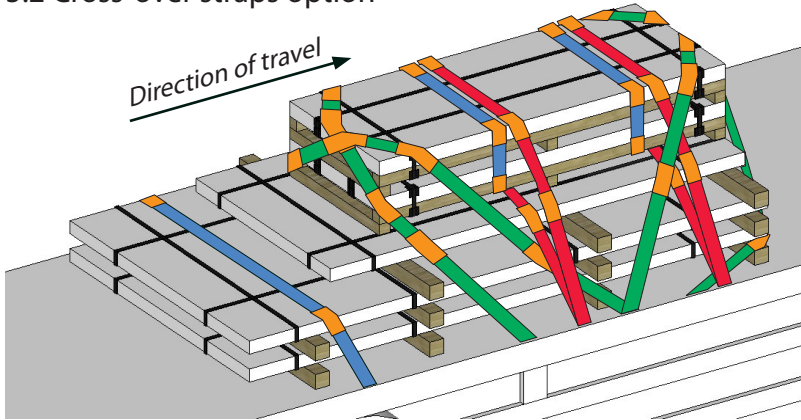
- ✓ Blocked forward.
- ✓ Headboard must cover height of product.
- ✓ 2 pairs of opposing loops per stack.
- ✓ Higher front stack is blocked rearward by vertical timbers.

**Table 3: Trailer headboard - EN 12642**

| Trailer type           | Permissible payload |
|------------------------|---------------------|
| Code L or equivalent*  | 10 t                |
| Code XL or equivalent* | 28 t                |

\* See Technical Information Sheet TIS-0010

#### 5.2 Cross-over straps option

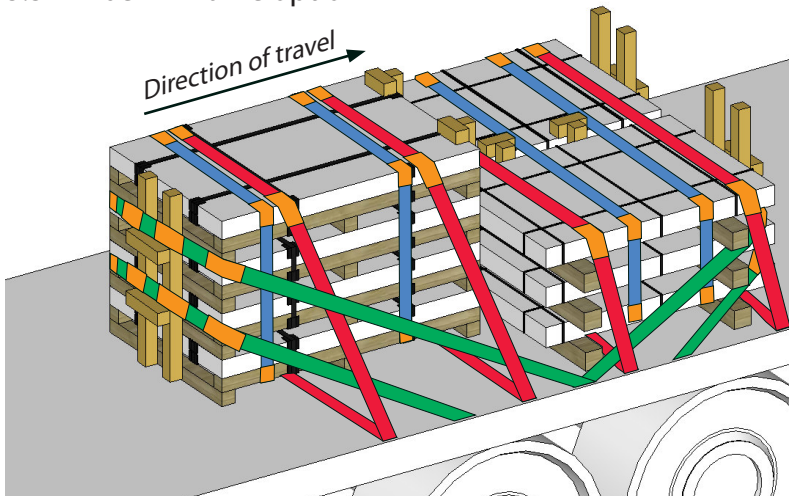


- ✓ Front of packs aligned and front cross-over straps covering all packs.
- ✓ 2 pairs of opposing loops (applied to upper packs if pyramid stacked).
- ✓ Rear cross-over straps (applied to upper packs if pyramid stacked).
- ✓ Additional strap or straps applied when longer packs are more than 1.5 times the shorter packs.

**Table 4: Cross-over strap capacities**

| Qty. of restraints | Permissible payload |           |
|--------------------|---------------------|-----------|
|                    | Forwards            | Rearwards |
| LC 2000 daN        |                     |           |
| 1 pair             | 12 t                | 24 t      |

#### 5.3 Timber 'H' frame option



- ✓ Front of packs aligned.
- ✓ Timber 'H' frame used to restrain against forward or rearward forces and lashed back with a minimum of 2 straps.
- ✓ 2 pairs of opposing loops per stack.

**Table 5: Timber 'H' frame**

| Qty. of restraints | Permissible payload |           |
|--------------------|---------------------|-----------|
|                    | Forwards            | Rearwards |
| LC 2000 daN        |                     |           |
| 2                  | 10 t                | 24 t      |
| 3                  | 14 t                | 28 t      |

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### 5.4 Sideways restraint (opposing loops or 'strangle strapping')



Side by side stacks or parallel stacks: opposing loops wrap around all material in all stacks.

Note: Edge protection must be used on all corners and sharp edges.



Pyramid stacks: opposing loops wrap around top packs only.

## 6. Unitizing sheet packs

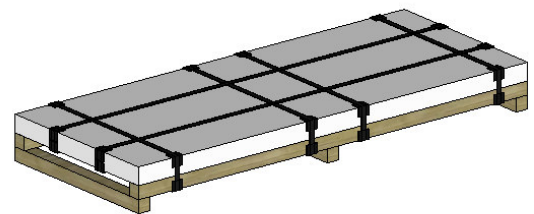
Additional banding or packaging can be used to fully unitize a sheet pack so that it acts as a single unit. When low friction sheet packs are unitized LRG-0030-SP can be used.

Tables 6 below shows the number of packaging bands (steel or plastic) required to unitize low friction sheet packs:

**Table 6: 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              |

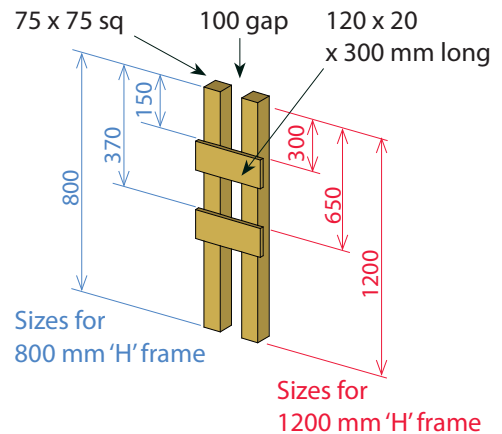
Calculated for banding pre-tension of 175daN.



## 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.



### 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.

### 7.3 Edge protection



Edge protection must be used to protect all webbing straps in contact with steel and all sharp edges.

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