

# **BPDWG**

**Building Products Delivery Working Group**



## **A Guide to Load Security** (Building Products)

June 2019

# BPDWG

## A Guide to Load Security (Building Products)

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**(Vehicle design - removed )**

## 1. Load Securing Responsibilities -

The Road Traffic Act states:- “that anyone who **causes or allows** a vehicle to be loaded may be held responsible if the load is dangerous, not just to their own employees, but anyone who loads and unloads the vehicle which includes sub-contract drivers, agency drivers and other road users.”

HSG 136 – Loading & Unloading Paragraph 121 states:-

“It is important to remember that *drivers are not the only people responsible for the safety of the vehicle and the load. The consignor (the person or company who actually place the load onto the vehicle) and those in control of sites must ensure the loading is carried out safely and that the load will remain in a safe and stable condition until it reaches its destination.* Those in control of sites where unloading takes place must also ensure unloading is carried out safely. *Hauliers are responsible for ensuring the correct equipment and vehicles are used and their drivers are properly trained and monitored.*”

### Consignee Responsibilities

- Ensure suitable and sufficient risk assessments and safe systems of work are in place for loading
- Provide a safe loading area
- Provide a safe place for the driver
- Develop loading plans in conjunction with drivers
- Ensure vehicle is loaded by competent/qualified people
- Ensure equipment used in loading is appropriate and compliant
- Monitor driver/haulier load security compliance

### Consignor Responsibilities

- Ensure suitable and sufficient risk assessments and safe systems of work are in place for driver tasks
- Provide a competent driver
- Provide the right vehicle/equipment for the load
- Provide suitable and sufficient securing devices (straps, chains etc)
- Prior to departure ensure that the vehicle is safe to take to the road
- Develop loading plans for products carried

Consignee & Consignors jointly – Thought should be given to some form of ‘Recovery Plan’, and / or Risk Assessment / SSOW in the event of a load shifting, or becoming unstable during transit, and as to how a safe offload can be achieved, either roadside or at customers / own premises (particularly with ‘sealed’ curtain side trailers).

### References -

- Health & Safety at Work Act 1974
- Road Traffic Act 1988 (Introduced by Road Traffic Act 1991)
- Road Vehicles (Construction & Use) Regulations 1986
- HSG 136 Workplace Transport – [www.hse.gov.uk/pubns/books/hsg136.htm](http://www.hse.gov.uk/pubns/books/hsg136.htm)
- European Best Practice Guidelines on Cargo Securing for Road Transport [http://ec.europa.eu/transport/roadsafety/vehicles/best\\_practice\\_guidelines\\_en.htm](http://ec.europa.eu/transport/roadsafety/vehicles/best_practice_guidelines_en.htm)
- DVLA – Load Securing ‘An Operator’s Guide’ (revised November 2018)

## 2. Voids -

## Avoid Voids!



### Voids

- Between headboard and product
- Between products
- Centre of trailer bed
- Front to rear
- Multi-products



### Voids can be reduced /eliminated

- Remove the void
- Intermediate bulkhead
- Avoid product movement
- Friction matting/paint
- Load restraint strapping
- **Wooden spacer**
- Load Restraint Device (LRD)
- Corner/edge protection



### Good /Best Practice

- Load to the headboard
- Remove gaps between product
- Carriage of single product
- Load containment
- Trailer protection

- Where a load is placed further than 300 mm from the headboard, then the load **must** be restrained by 'alternative means', as laid out in the DVSA Load Security Guide Matrix. (see Appendix A, Section 7)

- Where dense products like facing bricks, for example, are loaded to a headboard, this may cause an overload of the front axle on rigid vehicle, or the rear axle of the prime mover in an artic combination. In such cases, 'split loading' should be adopted, whereby half (or part) of the load is placed to the headboard and the remainder placed over the rear axles (and suitably restrained), to ensure weights remain within legal tolerances, and compliance with Load Security requirements is retained. (see Appendix B)

### 3. Strapping -

#### Strapping of vehicle loads

To effectively secure a load, Operators and Drivers must consider three very important things:

**Gaps between the load and the bulkhead or headboard.** It is much easier to stop an object moving than it is to stop it once it has already started to move; pallets are ideal in filling up spaces.

**Stacking of loads.** Clearly when placing products on top of each other, they must be fully stable and should be secured individually, i.e. the lower level / rows secured independently to the higher level.

**Lashing points.** When loading, straps should ideally be secured to lashing points in the floor, lashing points bolted to cross bearers (under the floor), the chassis itself or body sub-frame; lorries fitted with heavy steel raves – there may be no choice but to use the side raves of the body but **never use rope hooks**.



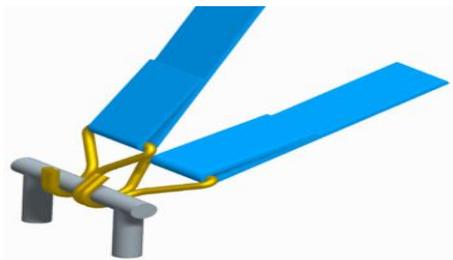
**Fig 1.** Care must be taken when using this type of floor mounted lashing point like the above as they are usually only rated to 500 daN (kg).



**Fig 2.** The two-bolt mounting lashing point above is available at a rating of 2,500 daN (kg) when the correct mounting bolts are used. These can be retro-fitted in place of rope hooks.



**Fig 3.** 'V groove' side rave lashing points are usually rated to 2,500 daN (kg), but some are only rated to 1,500 daN (kg); the rating is usually stamped on the lashing body. Check lashing for stamped rating.



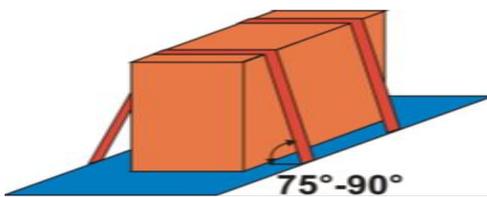
Capacity of webbing strap is reduced by 50% when both ends of the same strap are attached to the same anchor.



Do not anchor a webbing strap into the hook of another strap.

- Most industry used ratchet straps are most usually termed as being '5,000kg', which is technically incorrect. Straps should meet the technical specification BS EN 12195-2:2001.
- Standard Tension Force STf-300 daN (kg) – this is the amount of residual force left in the lashing when tensioned with a standard hand force (SHf) of 50 daN (kg).
- Ergo ratchets that pull down to tension can provide a much higher tension force of 500 daN (kg) in comparison.

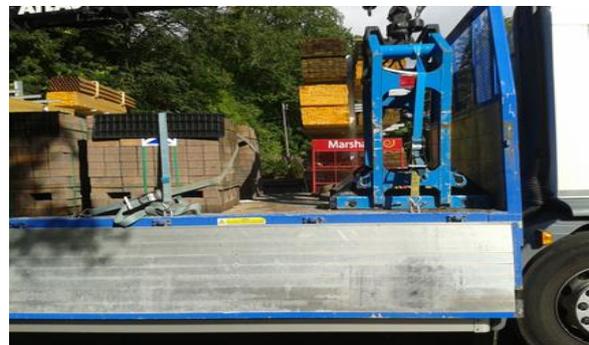
- For the strap to apply a force to the load, the elongation (stretch) on the webbing must be less than 7% when the lashing capacity is applied.
- Top-over lashing is a method of securing where lashings are positioned over the top of the goods to prevent the cargo section from tipping or sliding. If there is no side blocking at the bottom, for example, top-over lashing can be used to press the cargo section towards the platform bed. Top-over lashing forces the cargo against the load platform.
- Even if friction prevents the cargo from sliding, vibrations and shocks during transportation can make the cargo wander. This makes top-over lashing necessary even though the friction is high.
- Strapping angles are very important, as illustrated in the table below. This is particularly relevant when product is double-stacked, with one pack, or pallet, bridging two packs, as this typically results in strap angles of less than 45 degrees. A strap angle of just 30 degrees reduces the strapping force (typically 300 daN (kg)) by 50%, i.e. 150 daN (kg).



Degree angle	Tie down angle effect	Tie down effectiveness
90	1.00	100%
60	0.85	85%
45	0.70	70%
30	0.50	50%
15	0.25	25%



**Fig 4.** To increase the effectiveness of the lashing on low height products, or if due to width limitations requiring having to lash over drop side doors, packing of the product to increase height can be very effective as in the picture.



**Fig 5.** Cross strapping across the front of the product is an effective means of preventing forward movement where there are gaps between the load. There should be enough straps used to hold the weight of the remainder of the load held behind the straps.

- Spring lashing can be used to prevent tipping and/or sliding forwards or backwards. Spring lashing in combination with base blocking forwards or backwards is a restraining method consisting of a sling (bridle) across the corner of the cargo layer and two diagonal lashings. Spring lashing may also be in the form of a single, closed round-sling, placed across the edge of the cargo layer and lashed by means of a diagonal lashing on each side. The angle to the cargo surface is measured in the longitudinal direction and it is recommended that this angle is less than 45 degrees.



**Fig 6.** Corner protectors are very good at spreading the strapping forces over much greater area on packs of stacked items. Un-shrink-wrapped packs of blocks or bricks can be bound with the cling film type shrink wrap to prevent the loss of single items.



**Fig 7.** Bulk bags are always difficult to restrain as the product inside them settles when being transported. A good method to restrain them is to thread the strap through the fork tye loop, then pull backwards to the rear of the vehicle being careful not to attempt to over tension the strap as it cuts into the product and loses tension rapidly when the vehicle moves. The other good thing with this is you pull the bag loop back over the open top of the bulk bag, reducing spillage in transit. The bag also re-tensions itself when heavy braking occurs as the bag attempts to move forward. The strap cannot slip off the bag as it is threaded through the loop as in Fig 7.

#### Further Considerations.

- Consideration should be given to ensuring that ratchet straps cannot become loose and fall off the vehicle and become a danger to other road users. The use of ratchet straps with 'keeper' plates may help prevent this.
- Curtain side trailers – the standard 13 pairs of roof mounted cargo straps, usually found in curtain side trailers are not of sufficient capacity / strength to be used for load restraint. The straps should be used in conjunction with properly anchored ratchet straps to prevent lightweight objects from moving in transit.
- EN12642 XL rated curtain side trailers are so designed, that the bodywork and curtains act as 'load restraint', providing there is no more than an 80mm 'air gap', around any 1 pallet. Once 1 pallet is removed, the remaining load / pallets must be strapped, as though the trailer is 'in effect' a 'flat' trailer.
- Vehicles / trailers fitted with CCTV systems, offer the opportunity to monitor and record load security compliance / non-compliance providing the cameras are correctly positioned for such activities.

## 4. Double Stacking -

### Firstly, consider do you need to double stack?

If you do, then -

#### Key elements to consider when double stacking :

- Product type
- Pallet size and quality
- Load configuration – can voids be removed/reduced/ uneven height be removed?
- Restraint method to be used
- Consider straps/corner boards/void guarding
- Does the need for double stacking increase the need for working at height?
- If there is ever a need to go higher than a double stacking, then a specific risk assessment will be required for those product types – considering all the elements above

#### Consider product

- Is the product on the lowest level robust enough to support the pack above?
- Is the lower product's footprint larger than the product above, and does the product move or rock on the bottom product?
- Consider the product and pallet together, can you band or strap them together?
- Does the height of the product give a high centre of gravity?

If the answer to any of the above is YES, then reconfigure the load!

### Double Stacking – PALLETS

- The product should fit the pallet and vice versa
- Should the load be single stacked to avoid excessive loading on particular pallets if they cannot be removed from the load?

#### Consider

- Is the pallet of good quality?
  - Will it support the weight above it? If not, then
  - **Do not use that pallet**
- Does the pallet allow product to overhang it?
  - **Do not use that pallet**
- Is the pallet too big for the product? Will it mean that pallets loaded together will have gaps between the products?
  - **Do not use that pallet**

### Double Stacking – COMBINED PALLETS & HEADBOARDS

- The height of the headboard is key in the load configuration
  - Should the load go more than 50% above the headboard, then additional load restraint MUST be used
- As on previous points, the combination of the pallets loaded on top of each other must be considered carefully
  - Size; too big or too small
  - Movement of product possible
- Where pallets / packs are double stacked, both corner boards / protection and 'double strapping per pair of pallets / packs' is recommended. The pallets / packs on the top level should be positioned to ensure sound 'bridging' and ensuring that the strapping angles are as close to 90 degrees, as possible.

Any concerns should lead to the load being reconfigured!

## 5. Headboards and Dunnage

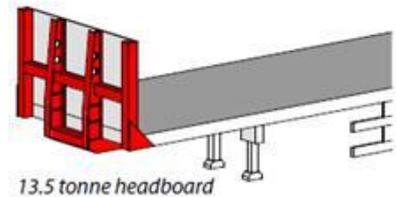
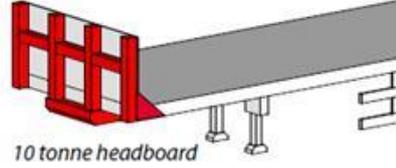
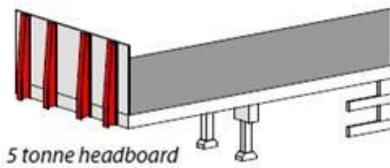
### Trailer Headboards

Headboards serve two vital functions in load security. Firstly, they form an integral part of the load restraint system provided the load is blocked directly against it; and secondly they can act as a safety back up offering the driver a degree of protection should the primary load restraint system fail. Headboards come with various 'shock' factors built in, with XL or XXL giving the best load restraint and safety provisions.



Trailer headboards which do not display this sticker do not meet the minimum requirements for XL rating.

### Examples of Headboards to EN12642 Specifications



The image on the right shows an example of just what the outcome can be when a load is allowed to move rather than blocking the headboard.

In this case, the load was less than half a metre back from the headboard, but when the driver was forced to brake hard, the immediate acceleration created by the forces acting upon 11 tonnes of steel, was sufficient to flatten the headboard and smash the cab from its chassis mountings.

The driver had a very lucky escape.



**NB: if more than 50% of the height of the load stands above the headboard, additional forward load restraint must be used to compensate for the lack of blocking**

### Timber Dunnage

Timber dunnage must always be of good quality and fit for purpose. If the dunnage fails, there will be a very real danger of load movement or loss. The four golden rules surrounding timber dunnage are:

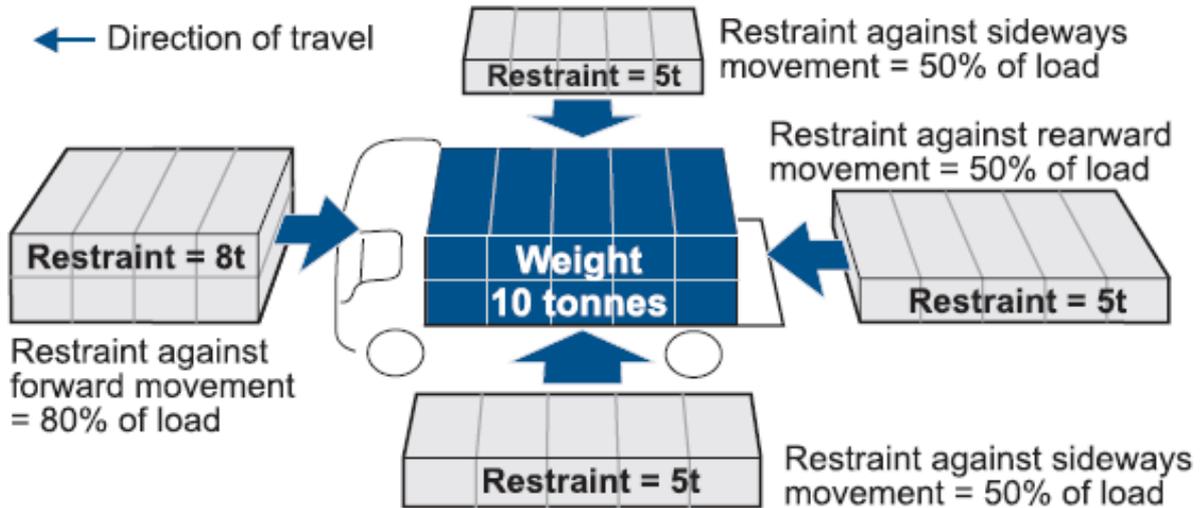
1. Always use 1<sup>st</sup> grade soft wood timber or better
2. Always use square cross section timbers
3. Base timbers must span the full width of the trailer
4. **NEVER** use timbers that are rounded or damaged. Such timbers will lead to failure (items marked 'banned' are not recommended)



## 6. Risk Assessments

### Load Security – Basic Requirements

The minimum horizontal restraint required to prevent movement of a 10-tonne load is shown:



### Load Security – Enforcement

DVSA examiners are instructed to assess the security of loads by asking themselves a series of questions:

- Can the load topple forwards or backwards?
- Can the load slide or topple off the side?
- Is the load unstable?
- Is the load-securing equipment in poor condition?
- Is there anything loose that might fall off?
- Does the vehicle present an immediate likelihood of causing danger or injury due to its load security or stability?

#### Is the load secured safely?

- Can the load slide or topple forward or back?
  - YES – review, repack, reload and re-secure with suitable equipment; use of headboard etc
- Can the load slide or topple off the side?
  - YES – source suitable retention equipment, consider use of sideboards/bars, repack or reload
- Is the load unstable?
  - YES – do not move the vehicle; seek immediate assistance and reload in a correct/safe manner
- Is load-securing equipment damaged or worn?
  - YES – do not use, source and replace with suitable alternative equipment
- Is there anything loose that might fall off?
  - YES – review/reassess the load and securing equipment; repack or reload if necessary

Completing a load risk assessment form, as per the attached example, could provide evidence that a risk assessment has been carried out. A copy of the completed form should be carried in the vehicle for inspection if required.

### Load information sheet

The Road Vehicles (Construction and Use) Regulations 1986 set out a requirement for the load carried on a vehicle to be secured so that it does not present a likely risk of danger or nuisance to any other road user.

To fulfil these legal responsibilities and secure the load so that a force equivalent to the entire weight of the load is secured in the forward direction and half the weight of the load to the sides and rear, the following load securing system has been used.

Headboard used as part of system: Yes  No

If no, the load is prevented from moving forward by:

Blocking  Bulkhead  Additional lashings  Chocks

Other: \_\_\_\_\_

The load is otherwise secured by:

Positive fit  Load retaining bars  Load-rated nets/tarpaulin

Lashings  Other: \_\_\_\_\_

The number of lashings was calculated using:

BS EN 12195:2010  IMO/ILO/UNECE guidelines  VDI 2700

Other: \_\_\_\_\_

Total load weight: \_\_\_\_\_ tonnes

## Load Security – Risk Assessed?



## 7. Appendices –

### A. DVLA Load Security Matrix (Nov 18) -

#### Risk represented by the type of load -

This table shows examples of the different load types, but there are other kinds.

<u>Load type A</u>	<u>Load type B</u>	<u>Load type C</u>
Metal pipes, sheet or bar	Timber	Clothing
Reinforced concrete	FIBCs/bulk powder	Wood chip
Bricks, stone or concrete	Roll cages	Waste paper
Vehicles including scrap	Bagged aggregate	Coal bags
Plant machinery	Empty skips stacked 3 high	Bulk material (in tipper)
Reels including steel, wire or paper	Heavy palletised goods (pallet weight of 400kg or above)	Packaging material
Kegs and barrels		Single loaded skips
Stacked loaded skips		Empty skips less than 3 high
Empty skips stacked more than 3 high		Light palletised goods (pallet weight up to 400kg)
Metal casings		
Glass		
Containers or work cabins		

#### Type of load security used -

<u>Defect category 1</u>	<u>Defect category 2</u>	<u>Defect category 3</u>
No load securing	Up to 30cm gap between load and vehicle headboard, unless other means of preventing forward movement have been used	Lashings on rope hooks (this is always poor practice, but there may be no other suitable attachment points)
More than 30cm gap between the front of load and vehicle headboard, unless other means of preventing forward movement have been used	Un-sheeted load in bulk tipper or skip	Minor damage to headboard not affecting structural integrity
Unstable load affecting vehicle stability or likely to topple from the vehicle	Inadequate load securing leading to likely risk of harm	Unsuitable load securing
Severe structural damage to the headboard, or gaps in the headboard that would allow load penetration	Unsuitable stacking of load items likely to lead to risk of harm	Poor condition of securing equipment
Items loaded over the height of the headboard (unless it's a single indivisible item, in which case the headboard must support the item to the height of its centre of gravity)	Height of load likely to affect vehicle stability	Unsuitable vehicle for the load

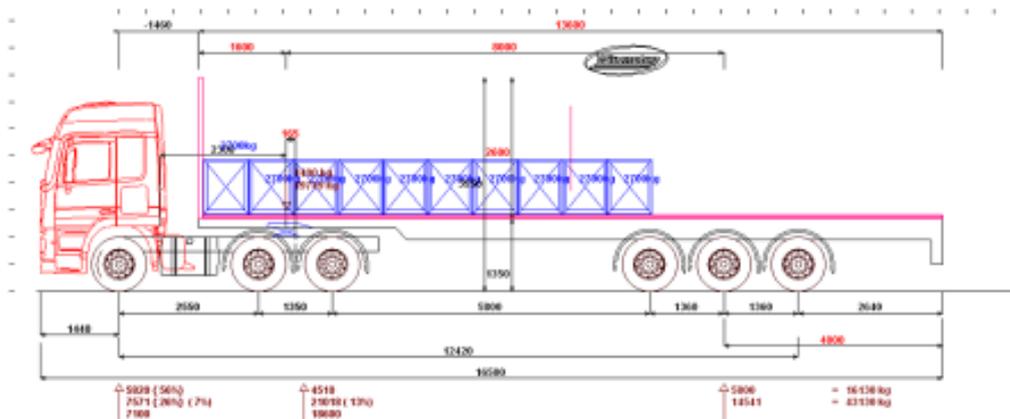
Appropriate action (by DVLA) -

<u>Load type</u>	<u>Defect category 1</u>	<u>Defect category 2</u>	<u>Defect category 3</u>
Load type A	Prohibit	Prohibit	Advise
Load type B	Prohibit	Prohibit/Advise	Advise
Load type C	Prohibit	Advise	Advise

You cannot consider the vehicle’s headboard part of the load securing system if there are large gaps between it and the load. If there are, then you need to find other ways of preventing forward movement.

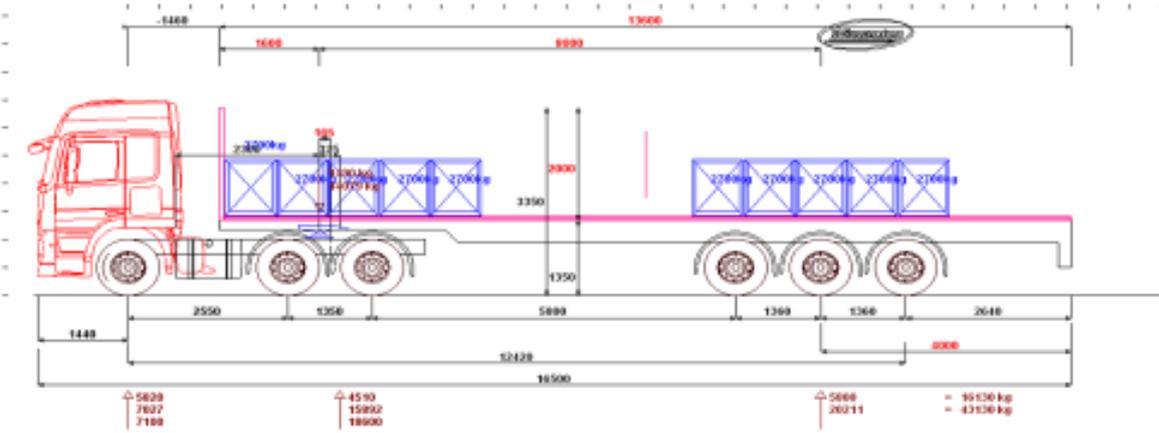
**B. ‘Split Loading’ -**

**Split Loading**



- Tractor front axle = 7% overload. Tractor bogie = 13% overload
- Tractor Gross Weight = 14% overload, Trailer kingpin= 32% overload  
(Tractor = 25,000 kg GVW, Trailer Kingpin rating = 15,000 kg, payload = 27,000 kg)

# Split Loading



## Correct Load Distribution

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