

Load Restraint Guideline for : Customer Pick ups - Vehicles less than 4.5 GVM

This load restraint guideline applies to:

The requirements for despatching Arrium product on customer vehicles. This document refers to:

- ✓ Customer safety on Arrium sites
- ✓ Application of Chain of Responsibility to Arrium customer pickups
- ✓ Loading general conditions
- ✓ Load dimension requirements
- ✓ Load restraint

1.0 Customer Safety on Arrium Sites

- ✓ Customers must remain in the safe area at all times unless otherwise directed by an Arrium representative
- ✓ Customers must obey all site requirements as indicated upon entry. Such requirements may include:
 - Personal Protective Equipment
 - Speed limits
 - Restricted area access

2.0 Chain of Responsibility

- ✓ Arrium is committed to the safe transport of goods. This extends to the transport of products despatched on customer vehicles
- ✓ To maintain safety for transport of goods, Arrium applies the key tenets of Chain of Responsibility:

“Any party who has control in a transport operation can be held responsible and may be made legally liable”

Arrium has the following Chain of Responsibility requirements for customer pick ups:

Customer (Consignor / Transporter)

- Ensure the vehicle is not over loaded by mass or dimension
- Apply required load restraint (See section 7)

Loader

- Ensure load placed within dimensional limits
- Ensure products are packaged suitably
- Assist customer to satisfy their responsibility where necessary.

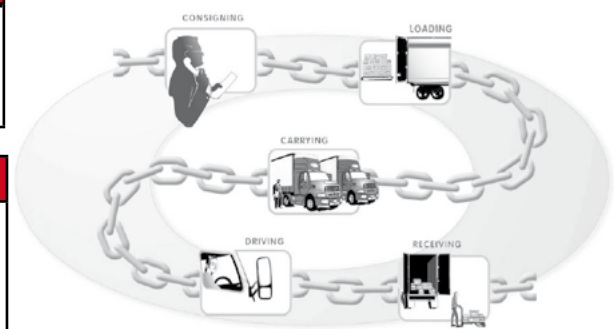


Image Courtesy of the NTC

3.0 Loading conditions

- ✓ The transport of loads that are too heavy or too long on an unsuitable vehicle can be dangerous and in breach of the law.
- ✓ Arrium reserves the right to refuse loading of any vehicle and /or loads considered inappropriate. Refer to Sections 4 and 5 for vehicle overhangs and load restraint requirements

This document is certified to comply with the requirements stipulated in the NTC performance standards (NTC Load Restraint Guide 2nd Edition 2004 s F(1), certification provided by RPEQ, CPEng 3121238). Compliance can only be achieved when all aspects of this document are adhered to in full. Additional requirements may be necessary under some conditions that are outside the scope of this certification. The information contained in this certification is confidential to and remains the property of Engistics. Any changes to this certification must be approved by Engistics.

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4.0 Light Trucks : Load Dimension and Rack requirements

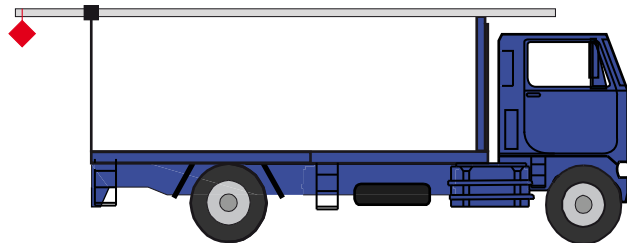
- ✓ Drivers vision must not be obstructed by product loaded on overhead racks
- ✓ All projecting loads must be fitted with a red flag 450mm x 450mm or larger
- ✓ Maximum front and rear overhang is 1200mm or 60% of Wheel Base, the lesser of the two
- ✓ Maximum 20% front and rear overhang for sheet product loaded on racks
- ✓ Maintain load masses below manufacturers cargo rating
- ✓ Weight limits shown are for full width product. i.e. Mesh or flat product
- ✓ Single bundles i.e RHS packs, structural beams etc will have mass limits 50% of those shown in the tables
- ✓ Maximum height of any rack is 1.8m above the tray

Trade Rack Weight Guidance: Twin racks

- ✓ The following table may be used for loads on two racks (one near front and other at rear). Loads are assumed to be equally distributed between the racks and product full width. i.e mesh or flat product

Upright Member Size	Weight Guidance Limit (total)
35 x 35 x 3.0 SHS	150 kg
40 x 40 x 3.0 SHS	220 kg
50 x 50 x 3.0 SHS	380 kg

SHS standards for Square Hollow Section (eg Tubeline® or DuraGal®)

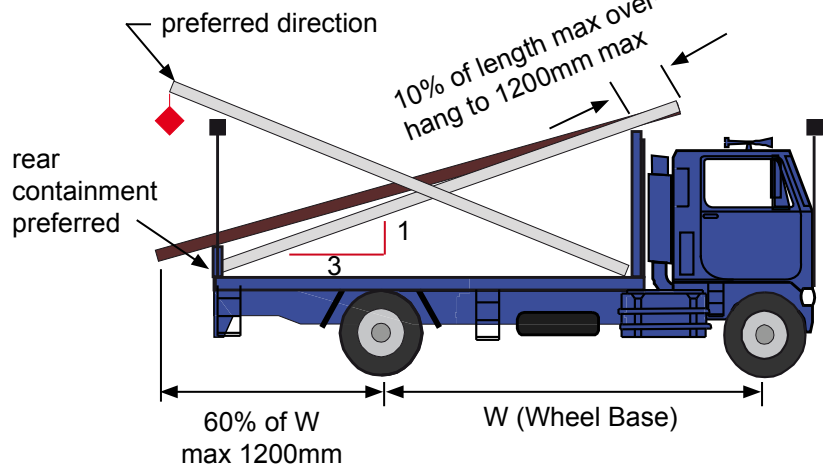


Trade Rack Weight Guidance: Single rack (inclined load)

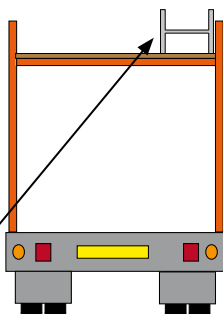
- ✓ Inclined racks accept a higher proportion of the forwards force. The following table provides guidance for inclined up to 18° (1 in 3 slope or 30%), with full width products, maximum 10% overhang

Upright Member Size	Weight Guidance Limit
35 x 35 x 3.0 SHS	100 kg
40 x 40 x 3.0 SHS	150 kg
50 x 50 x 3.0 SHS	250 kg

SHS standards for Square Hollow Section (eg Tubeline® or DuraGal®)

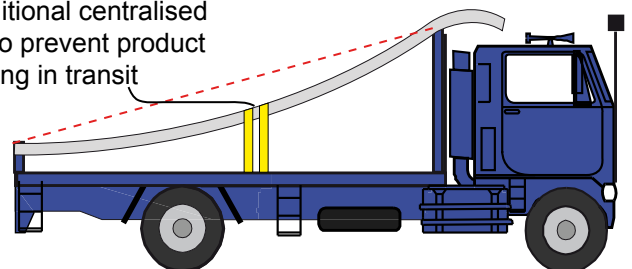


Long product on racks - point loads



Single long products or bundles of products not full width of the rack - **reduce allowable mass by 50%**

Apply additional centralised lashings to prevent product flexing in transit

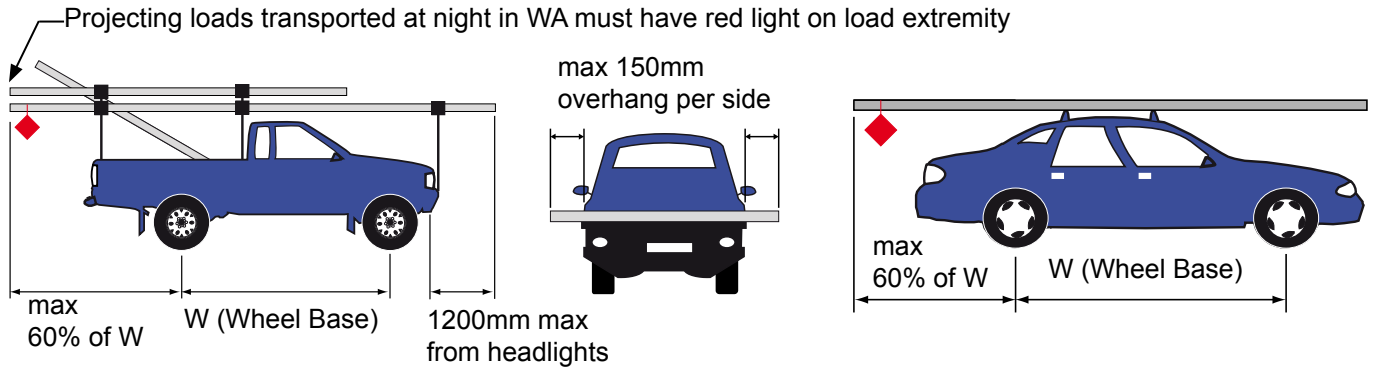


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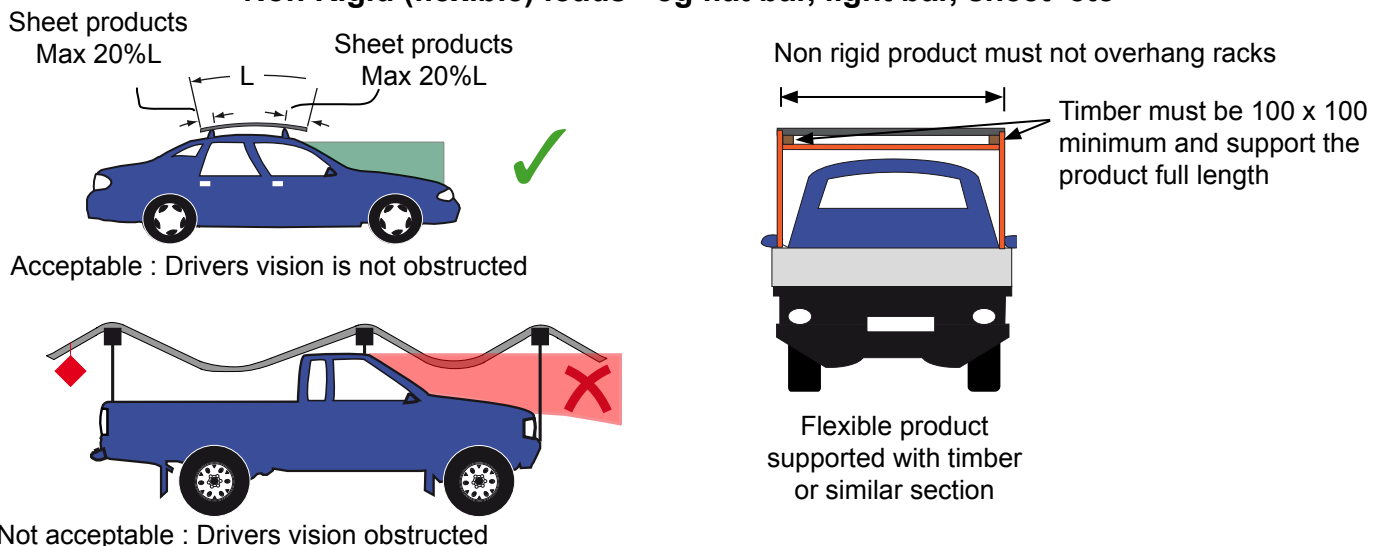
5.0 Sedans and Utility Vehicles : Load Dimension requirements

- ✓ Drivers vision must not be obstructed by product loaded on overhead racks
- ✓ All projecting loads must be fitted with a red flag 450mm x 450mm or larger
- ✓ Maximum front and rear overhang is 1200mm or 60% of Wheel Base, the lesser of the two
- ✓ Maximum 20% front and rear overhang for sheet product loaded on racks

Rigid self supporting loads - Pipe and Tube etc

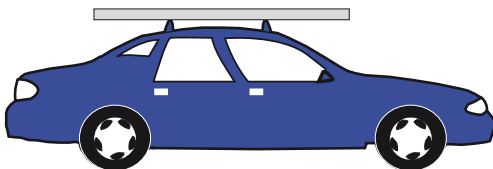


Non Rigid (flexible) loads - eg flat bar, light bar, sheet etc

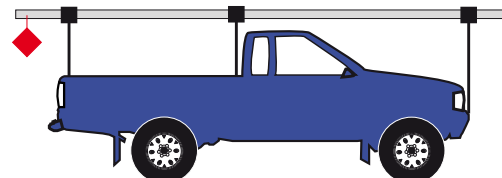


Mass Limits for product on roof racks

*40 kg for 2 racks - Non commercial vehicles (sedans / wagons etc)



*100 kg for 2 - 3 Racks for utes - tray back vehicles with a sedan or 4wd style passenger compartment



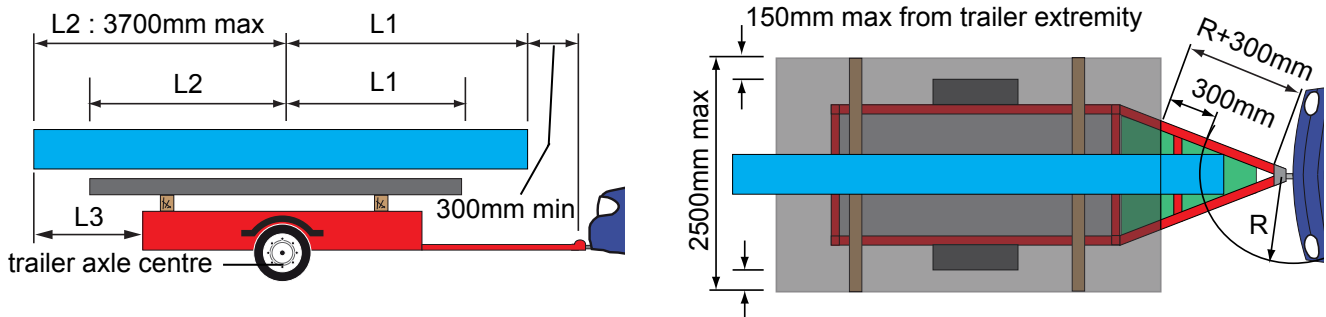
- ✓ Maximum mass on commercial factory standard roof racks is 40kg for 2 racks*
 - ✓ Refer to page 2 for maximum limits for light trucks
 - ✓ Be aware that loads secured on racks will impact vehicles stability, particularly in sideways direction
 - ✓ Maximum mass for racks includes the product payload, any supporting items and restraint equipment
- * Maximum mass limit without written certification for racks and vehicle

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6.0 Requirements for Trailers

- ✓ Product must be supported to prevent flex more than 100mm
- ✓ Maximum width of load is 2500mm
- ✓ Maximum side overhang is 150mm each side
- ✓ Product placement should provide some weight (approx. 10% of load) on the towball

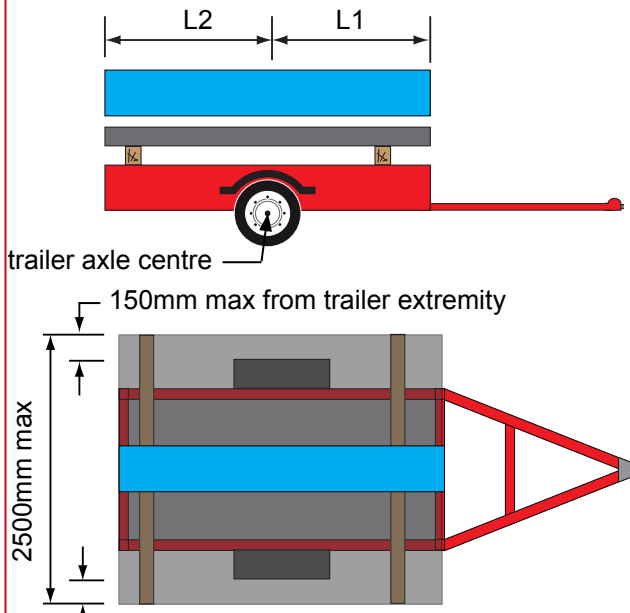
QLD / NSW Dimension limits for loads on Trailers



- ✓ L2 must be equal or less than L1
- ✓ Maximum front overhang is limited to:
 - minimum of 300mm from the towball if product width is within the area of the draw bar structure,
 - ✓ or, if wider than the drawbar structure;
 - a clearance of 300mm to any possible impact point with the turning car ($R+300\text{mm}$, see diagram)
- ✓ Must have appropriate supports and restraint points to allow any overhang of trailer box

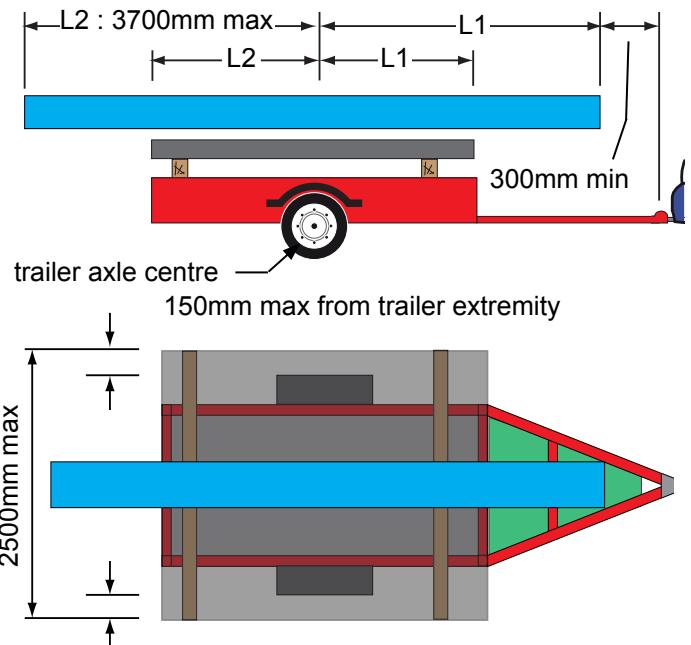
VIC / NT / ACT / TAS / WA Dimension limits for loads on Trailers

L2 = L1 to 3700mm max



- ✓ L2 must be equal or less than L1
- ✓ L1 is the distance from the center of the axle to the front of the load carrying area.
For box trailers this is to the front of the box

South Australia Dimension limits for loads on Trailers

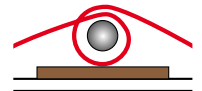


- ✓ L2 must be equal or less than L1
- ✗ The forward load overhang must not project outside the drawbar structure

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7.0 Load Restraint Requirements

- ✓ All loads must be loaded into a cargo area (eg vehicle boot, ute tray etc)
- ✓ All product must have a minimum of two lashings applied
- ✓ Additional lashings applied at 1.5m intervals is recommended for long product
- ✓ Use bellywrap or choke lashings for round objects, any bundles, for objects with low lashing angles, or for multiple packs (more than two) next to each other
- ✓ All products that are loaded with an incline must be lashed, preferably bellywrapped
- ✓ Any product loaded into a passenger compartment must be placed on the floor and be unable to slide
- ✗ No steel on steel contact. Products must be placed on surfaces such as timber or rubber



bellywrap configuration

Mass Limits per restraint

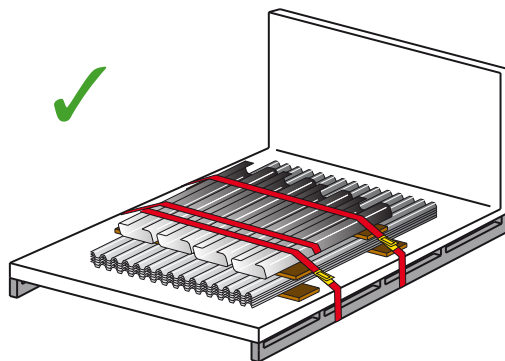
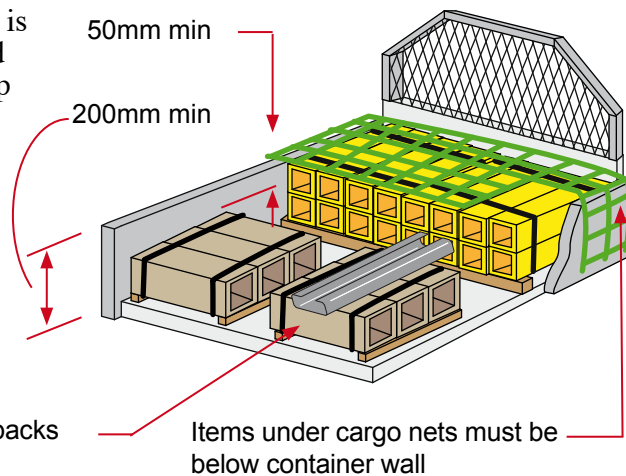
Lashing angle to horizontal	50mm webbing strap and ratchet	35mm webbing strap and ratchet	25mm ratchet webbing	25mm hand tightened webbing	8mm Synthetic rope with single hitch
30 - 45 degrees	380 kg **	320 kg **	120 kg **	60 kg	60 kg
45 - 60 degrees	540 kg **	455 kg **	180 kg **	90 kg	90 kg
60 - 90 degrees	660 kg **	550 kg **	220 kg **	100 kg	100 kg

** Check the rack capacity per pages 2 and 3 before applying the limits in yellow

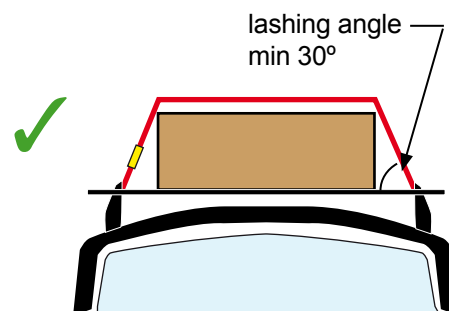
Restraint of product to the vehicle

All items not restrained by lashings :

- ✓ Must be contained so that the bottom of the pack is at least 200mm from the top of the container, and the top of the pack is at least 50mm below the top of the container
- ✓ Must be blocked in a way that will not allow the load to pierce the container
- ✗ Cannot be prone to movement
- ✗ No loose items stacked on top of packs
- ✗ Items placed under cargo nets must not extend above the top of the container
- ✓ Maximum gap to blocking surface 100mm



Bellywrap all long product where possible

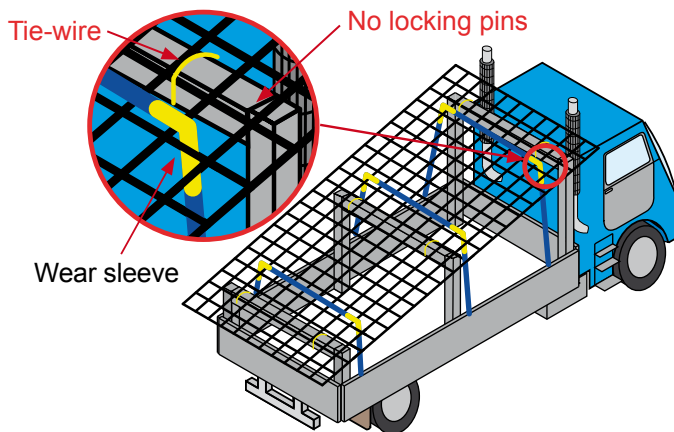


Steeper lashing angles above 60 degrees are preferred

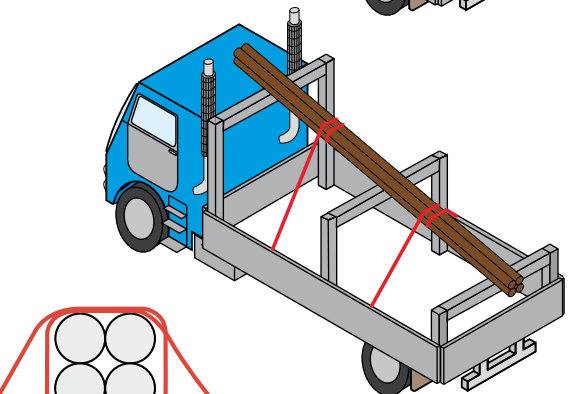
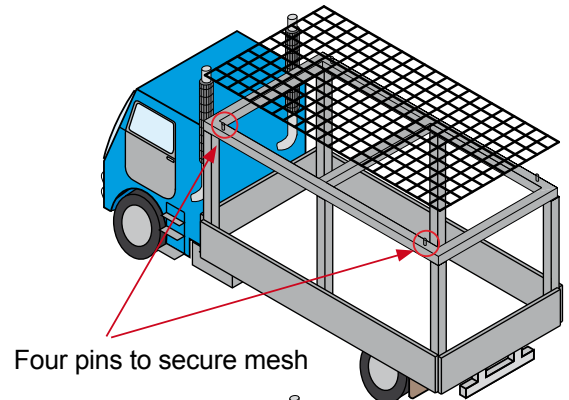
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Restraint of reinforcing products

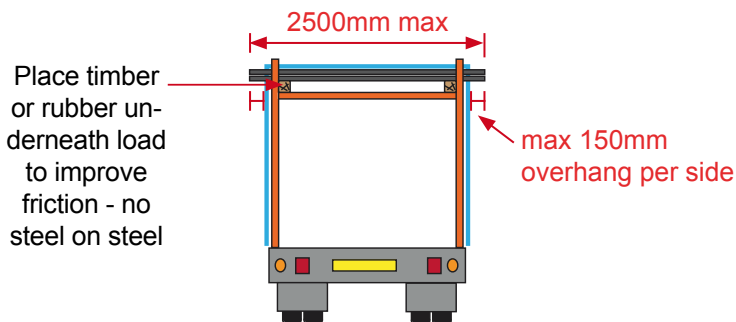
- ✓ Mesh product must be secured with lashings - locking pins are also recommended
- ✓ Product loaded on inclined racks exceeding 15% slope must be tied to the vehicle (tie-wire) to prevent uncontrolled movement during loading/unloading AND restrained using the required number of lashings
- ✓ **Max. 250kg product statically restrained to the vehicle per group of four tie-wire loops** (min. 3.15mm diam., 300MPa tens. strength, two wires per loop)
- ⚠ Take appropriate action to prevent uncontrolled movement when applying/removing restraints
- ✓ For non full width stacked product, thread lashings through mesh near product to maximise lashing angle
- ✓ Thread lashings through mesh to prevent product flex
- ✓ Bellywrap or choke lashings for bar product
- ✓ Refer to page 5 for restraint requirements



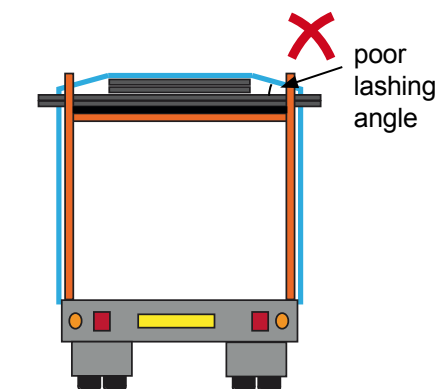
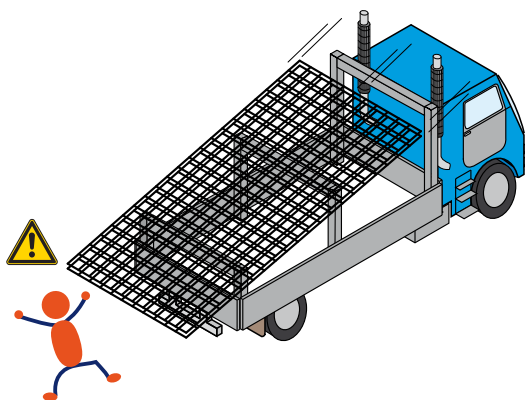
Lash through mesh to minimise product flex



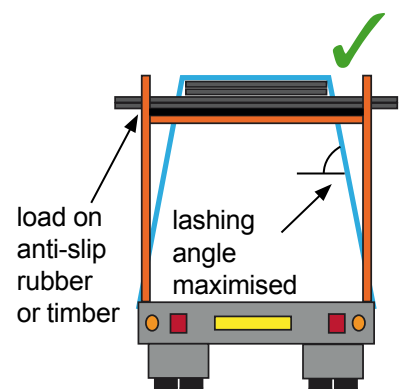
Belly wrap or choke lashings for bar product



Maximum product width 2500mm



Lashing angle not maximised

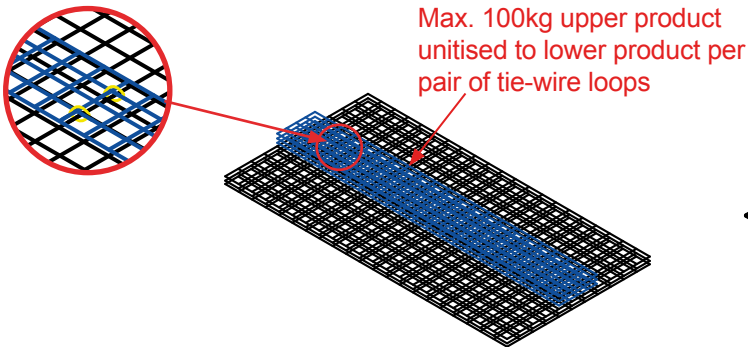


Lashing angle maximised

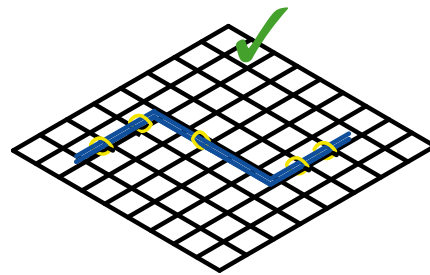
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Restraint of reinforcing products (cont.)

- ✓ Stacked packs of mesh product and bent starter bar stacked on mesh can be consolidated using tie-wire
- ✓ Max. 100kg consolidated product per pair of tie-wire loops (min. 3.15mm diam., 300MPa tens. strength tie-wire, two wires per tie loop)
- ✗ Tie-wire is unsuitable for load restraint and must only be used for unitising
- ✓ Restrain unitised loads with number of lashings per page 5 (minimum two lashings per unitised item)
- ✓ Apply a minimum of four tie-wires per pair of stacked packs

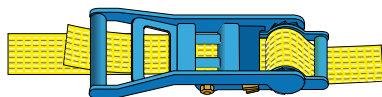


Unitised mesh product



Bent starter bar consolidated to mesh product

- ✓ Straight bar product unitised to mesh product on racking must be load choked, belly wrapped or cross lashed.
- ✓ Apply a minimum of two belly wraps/cross lashings and one tie down per unitised load
- ✓ For load choking, a 50mm webbing strap with ratchet tensioner is preferred
- ✗ Do not exceed the mass limits shown



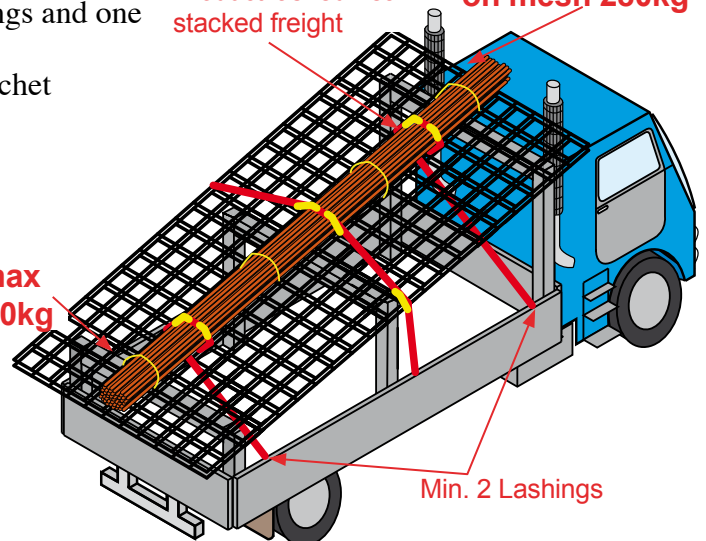
Minimum 50mm Webbing Strap

Mesh max mass 630kg

Max mass of unitised product on mesh 280kg

Product lashed near stacked freight

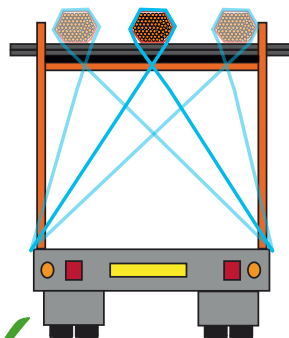
Min. 2 Lashings



Stacked mesh product unitised and lashed



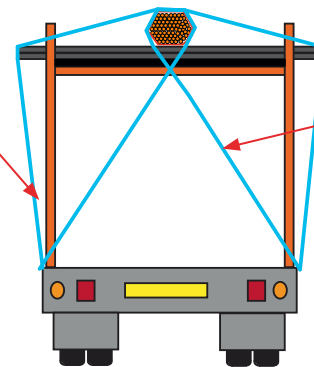
Load choke bar product



Cross lash bar product

1 x Tie Down

2 x Cross Lashings

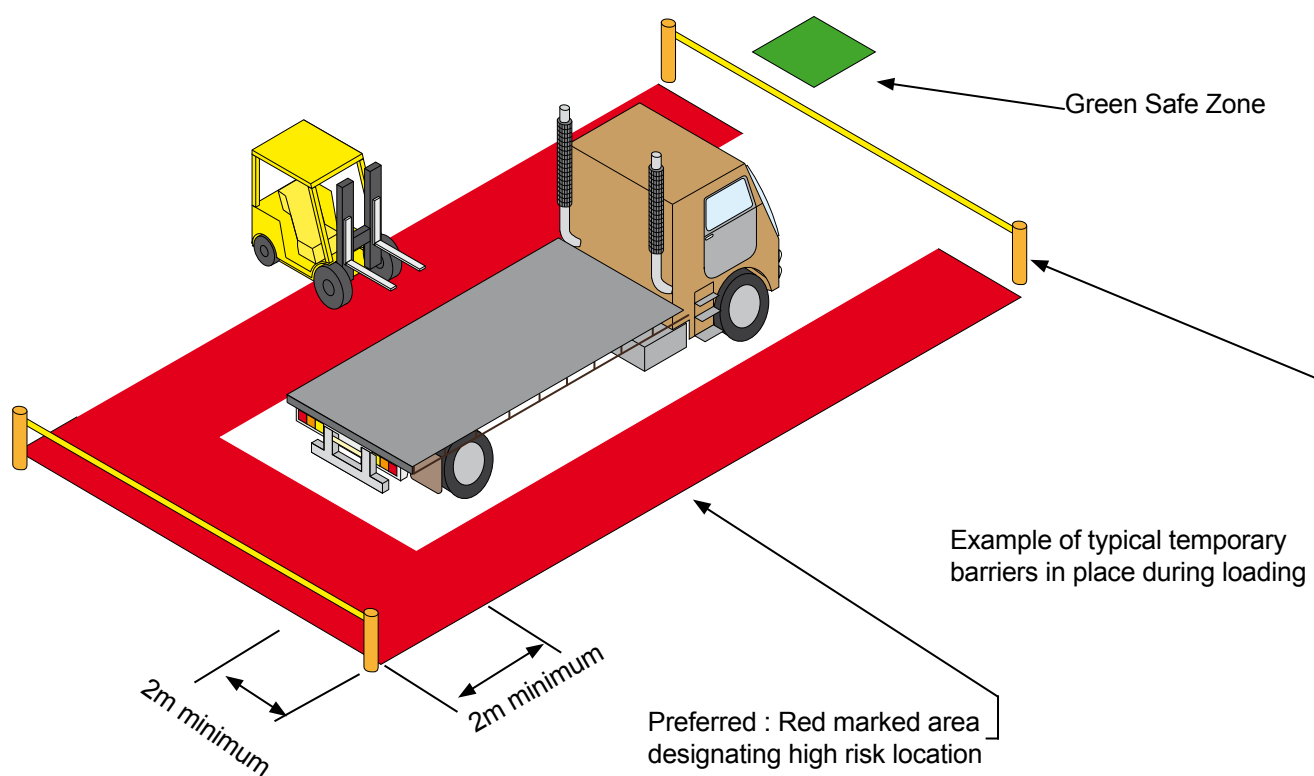


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8.0 Loading / Unloading Areas

- ✓ All loads must be loaded in a suitable area designated for the task
- ✓ A loading / unloading area must be established for every loading situation on an Arrium site
- ✓ To indicate the hazardous loading zone areas, signage must be in place at each end and barriers are preferred
- ✓ Customers may only access the loading area once loading is complete or as advised by Arrium personnel
- ✓ Customers must remain in the designated safe location as directed by Arrium personnel.
- ✓ Arrium personnel may only access the vehicle tray when loading/unloading activities have ceased
- ✗ Customers must not get onto the truck tray at any time during the loading and unloading process
- ✗ The opposite side of the vehicle from the forklift is a high risk area. Do not access during loading

Sample Loading / Unloading Area for Customer Pick Ups for GVM less than 4.5 tonnes**



**For vehicles where GVM is greater than 4.5 t refer to : The site specific safe Loading/Unloading Procedure or Mixed Loads Load Restraint Guideline

Key Assumptions (for rack strength):

1. Minimum 2 SHS sections in any rack.
2. Loads are tied down with maximum 300 kgf tension per upright (ie one standard 50 mm webbing strap per rack).
3. Minimum friction between product and vehicle (racks or tray) is $\mu_s = 0.4$
4. Uprights are no higher than 1.8 m from the tray.
5. Payload centre of gravity is a maximum of 3 m from the ground.
6. Loads are full width (point loads like beams require the above values to be halved).
7. Minimum yield strength of material 350 MPa.
8. All structures and welds in good condition.