



Load Restraints Toolbox Talk Part 1

SUBJECT	LOAD RESTRAINTS FOR HEAVY VEHICLES
RESOURCES	PowerPoint Presentation Load Restraint Fact Sheet Loading Guide Performance Standards

LOAD RESTRAINTS HEAVY VEHICLES

Facilitator

Explain:

Part 1 toolbox talk covers load restraints, performance standards, why a load needs to be restrained and legal obligations.

Part 2 toolbox talk will go into more detail on how Pantechicon and Containers are loaded correctly.

Handouts for this session:

Load Restraint Fact Sheet

Loading Guide Performance Standards

What are performance standards?

Performance standards when applied in regulations, they offer a flexible approach. By specifying the minimum standards that need to be met, there is room for flexibility in achieving the desired outcome, if the chosen method meets or surpasses the performance criteria. This allows individuals or businesses to select an approach that aligns with their specific requirements that best meets their needs. For example, braking performance is determined by the stopping distance or the rate at which the vehicle must be slowed, rather than by the size, type, or design of the brakes

Why are performance standards important?

Performance standards provide a flexible approach to your specific requirements, allowing you to tailor a load restraint system that best meets your business needs. The performance standards offer industry and regulators clear guidelines on what is deemed safe and compliant.

Securing your load is crucial, as unsecured or improperly loaded vehicles can lead to accidents such as loss of vehicle control, rollovers, collision, posing risks to road users resulting in injuries, loss of life, damage to property, and infrastructure.

This is normally caused by:

- Objects falling off the truck onto other vehicles or pedestrians
- Drivers swerve to miss objects falling from trucks

- Load shifting during transportation
- Load shifts during emergency braking leading to heavy vehicle crashes and damage to vehicles, infrastructure, pedestrians, etc
- Reduced vehicle stability whilst driving
- Heavy vehicles tipping over due to load shifts during sudden braking or cornering

Consequently, this results in

- Increased traffic accidents
- Damage to load
- Road hazards for other vehicles
- Penalties for non-compliance
- Legal responsibilities resulting from traffic incident or accident
- Traffic disruptions
- Road blockages

WHY DO I NEED TO RESTRAIN MY LOAD?

To be safe

Loads that are not restrained properly can injure or kill and can cause significant property damage.

- If the load falls off, it endangers the lives of other road users through a direct collision or by causing other drivers to swerve to avoid it
- If the load moves forward, it can pierce the cabin and injure or kill the driver or passenger
- If the load makes the vehicle unstable it can cause an incident, especially when taking corners

Unrestrained loads may move

- Forces from changes in speed, direction or slope may cause a load to shift.
- These forces result from normal driving conditions including braking, accelerating, cornering, road surfaces and air flow.
The weight of a load is not enough to hold it in place.
- A heavy load is just as likely to fall off as a light load because the heavier the load, the higher the forces it experiences

Business implications

Your company's reputation and your financial position can suffer if you're involved in a load restraint incident due to:

- adverse publicity
- loss of contracts due to damaged goods
- insurance excess payments
- increase in insurance premiums

To comply with the law

If you're involved in packing, loading, moving or unloading a vehicle, you are responsible for complying with load restraint laws.

YOUR LEGAL OBLIGATIONS

Rules on load restraint

You are legally responsible for restraining your load so that:

- **It does not come off your vehicle** under normal driving conditions, including heavy braking and minor collisions. If it comes off, this is evidence you have breached the law
- **It does not negatively affect the stability of the vehicle**, which can cause the vehicle to roll over or swerve uncontrollably and cause an accident
- **It does not stick out of the vehicle** in a way that could injure people, damage property or obstruct others' paths

You must pick up any fallen load if it is safe to do so or arrange for someone to retrieve it.

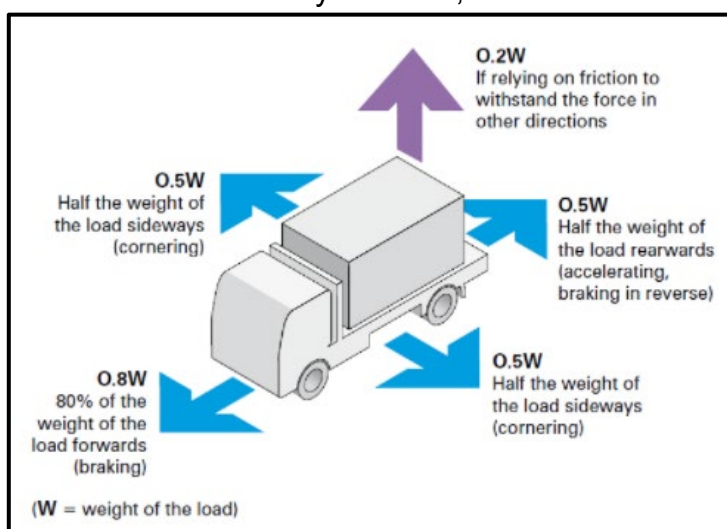
Causes of load movement

Just like any unrestrained person in a vehicle, loads can move forwards, backward, sideways and upwards:

- Forward shifts are caused by:
 - braking while driving forward, accelerating in reverse, downhill slopes
- Backward shifts are caused by:
 - braking in reverse, accelerating forward, uphill slopes
- Sideways shifts are caused by:
 - cornering, cambered roads
- Upward shifts are caused by:
 - uneven road surface

The law sets out performance Standards for load restraint

The **Performance Standards**¹ set out the minimum amount of force a restraint system must be able to withstand in each direction. For heavy vehicles, these forces are:



If a load is restrained to meet these Performance Standards it will not fall off or affect the stability of the vehicle under expected driving conditions. This includes emergency braking and minor collisions.

You can choose how to restrain your load to meet these standards

- The **Performance Standards** define what is required but not how to do it. This guide provides general information to help you choose a load restraint system suitable for your load.
- You can use alternative load restraint methods **provided you can show that they meet the Performance Standards**. The best way to do this is to get your restraint system certified by a qualified engineer (Certification).

Everyone shares the responsibility for compliance.

Employers and workers have a duty of care to ensure the work environment is safe.

Source:

NTC – Load Restraint Guide 2018: p7

NTC – Load Restraint Guide 2018: p4 – ¹Performance Standard

Refer to “Load Restraint Fact Sheet” handout for further information.

There following are the 10 steps when restraining your load:

LOAD RESTRAINT SYSTEM CHECKLIST

Planning your load

1. Understand your load
Know your load’s features, weight, dimensions, centre of gravity, load type, wheels, etc.
2. Choose a suitable vehicle for your load type and size
Check your vehicle’s carrying capacity and allowable overhang/height.
3. Use a restraint system that is suitable for your load
Select the appropriate restraint method for your load and vehicle.
4. Position your load to maintain vehicle stability, steering and braking
Maintain a low centre of gravity and ensure compliance with legal limits for overhang, height, width, mass, and axle mass.
5. Check your vehicle structures and restraint equipment are in good working condition and strong enough to restrain your load. **Loading (and unloading) the vehicle**
Ensure that all vehicle and restraint equipment is rated and in full working order, and promptly repair or replace any worn or damaged equipment.

Loading/unloading the vehicle

6. Make sure your load is stabilised
Take steps to stabilise a load that is at risk of toppling over
7. Make sure you understand and use safe work practices when loading and unloading a vehicle.

Develop plans, train personnel, establish loading zones, and communicate effectively for the given environment.

8. Make sure you use enough restraint to keep you and others safe. **Driving according to the load and driving conditions**

Your load restraint system must adhere to the Performance Standards.

Driving according to the load and driving conditions

9. Allow for changes in vehicle stability, steering and braking when driving a loaded vehicle
Be mindful of any alterations in your vehicle's handling, height, and width
10. Check the load and its restraint regularly during your journey
Loads may settle and shift, requiring lashings to be re-tensioned

RESOURCES:

Load restraint guide: www.nhvr.gov.au/files/202112-1285-load-restraint-guide-2018.pdf

Qld Government – Load Restraint – Schedule 7

<https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2013-0077#sch.7>

LUEZ guidelines: <https://truck.net.au/system/files/industry-resources/r1%202011%20luez%20guidelines.pdf>

RESOURCES: VIDEO (Optional)

NRSPP – LOAD RESTRAINTS

<https://www.nrspp.org.au/product/heavy-vehicle-toolbox-talks-load-management/>

Handouts

Load Performance Fact Sheet

NHVR: Loading Guide Performance Standards – NTI Load Restraint Guide 2018 (p4)



Items Raised/Corrective Action	Action By	Action completed	
		Sign off	Date

DATE:

FACILITATOR SIGNATURE

HANDOUT

LOAD RESTRAINTS FOR HEAVY VEHICLES

There following are the 10 steps when restraining your load:

LOAD RESTRAINT SYSTEM CHECKLIST

Planning your load

11. Understand your load
Know your load's features, weight, dimensions, centre of gravity, load type, wheels, etc.
12. Choose a suitable vehicle for your load type and size
Check your vehicle's carrying capacity and allowable overhang/height.
13. Use a restraint system that is suitable for your load
Select the appropriate restraint method for your load and vehicle.
14. Position your load to maintain vehicle stability, steering and braking
Maintain a low center of gravity and ensure compliance with legal limits for overhang, height, width, mass, and axle mass.
15. Check your vehicle structures and restraint equipment are in good working condition and strong enough to restrain your load. **Loading (and unloading) the vehicle**
Ensure that all vehicle and restraint equipment is rated and in full working order, and promptly repair or replace any worn or damaged equipment.

Loading/unloading the vehicle

16. Make sure your load is stabilised
Take steps to stabilise a load that is at risk of toppling over
17. Make sure you understand and use safe work practices when loading and unloading a vehicle.
Develop plans, train personnel, establish loading zones, and communicate effectively for the given environment.
18. Make sure you use enough restraint to keep you and others safe. **Driving according to the load and driving conditions**
Your load restraint system must adhere to the Performance Standards.

Driving according to the load and driving conditions

19. Allow for changes in vehicle stability, steering and braking when driving a loaded vehicle
Be mindful of any alterations in your vehicle's handling, height, and width
20. Check the load and its restraint regularly during your journey
Loads may settle and shift, requiring lashings to be re-tensioned

PLANNING A LOAD

Step 1: Understand your load

✓	<p>Think about the load that you plan to transport - what are the load's characteristics:</p> <ul style="list-style-type: none"> • Weight • dimension • centre of gravity • crushable/fragile loads • wheels • friction levels • packaging or unitisation • any other important or unique features
✓	<p>Undertake a risk assessment on the load, keeping in mind its specific characteristics and plan to mitigate any risks.</p> <ul style="list-style-type: none"> • For example, if you do not know the precise weight of your load, you could: <ul style="list-style-type: none"> under-load for the first trip and verify the weight at some stage of the journey if the vehicle's weight cannot be accurately assessed at the time of loading. • fit scales to loading equipment and keep a "running" total of the weight of the load for each trip weigh each container/home pack to confirm its weight; records should be kept to ensure a low-risk factor

Step 2: Choose a suitable vehicle for your load type and size

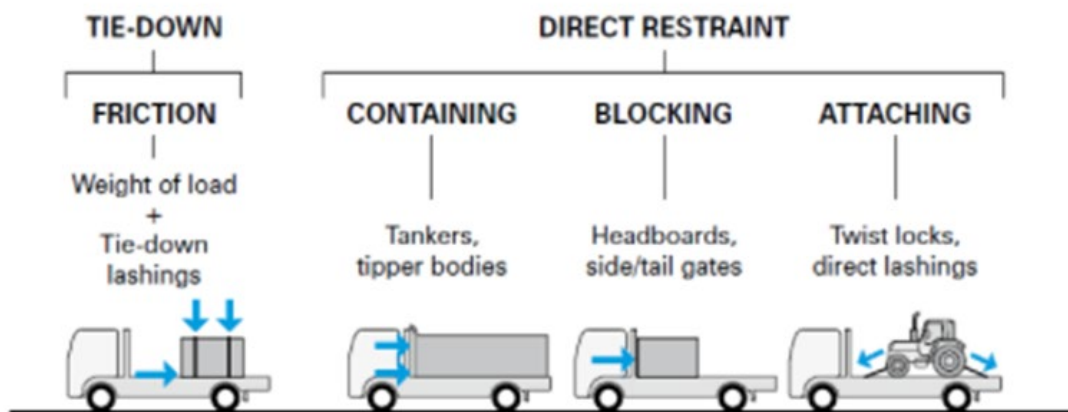
✓	<p>Check your vehicle's load-carrying capacity.</p> <p>Your vehicle should have adequate load capacity and sufficient space for the load.</p>
✗	<p>Do not allow your load to overhang.</p> <p>If you have a long load your vehicle needs to be long enough to avoid excessive overhang. Excessive overhangs will affect the steering capacity, swept path and stability of your vehicle.</p>
✓	<p>Check the overall height of your load.</p> <p>The overall height of a loaded vehicle must be safely lower than the height of any obstruction on your journey (such as a bridge or overhead wires).</p>
✓	<p>Choose a vehicle that gives you the roll stability your load needs.</p> <p>Loads with a high centre of mass are less stable and increase the risk of vehicle rollover. Such loads should be carried on a vehicle with a low platform height (for example, drop frame trailer or low loader) or on a vehicle with good roll stability.</p>

Step 3: Use a restraint system that is suitable for your load

✓	<p>Choose the restraint method that is most suitable given your load and vehicle.</p> <p>Loads can be restrained by two basic methods: tie-down or direct restraint (ie: containing, blocking and attaching).</p> <p>The diagram below shows the different restraint methods for controlling load movement in the forward direction. The same principles apply to backward and sideways movement.</p>
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NOTE: The containing, block and attaching methods are not commonly used in the Furniture Removals Industry.

Different restraint methods



A combination of different restraint methods can be used and, in some cases, may be necessary to meet the Performance Standards.



Make sure you are using enough lashings of sufficient capacity if using the tie-down restraint method.
You will need to consider the weight of your load, whether the load is blocked or unblocked and the amount of friction between the surfaces of your load and the vehicle deck.



Use a direct restraint method for loads that are difficult to tie down.
Using direct lashings to attach a load is especially suitable where there is little or no friction between the load and the loading deck, such as:

- slippery loads
- loads on wheels



Make sure you are using load-rated headboards and load-rated side/tailgates if using the blocking restraint method.



Make sure contained loads cannot shift within the vehicle structure.



Make sure the load restraint method you use meets the Performance Standards.

Step 4: Position your load to maintain vehicle stability, steering and braking



Keep the centre of gravity low and close to the vehicle's centreline.
The position of a load has a significant impact on the vehicle's stability, particularly its rollover stability. Rollover stability is very sensitive to the centre of gravity of the vehicle. Rollover stability increases by lowering the centre of gravity.

✓	Load heavy objects first and do not offset them to one side of the vehicle.
✓	Check your rollover stability. Static rollover threshold (SRT) is a basic measure of rollover stability. High SRT values imply better resistance to rollover. SRT calculators can be found online to help reduce the rollover risk.
✓	Spread the load evenly across the deck and share the weight between the axles. The weight distribution of a load can also affect vehicle dynamics. For example: Overloading either the front or rear axle will affect the vehicle's steering ability. <ul style="list-style-type: none"> • Uneven weight on the wheels influences the braking force of the wheels and can cause them to lock up. Axle loads can be obtained by weighing or by calculation.
✗	Do not allow your load to excessively project from the vehicle. A load should not excessively project from the front or sides of the vehicle because it could cause danger to other road users or damage to property.
✓	Face dangerous projections away from the driver/staff. A load with any potentially dangerous projections should be placed in a way that minimises the risk to the driver/staff if the load shifts during braking or a collision.
✓	Understand the legal mass and dimension requirements of your vehicle. The HVNL covers mass and dimension requirements for heavy vehicles. Visit the NHVR's website for more information on mass and dimension requirements .

Step 5: Check your vehicle structures and restraint equipment are in good working condition and strong enough to restrain your load

✓	Make sure that all equipment used in packing, loading and load restraint is serviceable and regularly maintained.
✓	Inspect all vehicle and restraint equipment before each trip to make sure it is in good working order. Wear and damage on vehicle and restraint equipment can significantly reduce their strength and function. If there is any doubt about their reliability and safety, do not use them for the trip. Instead, replace them with equipment in good condition.
✓	Check your lashings. Even minor wear and damage may considerably reduce performance compared with the lashings' rated capacity, putting you and others at risk.
✗	Do not use equipment weakened by cracked, broken or worn components for restraining loads.
✓	Check all locking and latching mechanisms are fully functional when being used for load restraint purposes, particularly when loading containers.
✓	Use rated equipment.

	Any vehicle structures and restraint equipment used in a restraint system must be strong enough to withstand the forces indicated in the Performance Standards. Restraint equipment is rated by manufacturers to indicate its restraint capacity. The restraint capacity of unrated equipment is very low.
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LOADING THE VEHICLE




Step 6: Make sure your load is stabilised

	Unstable and tall loads can tip over under heavy braking or cornering, even if they are restrained properly at the base.
	A tall load can tip forwards if the length of the base is less than 80% of its height. It can tip sideways if the width of the base is less than 50% of its height.
	A load will also be unstable if it is on a base such as timber dunnage that is narrower than the base of the load.
<i>To increase the stability of tall loads:</i>	
	Place unstable loads against a rigid structure (such as a headboard) to prevent them from tipping.
	Strap several unstable items together to form a stable pack.
	Fully tension your lashings to increase load stability when using tie-down restraints.
	Use direct lashings to prevent a load tipping if further restraint is required.
	Rope and webbing straps can stretch and loosen – check them frequently if using these types of lashings to stabilise a load.
	Don't mix and match chains and straps on the same load. They have different stretch factors and breaking points, which may cause lashing to fail. Always assess the restraint to its weakest point (for example, grab hooks may have a lower capacity than the chain 'strength).



Step 7: Make sure you understand and use safe work practices when loading and unloading a vehicle

	Multiple deaths and injuries occur each year in Australia as a result of incorrectly loading and unloading trucks. The following principles and actions are designed to prevent such events.
Planning	
	Plan to take into account the load, vehicle and equipment characteristics.
Loading plan	
	Use appropriate loading equipment.
	Use the appropriate load restraint equipment and methods.

✓	Obey the relevant mass and dimension limits for load and route.
Unloading plan	
✓	Check your load for movement or stability before removing restraints and unloading.
✓	Use appropriate equipment for unloading
Documentation	
✓	Document an appropriate loading and unloading procedure and load restraint system that is displayed and easily accessed by packers, loaders, drivers and other parties in the supply chain.
✓	Use loading, unloading and load restraint diagrams for different types of loads to support safe and compliant loading.
✓	Use a template that requires the person in control of packing or loading the goods to verify the accuracy of any records.
Training	
✓	Make sure everyone understands.
✓	Train all people on the loading and unloading site according to their role.
✓	Include loading and unloading exclusion zones in site inductions
Work execution	
✓	<p>Clarify who has authority.</p> <ul style="list-style-type: none"> The loader has authority over the activity and directs the truck driver or others to make sure the activity is safe. <p>The loader and the truck driver discuss how the loading and unloading will occur.</p>
✓	Separate equipment and people
✓	<p>Establish the following zones:</p> <ul style="list-style-type: none"> Loading and Unloading Exclusion Zone. No people or other equipment can enter this area. Mark the area with fences, witches' hats, electronic sensors, barriers or similar <p>Driver safety zone, to allow line of sight between the loader and the truck driver to observe the loading or unloading.</p>
✓	<p>Include additional measures</p> <ul style="list-style-type: none"> good layout of the area to maximise visibility. additional spotters observing the activity. <p>site-specific measures, especially for complex sites.</p>









Communication	
	Check there is fit-for-purpose communication between the loader and the truck driver. This includes hand signals, two-way radio, talking, etc.
	Maintain line of sight between the loader and the driver. If broken, the loader immediately stops and waits until the line of sight is re-established.
	Stop work if people enter the Loading and Unloading Exclusion Zone. The Loading, Unloading Exclusion Zone (LUEZ) Guidelines provide more information on this topic.

Step 8: Make sure you use enough restraint to keep you and others safe



	Restrain your load to prevent unacceptable movement during all expected conditions of operation. <ul style="list-style-type: none"> • Movement is unacceptable if it negatively impacts on weight distribution or the stability of the vehicle. • Expected conditions of operation include emergency braking and minor collisions. Part or all of the load coming off the vehicle is a load restraint breach.
	Make sure your load restraint system can withstand the load restraint performance standard forces.

DRIVE ACCORDING TO THE LOAD & DRIVING CONDITIONS:

Step 9: Allow for changes in vehicle stability, steering and braking when driving a loaded vehicle

	Understand the effect your load type and its position can have on the vehicle's stability, steering and braking capacity.
	A truck carrying a load with a high centre of gravity will be less stable.
	A load that is not evenly distributed across the width of the trailer will reduce the vehicle's stability when cornering.
	If a load is not evenly distributed along the length of the trailer, and there is more weight on some wheels than others, then each wheel will not brake with the same force. This can cause the wheels to lock up.
	Braking forces can be greater at low speed because of the "grabbing" effect.
	External factors such as high wind speeds can also reduce vehicle stability or blow the load off.
	Drive at an appropriate speed for the driving conditions Many rollovers are caused by inappropriate speed when changing direction, particularly on corners. Remember: The faster the vehicle is going and the tighter the turn, the more likely a driver is to lose control.
	Be aware of the height and width of your loaded vehicle. You should make allowances for high and wide loads when driving around corners, under bridges and electric cables and near power poles, traffic lights and other obstructions.

Step 10: Check the load and its restraint regularly during your journey

	<p>Check your load and lashings regularly during your journey to make sure the load remains secure. Some loads can settle and shift during a journey, causing lashings to loosen. The amount of checking required depends on many factors including the type of load, the type of restraint system, the roughness of the road and how well it's packed.</p>
	<p>Understand the characteristics of your load and know how often it needs to be checked during a journey. Some loads require the lashings to be checked and re-tensioned after only a very short distance.</p>

RESOURCES:

Load restraint guide: www.nhvr.gov.au/files/202112-1285-load-restraint-guide-2018.pdf

Qld Government – Load Restraint – Schedule 7 <https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2013-0077#sch.7>

The Loading, Unloading Exclusion Zone (LUEZ) - www.truck.net.au/system/files/industry-resources/r1%202011%20luez%20guidelines.pdf

NATIONAL HEAVY VEHICLE REGULATIONS (NHVR)

LOADING PERFORMANCE STANDARDS

(1) A load on a heavy vehicle must be restrained by a load restraint system that:

(a) prevents the load from moving in relation to the heavy vehicle (other than movement allowed under subsection (2)) in the circumstances mentioned in subsection (3); and (b) at a minimum, is capable of withstanding the forces that would result in the circumstances mentioned in subsection (3).

(2) A load may move in relation to a heavy vehicle if:

- (a) the vehicle's stability and weight distribution are not adversely affected by the movement; and
- (b) the load does not become dislodged from the vehicle.

Examples of load movement that may be permitted under (2)

1. load contained within the sides or enclosure of the heavy vehicle that is restrained from moving horizontally may be able to move vertically;
2. a load of very light objects, or a loose bulk load, that is contained within the sides or enclosure of the heavy vehicle may be able to move horizontally and vertically;
3. a bulk liquid load contained within the sides or enclosure of the heavy vehicle.

(3) For subsection (1), the circumstances are that the loaded vehicle is subjected to:

(a) any of the following, separately:

- (i) 0.8 g deceleration in a forward direction;
- (ii) 0.5 g deceleration in a rearward direction;
- (iii) 0.5 g acceleration in a lateral direction; and

(b) if friction or limited vertical displacement is relied on to comply with (a), 0.2 g acceleration in a vertical direction relative to the load.

Source: NTI – Load Restraint Guide 2018:p4