

# LOAD RESTRAINT GUIDE

FOR LIGHT  
VEHICLES

2017

*Draft for  
consultation*



National Transport Commission



# ABOUT THIS GUIDE

The Load Restraint Guide for Light Vehicles is designed to help you safely restrain loads on your light vehicle.

This is a **guide only**. You can meet the load restraint requirements in another way, however you must be able to prove that your method complies with the law.

## Know your legal obligations

- **You must restrain any load** you are carrying on a light vehicle so that it:
  - **Stays on the vehicle during normal driving conditions** – this includes heavy braking, cornering, acceleration and even minor collisions.
  - **Doesn't negatively impact the stability of the vehicle**, making it difficult or unsafe to drive.
  - **Doesn't protrude from 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.

## Understanding load shift

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

- **Forwards shift** is caused by: braking while driving forward, accelerating in reverse, driving downhill
- **Backwards shift** is caused by: braking in reverse, accelerating forward, uphill slopes
- **Sideways shift** is caused by: cornering, cambered roads
- **Upward shift** is caused by: uneven road surface, airflow.

### What is a light vehicle?

A light vehicle is **any car, ute, van, truck or trailer (including a combination**, e.g. a ute and trailer) that has a gross vehicle mass **up to 4.5 tonnes**.

### Who should use this Guide?

If you:

- **drive** a light vehicle
- **load or unload** a light vehicle
- **supervise or manage** drivers and loaders of light vehicles

This guide is designed to help you **restrain loads safely, securely and within the law**.

This guide will help you if you are taking timber home from a hardware store, a delivery driver dropping off packages, a tradesperson carrying your tools and equipment, or responsible for safe carriage of any other load in a light vehicle.

## TOP TIPS TO HELP YOU RESTRAIN YOUR LOAD EFFECTIVELY

### Restraining your load is not complex, but it does require training and knowledge

- **Read** this load restraint guide for light vehicles and keep it handy as a reference
- **Get training** – from more experienced colleagues or load restraint training organisations

### Loads can and do move if not properly restrained

- **A load can move forwards, backwards or sideways and must be restrained in each of these directions.** You must also ensure any upwards movement is limited.
- **Light and heavy loads move just as easily** – don't assume a heavy load will be held by its weight: it won't
- **Braking forces are typically higher at low speeds** – don't assume because you are travelling slowly that you don't have to restrain your load correctly

### Each load is different; consider the restraint method that will work best

- Choose a load restraint method that allows you to meet your **legal obligations**
- Choose a vehicle that meets the requirements for dimension and projection, and is well-maintained and roadworthy
- Choose load restraint equipment that is fit-for-purpose, has the rated capacity to restrain the load and is in good working order

### There are two main load restraint methods

- **Tie-down** restraint – using lashings to clamp the load to the vehicle (relying on friction for most of the restraint forces)
- **Direct** restraint:
  - **Containing** – the load is contained within the vehicle
  - **Blocking** – the load is blocked from moving by a rigid structure, e.g. a rated headboard
  - **Attaching** – the load is attached to the vehicle
- **A combination** of the two methods can be effective

### Check your loads and lashings regularly during your journey to make sure the load remains secure

- **Lashings can lose tension during the journey and loads may shift, settle or compress**

# KEY ELEMENTS OF LIGHT VEHICLE LOAD RESTRAINT

## PART A: PLAN FOR YOUR LOAD

### Step 1: Understand your load

- ✓ Think about the load that you plan to transport  
What are the load's characteristics:
  - weight
  - dimensions – length, width and height
  - friction levels/texture – is it slippery or rough?
  - centre of gravity of the load, or individual components of the load – is it top heavy?
  - stability – is it prone to roll or tip?
  - vulnerability – is it fragile or crushable?

### Step 2: Choose a suitable vehicle for your load

- ✓ Keep the vehicle within the maximum safe and legal loaded weight and dimensions
- ✓ Make sure any parts of the load that stick out of the vehicle are within the maximum allowable length  
**If any part of the load projects beyond the maximum allowable length you will need a different vehicle.**
  - Not being within the safe and legal maximum limits is one of the most common reasons people are fined for load breaches
- ✓ Attach appropriate warning signals to the end of any objects that project out from the back of the vehicle:
  - **During the day:** a flag/material which is brightly coloured and at least 300mm long.
  - **At night:** a red light that can be seen from 200m away

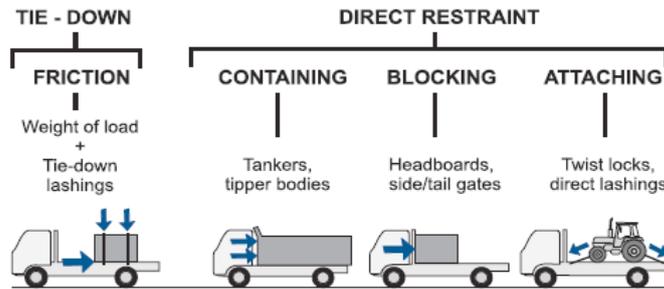
#### Want to know more?

See the [Vehicle dimensions](#) section to find out the **maximum safe and legal weight and dimensions** for light vehicles, as well as the **maximum allowable length of any projections**.

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

- i** Loads can be restrained by two basic methods:
  - tie-down restraint
  - direct restraint (containing, blocking and attaching)

Figure 1.



- i** A combination of methods can be used to achieve a safe and secure restraint.

**Want to know more?**  
 For more information about **restraining your load** using tie-down or direct restraint, see the section on [Load restraint methods](#).

### Step 4: Choose appropriate load restraint equipment, and ensure it's in good working order

- ✓** Use rated equipment to ensure you know the weight it can restrain
  - Only use rated equipment that meets **Australian standards**
- ✓** Inspect your vehicle and restraint equipment **before each trip**:
  - Is it in good working order?
  - Is it strong enough to restrain your load?
- ✓** Check all components for cuts, cracks, breaks, tears, fraying, furriness, buckles, missing pieces, stretched material, signs of corrosion, etc.
- ✓** Don't use equipment that is broken, damaged or worn

**Want to know more?**  
 See the [Load restraint equipment and materials](#) section for **information on selected equipment** such as tie-down lashings and cargo nets.

## PART B: LOADING THE VEHICLE

### Step 5: Make sure you understand and use safe work practices when loading and unloading a vehicle

- ✓ Discuss who has authority over the loading process before you begin
  - The person who is loading the vehicle has authority over the activity and directs the driver and anyone else involved to make sure the activity is safe.
- ✓ Create loading and unloading plans
- ✓ Make sure everyone understands what to do
  - Train new staff
- ✓ Create loading and unloading exclusion zones - higher risk areas not to be entered during loading or unloading
- ✓ Stop work if people enter the loading and unloading exclusion zones unexpectedly or without authorisation.
- ✓ Use an appropriate communication style for the environment when loading/unloading
  - For example, use hand signals in busy/loud areas – don't assume you can be heard
- ✓ Always maintain line of sight between the loader and the driver

### Step 6: Load the vehicle

- ✓ Make sure you use enough restraint to keep you and others safe
  - ✓ Every item must be restrained so that it can't fall off or move in a way that makes the vehicle unsafe or difficult to drive.
  - ✓ Always use suitably-rated load restraint equipment
- ✓ Stabilise all loads to prevent them moving
  - ✓ Use one of the direct restraint methods – i.e. blocking, containing or attaching – wherever possible when restraining unstable loads
  - ✓ Block the load by placing it against a headboard
  - ✓ Strap several unstable items together to form a stable pack
  - ✓ Use chains for heavier loads where possible, because chains don't stretch as much as webbing straps and ropes

#### What makes a load unstable?

**A tall load can tip forward** if its length (along the side of the vehicle) is less than 80% of its height. It can **tip sideways** if its width (across the vehicle) is less than 50% of its height.

Loads that have a **high centre of gravity** – e.g. they are narrower at the bottom or are top-heavy – can also be unstable and tip over or tip the vehicle over.

- ✓ Position your load to maintain vehicle stability, steering and braking
  - ✓ **Keep the centre of gravity low** and close to the vehicle's centre-line
    - If you are using a containment method the centre of gravity of the load must sit well under the top of the tray (e.g. if an item is top-heavy, the heaviest part must be contained within the tray and not sit above it)
  - ✓ **Spread the load evenly** across the width and length of the vehicle, sharing the weight between the axles
  - ✓ Load heavier items at the bottom and lighter items on top
  - ✓ Face any dangerous parts of the load - for example points that stick out - away from the driver
  - ✓ **Fill gaps** between larger items with smaller items or packing material
  - ✓ Use packing material or rubber matting to increase the friction on slippery loads – this makes them easier to restrain – do not use conveyor belt rubber
- ✓ Stay within the safe and legal dimensions and projections for your vehicle and load

#### Want to know more?

See the [Vehicle dimensions](#) section to find out the **maximum legal loaded weight and dimensions** for light vehicles, as well as the **maximum length of any projections**.

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## PART C: DRIVE ACCORDING TO THE LOAD AND DRIVING CONDITIONS

### Step 7: Allow for the impact of the load on how your vehicle drives

- ✓ Monitor your vehicle's stability, steering and braking capacity
  - ✓ Your load affects how your vehicle drives
  - ✓ Drive carefully, take corners slowly and smoothly and avoid harsh acceleration or braking wherever possible
  - ✓ Braking can be compromised if the load isn't distributed evenly and there is more weight on some wheels than others
  - ✓ There is potential for a greater braking force when driving at low speed
  - ✓ Be aware of how air pressure, e.g. wind and air moving over the vehicle in motion, may affect your load while driving
- ✗ Don't drive an unsafe vehicle. Choose a better vehicle for the load instead

### Step 8: Check the load and its restraint regularly during your journey

- ✓ Check your load and lashings regularly during your journey to make sure the load remains secure
  - ✓ Depending on the load and the restraint method, you may need to check it soon after starting your journey as the impact of driving will cause the load to 'settle'
- ✓ Recheck your load and lashings after you drop off part of the load
- ✓ Check if the load has moved before unloading the load

# USEFUL INFORMATION

## KEY MAXIMUM LEGAL LOADED MASS AND DIMENSIONS OF VEHICLES

Dimension	Maximum	Notes	Diagram
<b>Mass</b>	The maximum mass of the vehicle is set by the manufacturer and is known as the <b>gross vehicle mass</b>	The gross vehicle mass includes the vehicle and everything in or on it including the driver, the passengers and the goods, etc	<b>1</b>
<b>Length</b>	12.5 metres	This includes the light vehicle and any projections to the back or front of the vehicle	<b>2</b>
<b>Width</b>	2.5 metres		<b>3</b>
<b>Height</b>	4.3 metres	Drivers need to consider the stability of the vehicle and any restrictions enroute	<b>4</b>

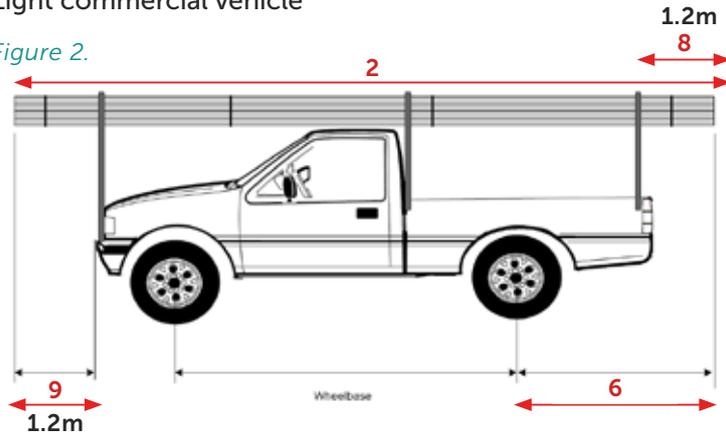
These are the key maximum legal dimensions and allowable loads. Other limits exist; refer to your road authority.

## MAXIMUM LENGTH OF PROJECTIONS STICKING OUT OF THE VEHICLE

Projection direction	How length is calculated	Maximum	Notes	Diagram
<b>Sideways</b>	From the edge of the vehicle to the end of the projection	150 millimetres (either side, or combined across both sides)	This is the combined projection from both the left and right side of the vehicle.  South Australia 300 millimetres (both sides)	<b>5</b>
<b>Rear overhang</b>	From the rear axle to the end of the projection	Either 60% of the wheelbase or 3.7 metres – whichever is lesser	Wheelbase is the distance between the vehicle's two axles.  Applicable in all States and Territories except Western Australia.	<b>6</b>
<b>Rear overhang – single axle group trailer</b>	From the rear axle to the end of the projection	Either the front load carrying area (measured from axle to front of trailer), or 3.7 metres – whichever is lesser		<b>7</b>
<b>Rear</b>	From the end of the vehicle	1.2 metres	Applicable in Western Australia and the Northern Territory only.	<b>8</b>
<b>Forward</b>	From the front of the vehicle	1.2 metres		<b>9</b>

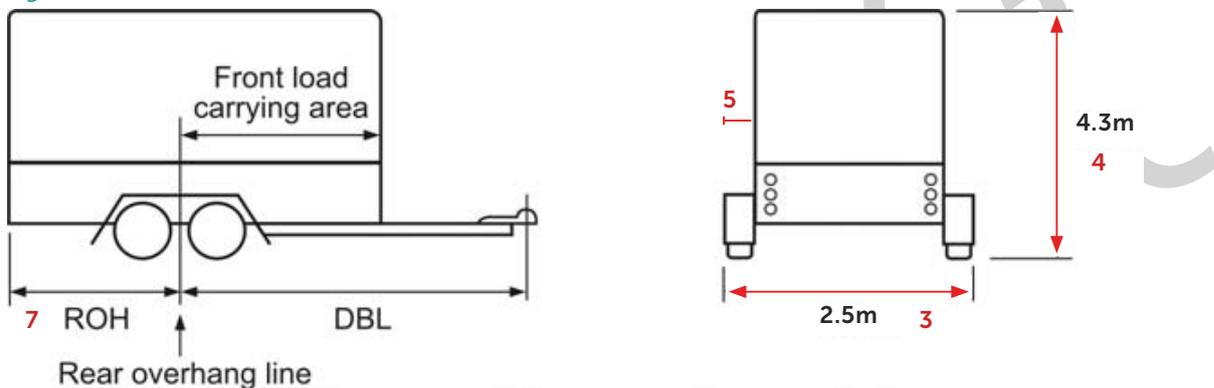
Light commercial vehicle

Figure 2.



Single Axle trailer

Figure 3.



- Loads for which the projection is not easily seen from behind the vehicles, or with a rear projection greater than 1.2m (all States except Western Australia and the Northern Territory) must attach warning signals to the end of the rear projection:
  - **During the day:** a flag/material which is brightly coloured and at least 300mm long
  - **At night:** a red light that can be seen from 200m away

LOAD RESTRAINT METHODS

Tie-down restraint

- Tie-down – i.e. using lashings to tie down the load – is a common method of load restraint
- The load is prevented from moving by the friction between the load and vehicle, created by the weight of the load and pressure from the tie-down lashings
- Tie-down lashings include webbing straps, chains and ropes. These are **tensioned** to clamp the load down

What is friction?

Friction is the resistance to movement cause by the roughness of two surfaces in contact with each other.

How heavy or how large an object is won't affect the friction.

Friction between smooth surfaces can be increased using timber dunnage or anti-slip rubber matting between the surfaces.

It can be greatly reduced by oil or water between metal surfaces, or dust, sand or other particles between surfaces.

## Direct Restraint

- Direct restraint can be used for most loads, especially those that are difficult to tie down, such as:
  - unstable loads
  - crushable/fragile loads
  - offset loads
  - slippery loads
- A load can be directly restrained by:
  - **Attaching** – direct lashings such as webbing straps, chains and twist locks directly attach the load to the vehicle; attaching is especially suitable for slippery loads and loads on wheels
  - **Blocking** – headboards, side gates and tailgates, etc., block the load from moving in each direction respectively
  - **Containing** – the vehicle structure restrains the load, e.g. a load in a tipper truck, or equipment in a ute

### Why use rated equipment?

**Rated equipment has been tested** by the manufacturer to restrain a certain load weight. The equipment **will state the capacity** it can restrain.

## LOAD RESTRAINT EQUIPMENT AND MATERIALS

Using the right load restraint equipment is essential to restrain your load correctly and keep yourself and others safe.

Ensure your equipment is in good working order.

If you use the wrong equipment, or faulty or damaged equipment, it can result in losing the load, causing damage to property, and injury – and sometimes even death – to people.

**Below is a selection of standard and regularly used load restraint equipment.** It is not an exhaustive list; you can use any other equipment that enables you to safely and securely restrain your load within the legal requirements.

## Tie down equipment

### Lashings

- Lashings are **attached to the vehicle and over the load** to secure it
- Headboards, side gates, tailgates and other vehicle structures provide an anchor point for the tying on lashings
- The number of lashings needed is dependent on the weight and shape of the load
- The greater the pre-tension, the more weight that can be restrained by each lashing

- Tie down lashings are most effective if they are vertical and tight. **The more a lashing is angled away from the load, the less effective it is:**

	APPROX. ANGLE	TIE-DOWN EFFECTIVENESS
	90°	100%
	60°	85%
	45°	70%
	30°	50%
	15°	25%

Figure 4.

- The **minimum lashing angle for effective restraint is 35 degrees**. Place stable packing material under the load to achieve this angle if you need to.

#### Webbing straps

- Webbing straps are suitable for many types of loads
- Webbing straps include the strap, its end fittings and its tensioners
- The tensioners attach to the vehicle using a mechanism such as a truck winch or hand ratchet
- Rated webbing straps display the manufacturer's advised lashing capacity
- Webbing straps can stretch – they should be checked and re-tensioned during the journey

**The tension in any lashing must not exceed the manufacturers' lashing capacity.**

#### Synthetic ropes

- Rated ropes are colour coded and display the lashing capacity
- Use a truckie's hitch or double hitch to tie and tension the rope (check videos online if you're unsure how to do this)
- Ropes are only recommended for light loads, such as ladders, plastic pipes or light boxes
- Don't use rope unless it is rated and is suitable for your load; otherwise, use a webbing strap or chain instead

#### Chains

- A chain lashing includes the chain and a hook to attach it to the vehicle
- Chains are best for heavy or unstable loads
- Chains have very limited stretch – at most a chain will stretch up to 1% of its length

### Cargo nets

- Cargo nets are a rated net that covers an open part of the vehicle
- They provide an effective restraint, particularly for utes, trailers and other open vehicles
- Cargo nets can contain a load up to their rated capacity

### Tarpaulins

- For most loads, tarpaulins – or tarps – are not effective restraint systems on their own
- Tarps can be used in conjunction with another restraint system for other purposes (e.g. weather protection)
- Tarps can be useful for very light loads that could be affected by air flow
- Some tarpaulins are rated (these are rare). Unless they are rated, **do not factor any restraint from the tarp** when calculating how many lashings to use

## Direct restraint equipment

### Headboards, side gates, tailgates

- These **block a load** from moving in a certain direction
- They can also **contain a load**, if they are present on **all four sides of a vehicle**
- You can also **attach the load** to the headboard, etc. to improve the load restraint further

### Tool boxes

Tool boxes connected to the vehicle are ideal for **containing** equipment and tools.

### Ute tray and trailers

- A ute tray or trailer can **contain a load**, provided the load's centre of gravity sits under the side of the ute or trailer
- If the centre of gravity is above the side of the ute or trailer another load restraint system must be used
- A ute tray or trailer is most effective if your load is **snugly packed** to reduce movement within the tray
- Heavy items may need to be separately restrained with the tie down or other direct restraint methods
- Any light items must be contained in a separate box or covered to stop them being blown off when you are driving, e.g. a box with a lid should be used to contain light plastic pipe offcuts

### Carrier barriers

Carrier barriers stop the load entering the vehicle cabin area by **containing** it within the load area. These are often used on light commercial vehicles, vans and station wagons when carrying packaged goods and other loads.

## Packing material

- **Rubber matting** is used to increase the friction on slippery loads, such as steel pipes
- **Protective material** can be used around chains, webbing straps and ropes to protect the load from damage, or to protect the lashings from damage from sharp-edged loads

### When should you tie down items that are contained?

If a load item requires **two people to lift it onto the vehicle**, it also needs to be tied down.

## RESTRAINING SPECIFIC LOADS

### Light packaged goods

- Make sure packages are spread evenly in the vehicle
- Packages can be contained in the cargo area of a vehicle, e.g. cargo area of a van, station wagon or delivery truck
- Separate the vehicle cab area from the cargo area, e.g. through the use of a cargo barrier

### Light loads that could be blown away

- Such loads include garden waste, paper, light plastic (e.g. pipes, buckets, sheet metal or plasterboard), or anything else that could be blown away by airflow from driving or the wind
- An effective way to restrain light loads is to **contain** the load using a truck, trailer or ute with sides:
  - If the load sits under the top of vehicle sides, cover it with either a cargo net or a tarpaulin that is tied down (so it does not flap in the wind)
  - If the load is above the vehicle sides, tie it down with a cargo net or tarp that is held down with lashings that are rated to hold the weight of the load

### Moving furniture

- Typical furniture loads include desks, fridges, beds, packaged boxes, tables, etc.
- **Choose a vehicle with sides, and if possible a roof**, e.g. a truck, trailer, ute
- Use a **combination of tie down, blocking and containing restraint**, depending on the items, for example:
  - **block and tie down heavy and tall furniture** against the headboard, sides or tailgate
  - **spread the load** across the vehicle, especially across the wheel axles
  - place **heavy items on the bottom**, with lighter items at the top
  - **pack all pieces snugly** to avoid movement when driving; if required use packing material to fill in the gaps
  - **reduce the centre of gravity** of the load as much as possible, potentially lying tall vertical items on their side

- **use rated webbing straps to tie down a load**, avoid using ropes
- **make sure webbing straps are rated** for the weight of the load
- **protect webbing straps and ropes** from any sharp or rough surfaces

## Boats

- Boats should always be transported on purpose-built boat trailers
- A safety chain should be used in addition to the wire rope from the trailer's winch to the bow of the boat and the boat should have a strap over the stern, attaching it to the trailer
- If the boat is fitted with an outboard motor, and its mounting to the stern is not designed to withstand bumps and other shocks encountered in road transport, it may be necessary to separately restrain the motor or remove it during transport

## Animals

- **Animal welfare is enshrined in law in all Australian states and territories**
- Animals must be transported in a way that ensures **they do not fall off or are injured**
- Animals **must also have adequate ventilation and protection** from the wind, rain, dust and sun
- **Laws for carrying dogs vary across Australia** – e.g. in Victoria it is illegal to carry an unrestrained dog in the back of a ute
  - Check with the relevant authority for your State to find out what the laws are for carrying dogs
- The safest way to transport a dog in the back of an open vehicle is enclosed in a cage that is securely restrained
- If a dog is tethered to the back of a ute, make sure that the lead or chain:
  - is attached to a secure neck collar or properly fitted dog harness
  - is secured to a point in the mid-point of the cabin
  - is the right length (long enough to allow the dog to move about comfortably, but not long enough for the dog to reach the ute's side)
  - has swivels at both ends to prevent it becoming entangled

## LPG bottles

- When transporting LPG bottles:
  - Cylinders with a capacity of 9kg or less can be transported in an enclosed vehicle
  - Up to 2 cylinders can be transported, up to 15kg in total
  - Place cylinders in the boot where possible
  - Keep the cylinders secure and standing up
  - Remove the cylinders from the vehicle as soon as possible
  - Keep cool and away from flames, sparks and heat.

**LP gas bottles and gas cylinders are dangerous goods** and must be treated carefully. See the following section for more information.

## Dangerous goods

- Dangerous goods are chemicals that can cause injuries or death if they are spilt or released in an accident
- There are more stringent legal requirements for restraint of dangerous goods. For more information see the *Australian Code for the Transport of Dangerous Goods by Road and Rail*

## Loose equipment

- Restrain loose equipment, including tools, in a **storage box** that is adequately restrained. The box could be **tied down** using straps, ropes, a cargo net, **or permanently attached** to the vehicle

## Small rubber-tyred equipment

- Small rubber-tyred equipment, such as mowers and skid-steer loaders, can be restrained without vertical tie-down, by containing them in open vehicles such as trailers and tippers, provided that:
  - the vehicle bodies have side and end structures of adequate strength
  - the side and end blocking structures are vertical
  - the tops of the side and end blocking structures are at least 300mm above the deck, and are higher than the top of any equipment tyres
  - the side and end blocking structures are positioned to restrict movement of the equipment to a maximum of 100mm in any direction. The use of intermediate packing between the equipment and blocking structures is acceptable, provided that the packing is at least as high as the structures and is restrained in position

# CONTACTS

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