Direct Load Restraint of Earth Moving Equipment

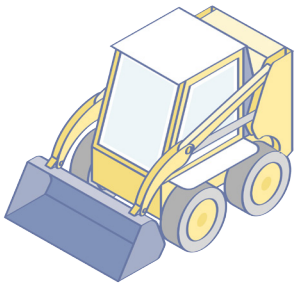
This Reference Document:

This document provides information from certification E01662-LRC1 for the direct restraint of Earth Moving Equipment for HRIA and its members. This also extends to member customers and subcontractors. Alternative load restraint systems or methods may be used provided they are supported by testing or engineering advice that demonstrates compliance with the loading performance standards specified in schedule 7 of the Heavy Vehicle (Mass,Dimension and Loading) National Regulation (as published 1/10/2018).

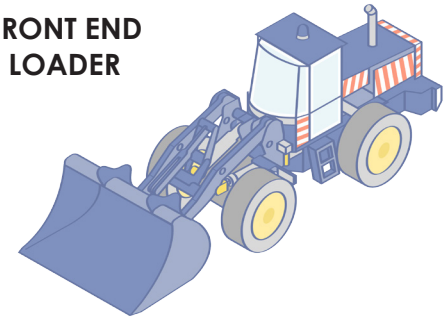
Documentation applies to :

- Earth Moving Equipment:
    - Skid Steers
    - Front End Loaders
    - Graders
    - Excavators
- Earth Moving Equipment with a mass no greater than 26t
- Earth Moving Equipment with a width no greater than 2450mm
- Earth Moving Equipment in serviceable condition and no major defects
- Earth Moving Equipment transported on tilt trays and heavy haulage trailers
- Accessories for nominated Earth Moving Equipment that form the same transport movement

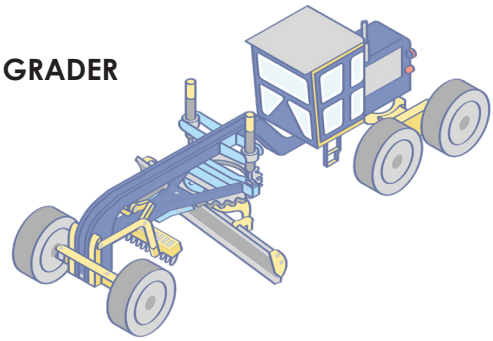
SKID STEER



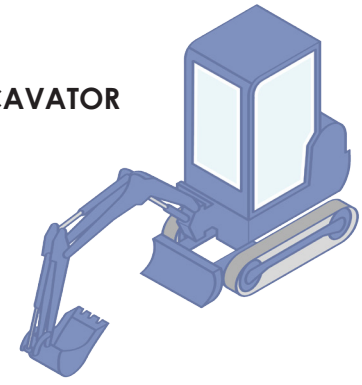
FRONT END LOADER



GRADER



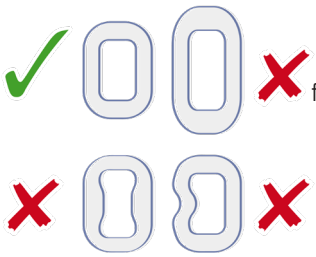
EXCAVATOR



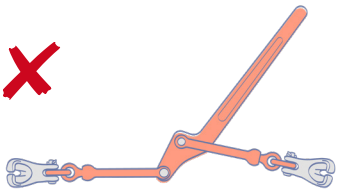
Direct Load Restraint of Earth Moving Equipment

Load Restraint Equipment

All equipment must conform to AS/NZ 4344 and AS/NZS4380 standards with consideration taken for the following:

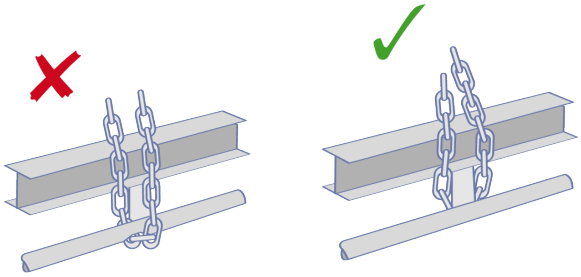


When inspecting chain look for elongation, key holing or bent links must not be used for restraint.

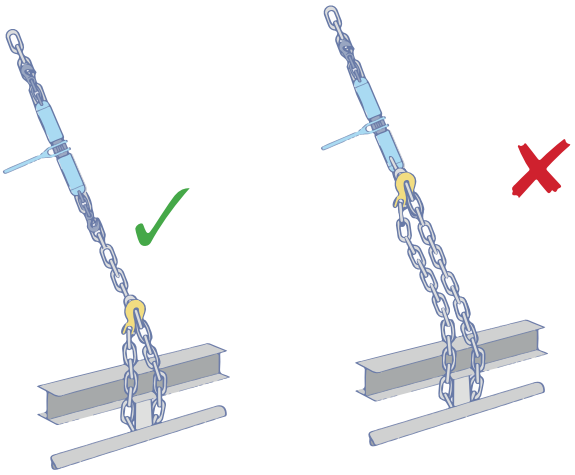


Do No use over-center lever load binders (Dogs)

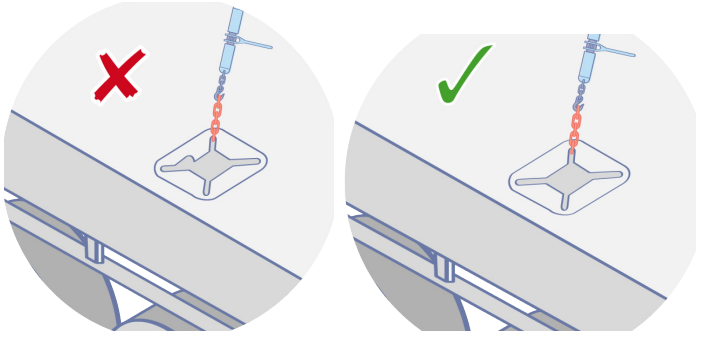
Torn or excessively worn webbing straps must not be used for restraint.



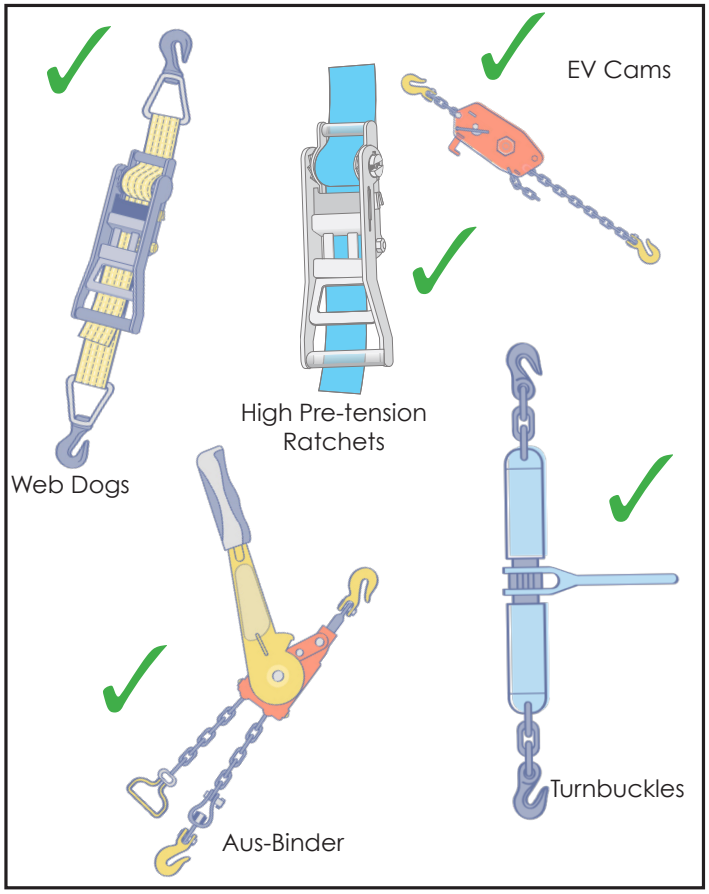
Ensure chains are positioned around load post.



Ensure chain hook is positioned just above the coaming rail.



Do No use damaged anchor points. Ensure their capacity is suitable for transport task.

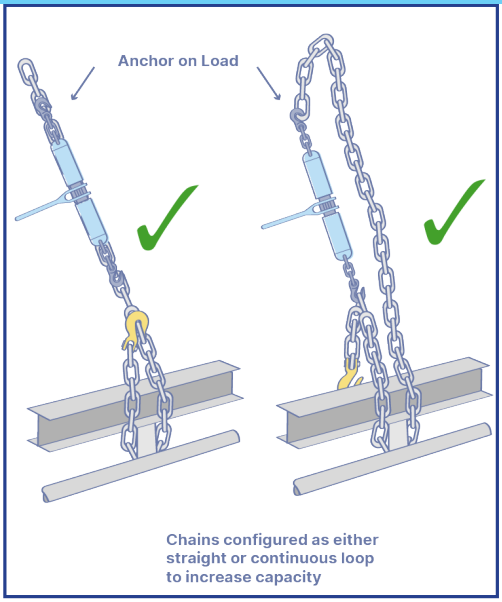


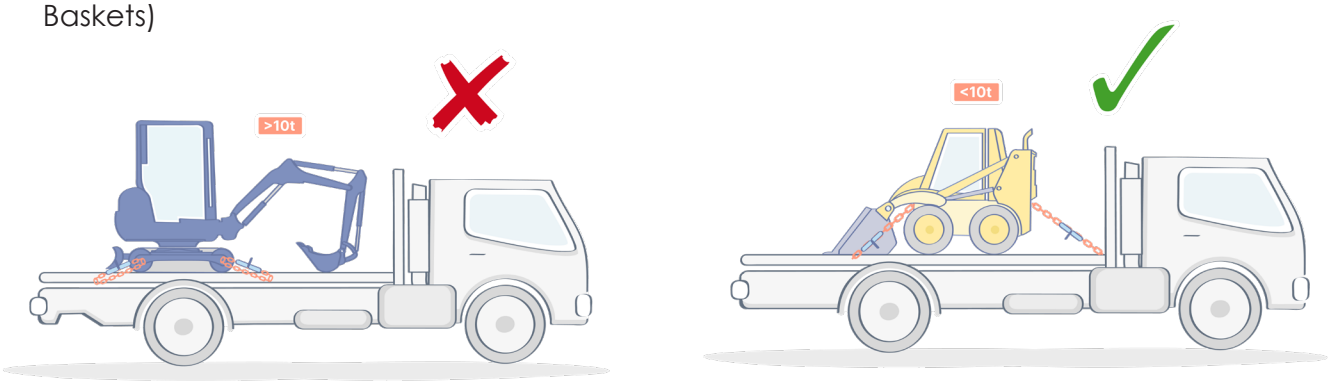
Use appropriate ratchets conforming to AS/NZS4380

Engistics

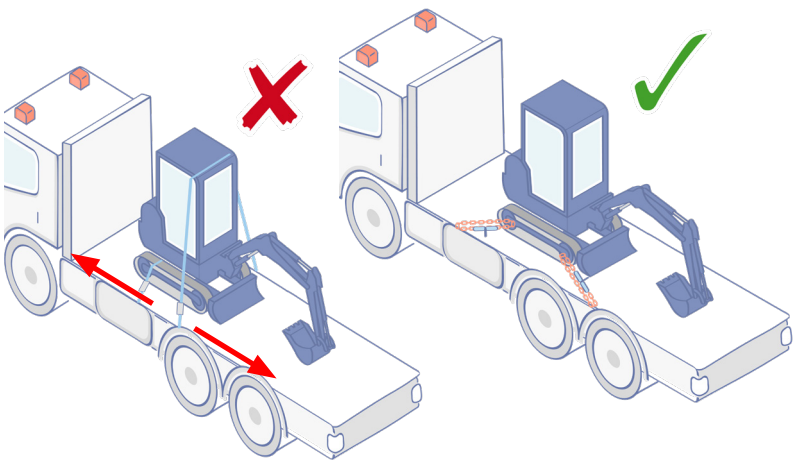
Key Considerations

- ✓ A minimum of <u>four</u> lashings will be required, two angled forwards and two backwards.
- ✓ All lashings to be similar geometry.
- ✓ Apply any brakes provided as per mobile plant operators manual
- ✓ All on board equipment must be secured (e.g. booms and buckets) as per mobile plant operators manual.
- ✓ All hydraulic and mechanical equipment must be isolated, as per operators manual, to prevent inadvertent movement in transit.
- ✗ Do not mix lashing types i.e. chain and webbing on the same item for restraint. (Note: Webbing straps can be used to restrain equipment accessories e.g. Buckets and Baskets)

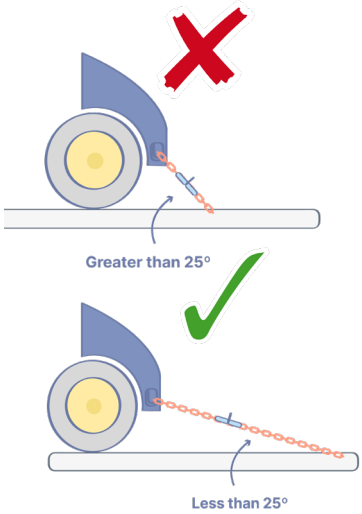




Keep loads on tilt trays and rigid vehicles to under 10t. To ensure anchor points restraint capacities are not exceeded.



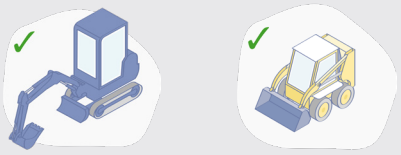
Tie Downs over tracks or through the cab are noncompliant and are not permitted. Minimum of four lashings required; two angled forwards and two backwards.



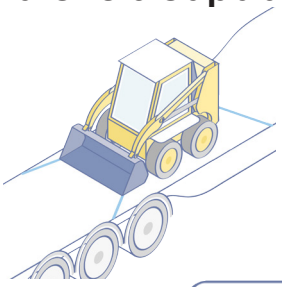
Keep lashing angles to 25° or less to increase restraint effectiveness and minimise shock load to the chain.

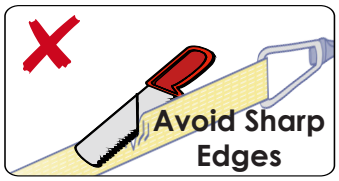
Engistics

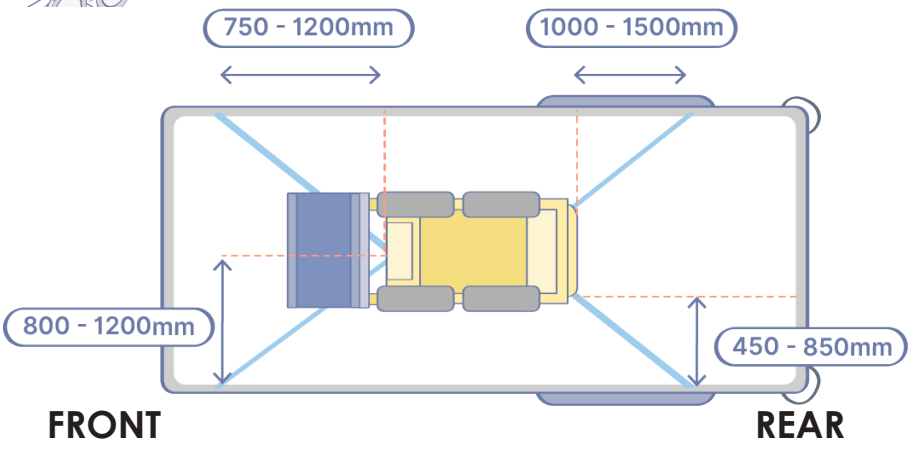
Earth Moving Equipment Load Restraint up to 1.2t

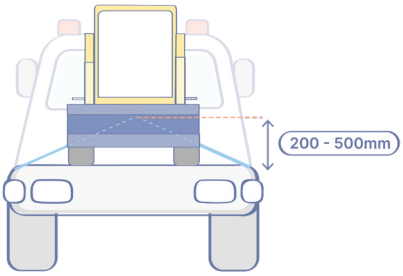


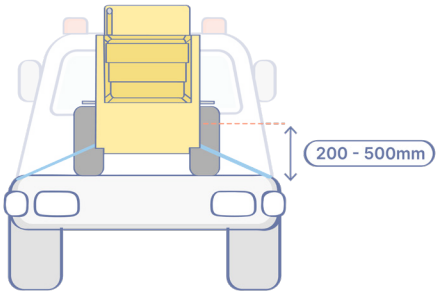
Wheeled, unblocked, minimum of 4 x 50mm webbing straps with high pretension ratchets capable of providing 600kg.f



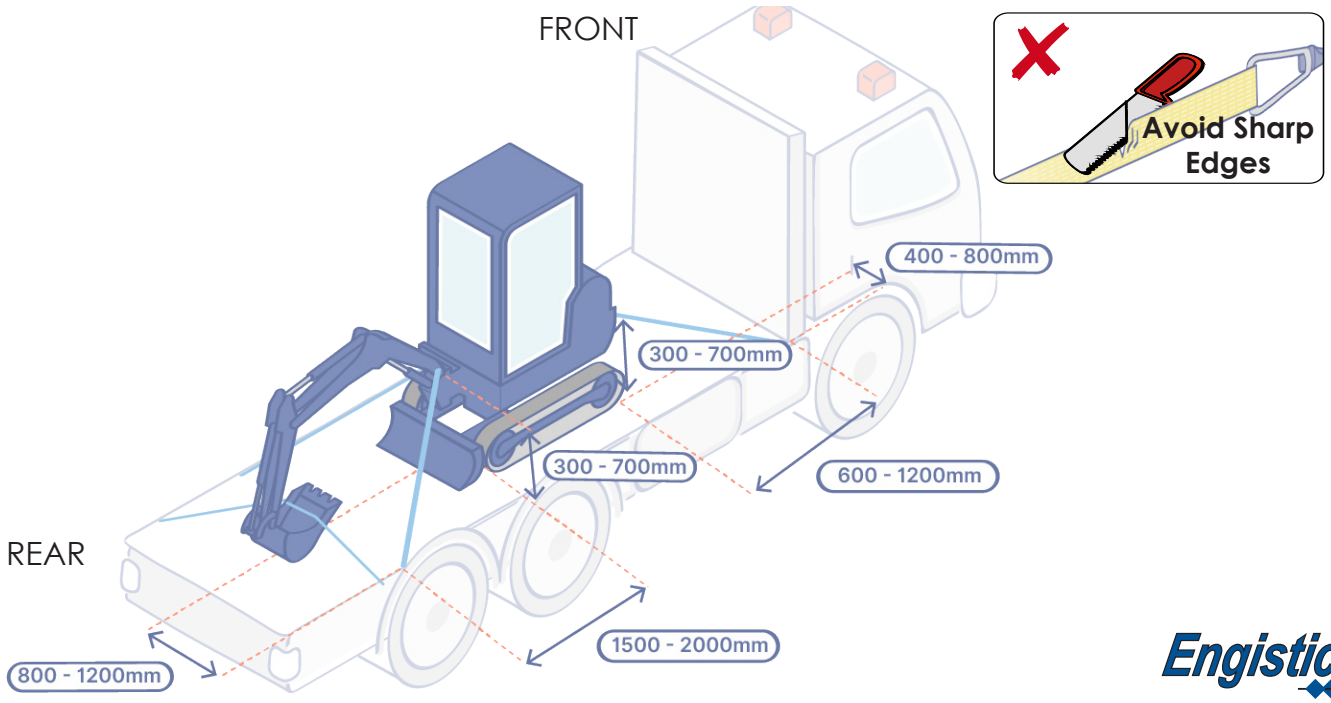




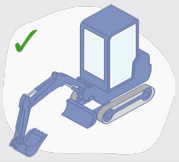




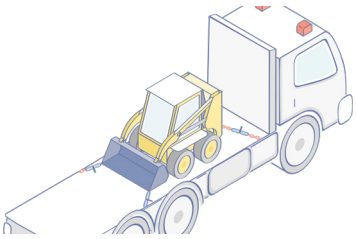
Tracked, unblocked, minimum of 4 x 50mm webbing straps with high pretension ratchets capable of providing 600kg.f

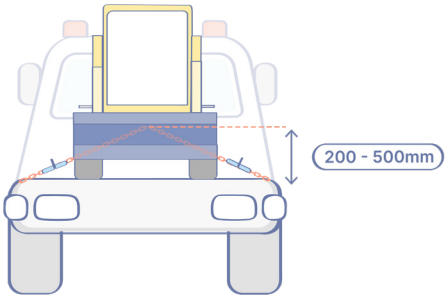


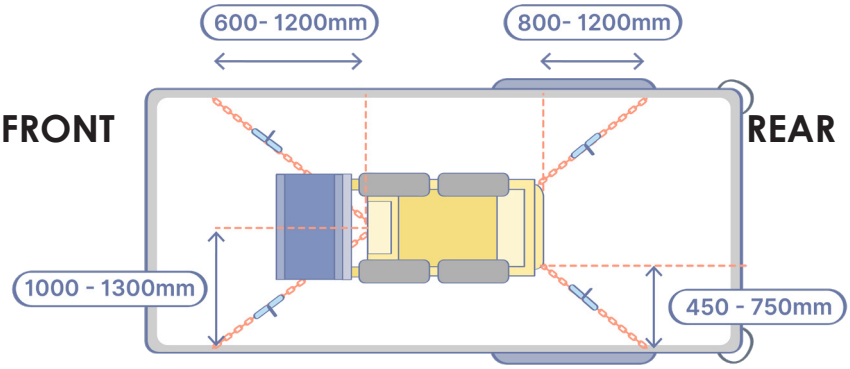
Earth Moving Equipment Load Restraint between 1.2t - 3t

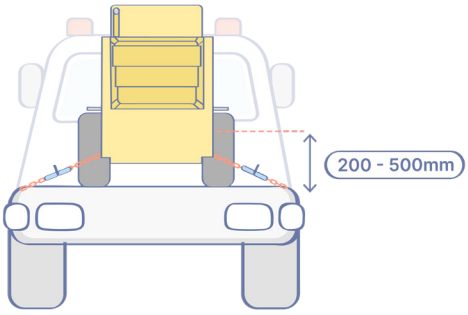


Wheeled, unblocked, minimum of 4 x 8mm straight chain

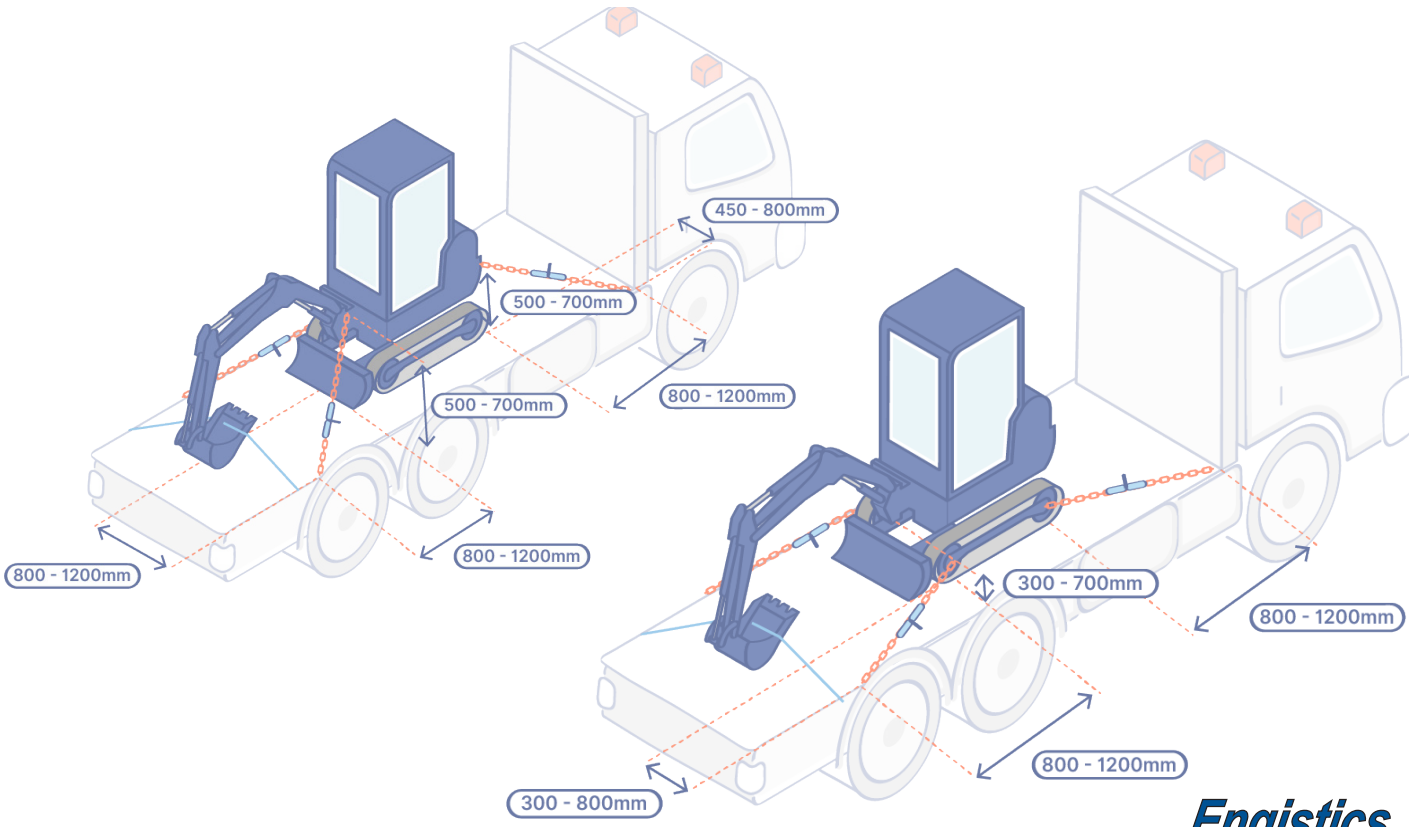








Tracked, unblocked, minimum of 4 x 8mm straight chain



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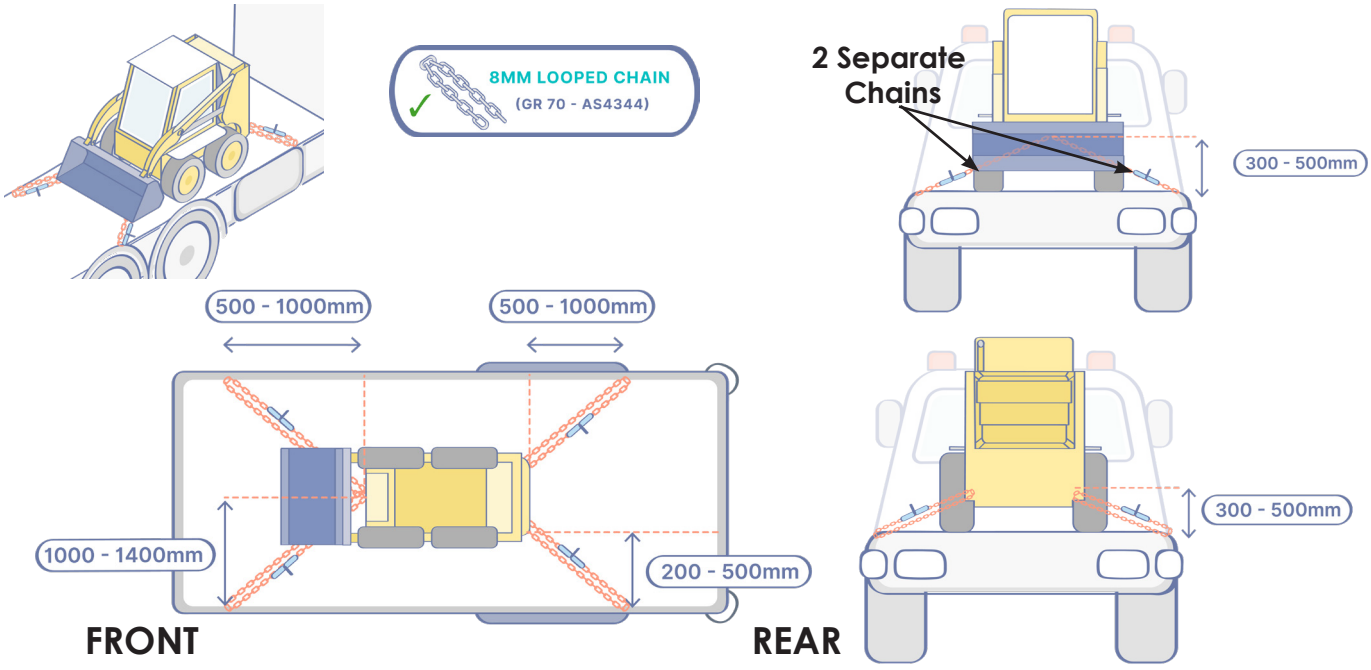
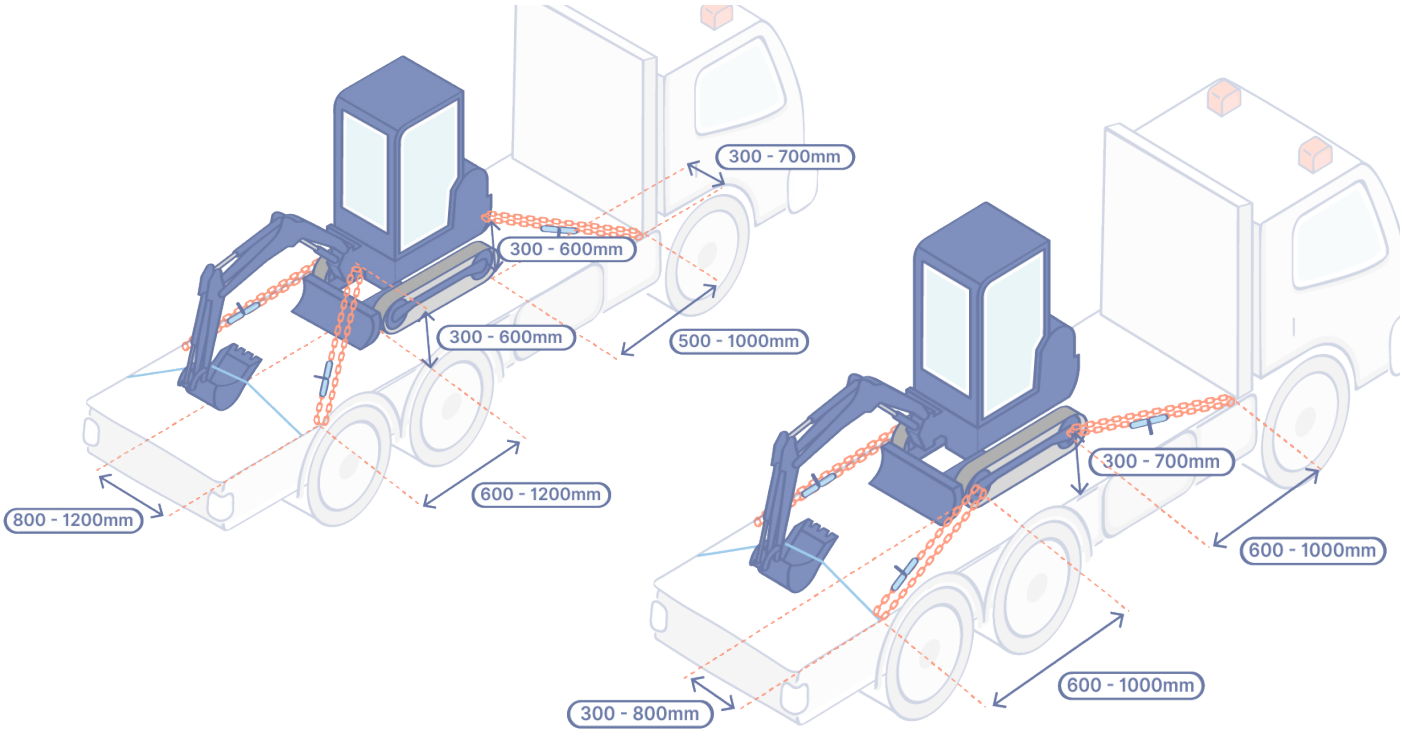
Earth Moving Equipment Load Restraint between 3t - 5.5t

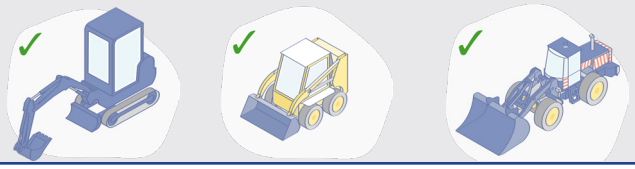
Wheeled, unblocked, minimum of 4 x 8mm looped chain



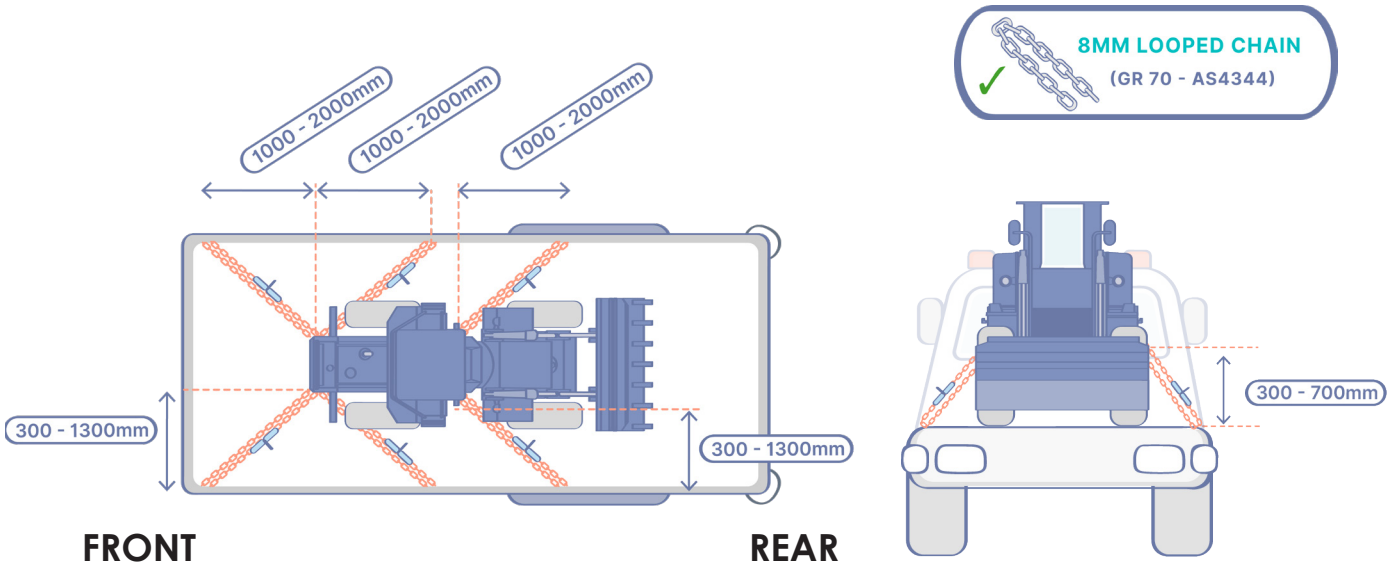
Tracked, unblocked, minimum of 4 x 8mm looped chain



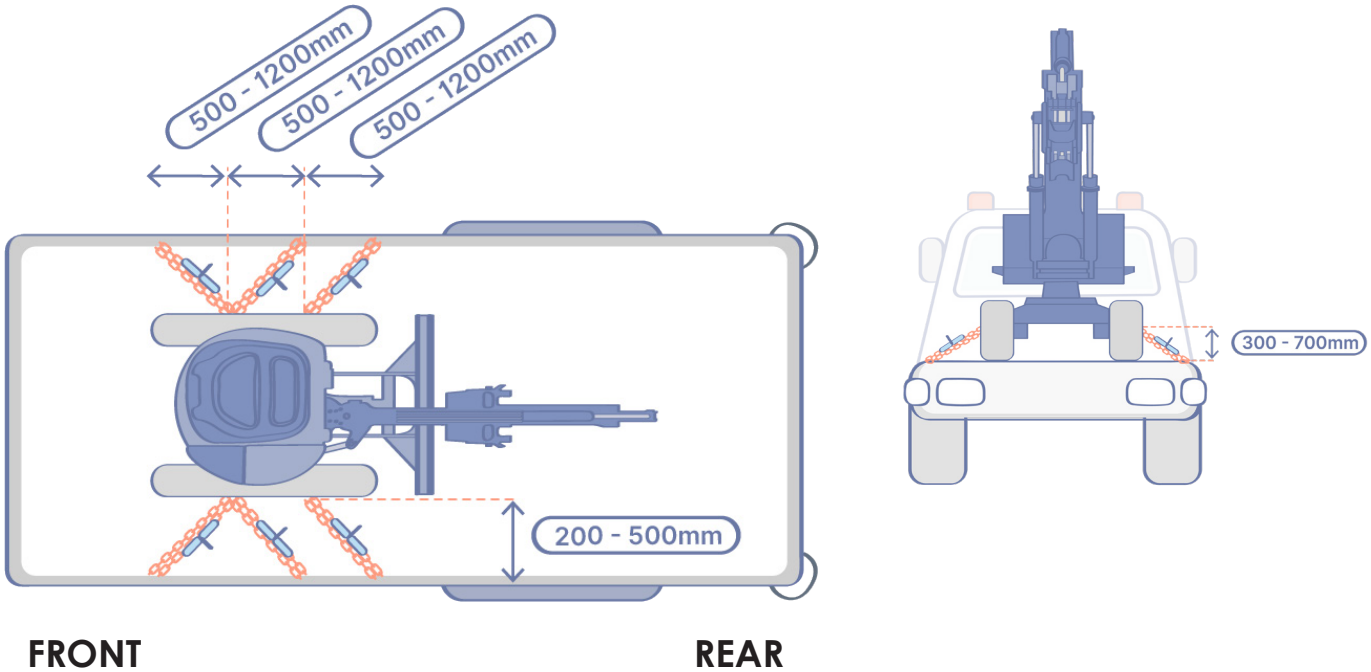
Earth Moving Equipment Load Restraint between 5.5t - 10.2t



Wheeled plant, unblocked, minimum of 6 x 8mm looped chain

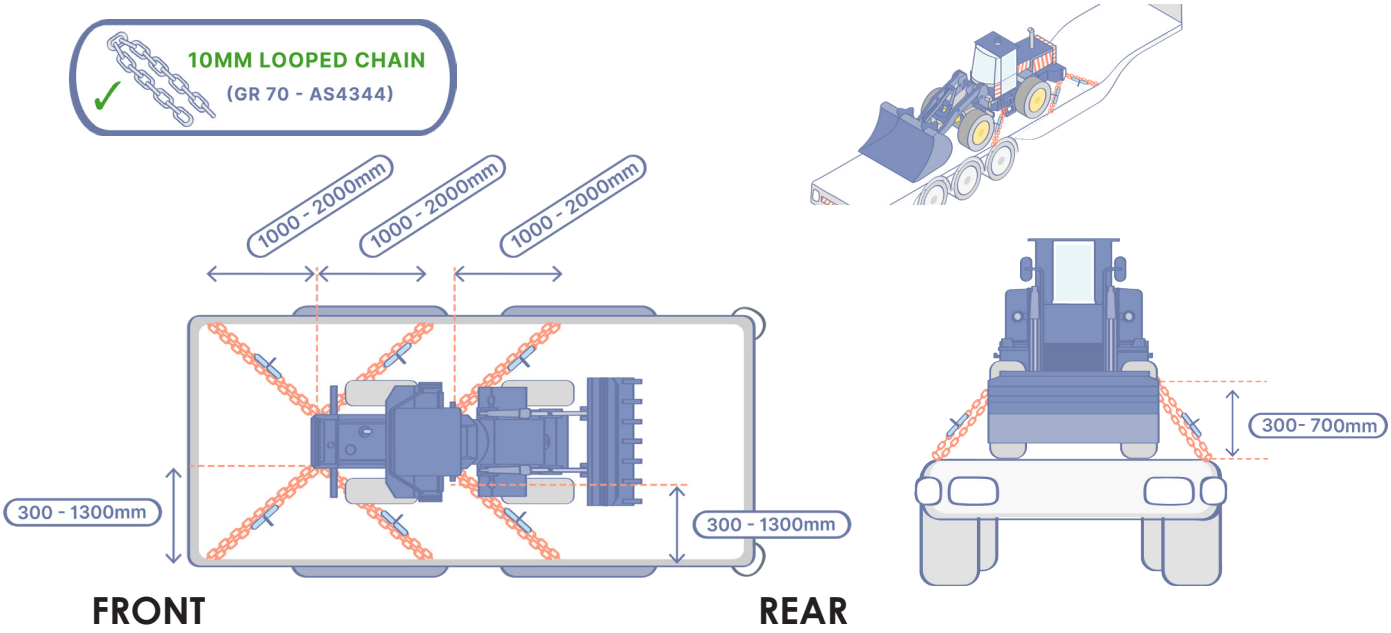


Tracked plant, unblocked, minimum of 6 x 8mm looped chain



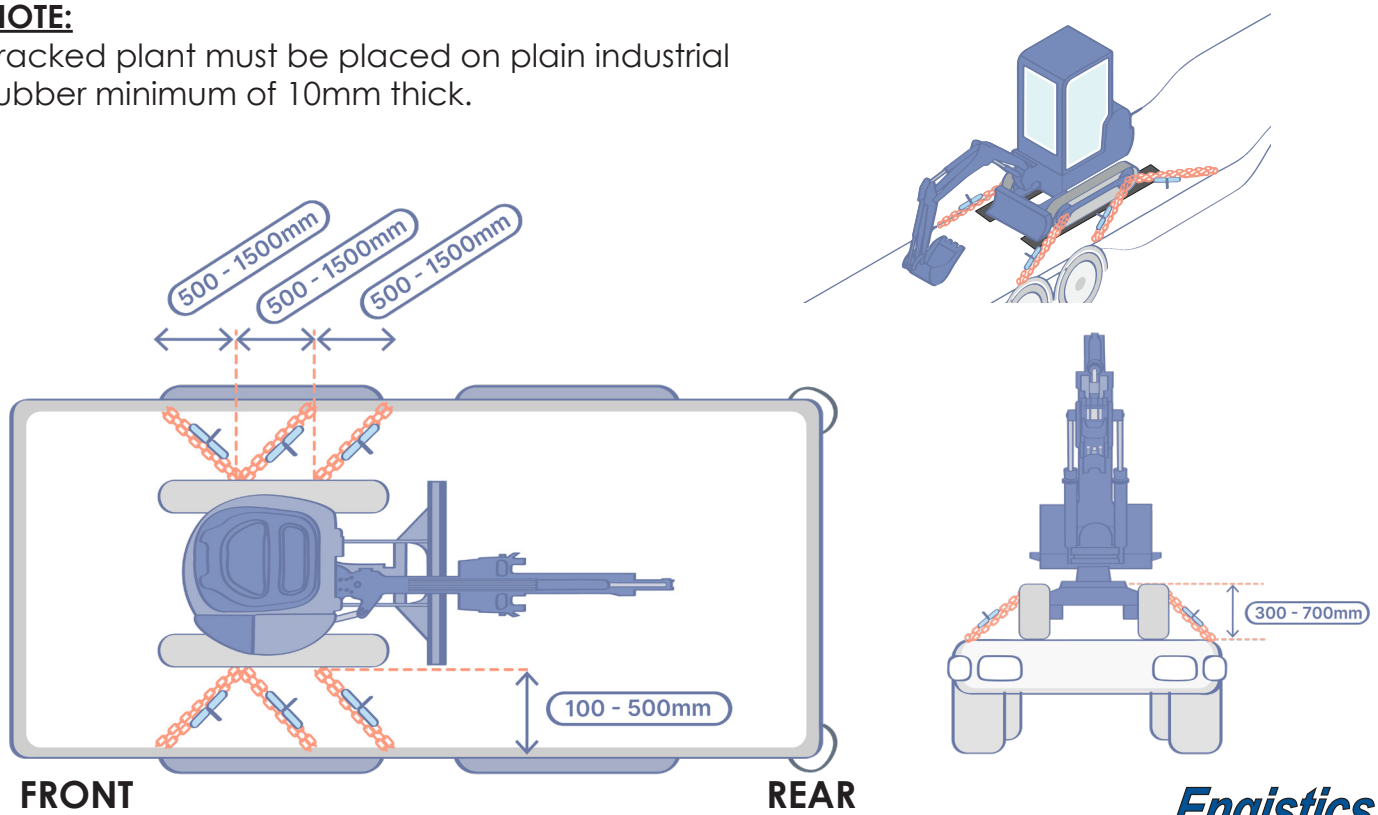
Earth Moving Equipment Load Restraint between 10.2t - 17.2t

Wheeled plant, unblocked, minimum of 6 x 10mm looped chain

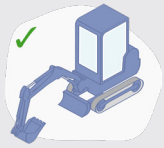


Tracked plant, unblocked, minimum of 6 x 10mm looped chain

NOTE:
Tracked plant must be placed on plain industrial rubber minimum of 10mm thick.



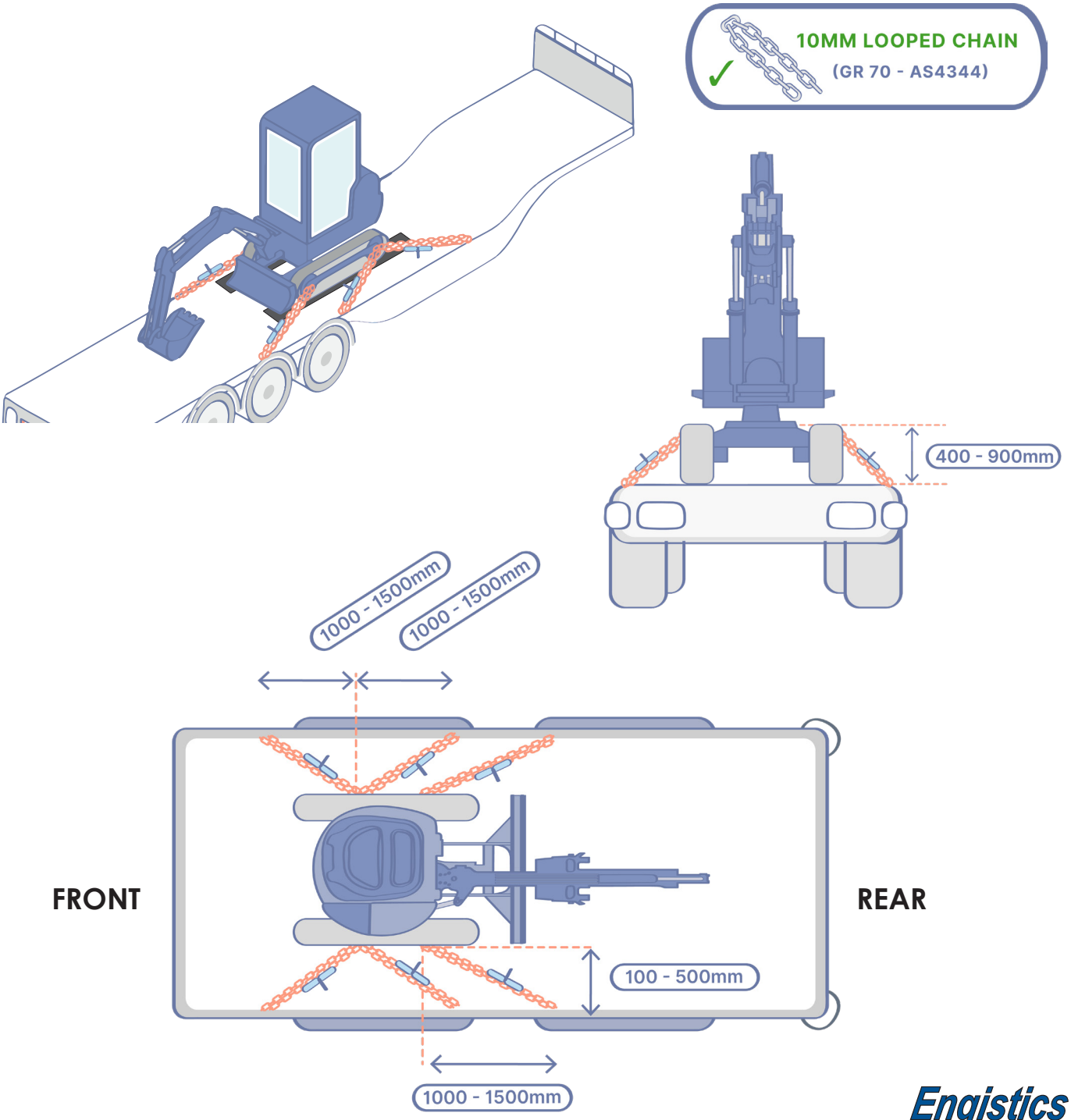
Earth Moving Equipment Load Restraint between 17.2t - 21.6t



Tracked plant, unblocked, minimum of 6 x 10mm looped chain

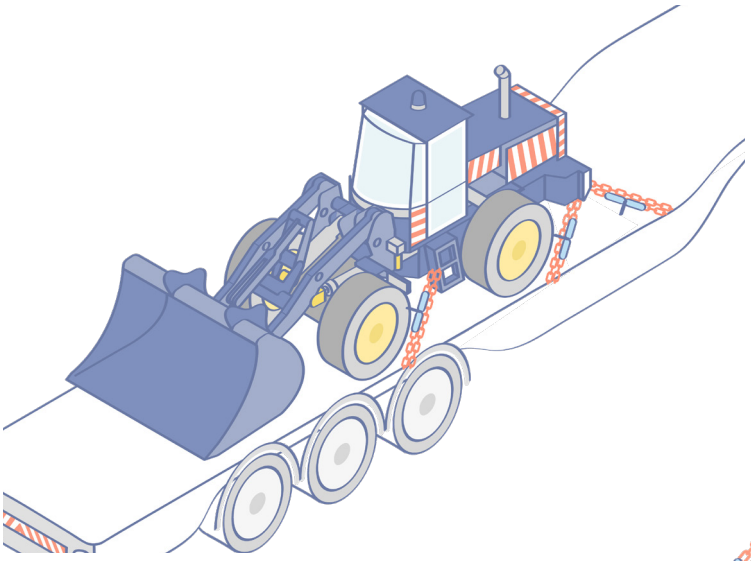
NOTE:

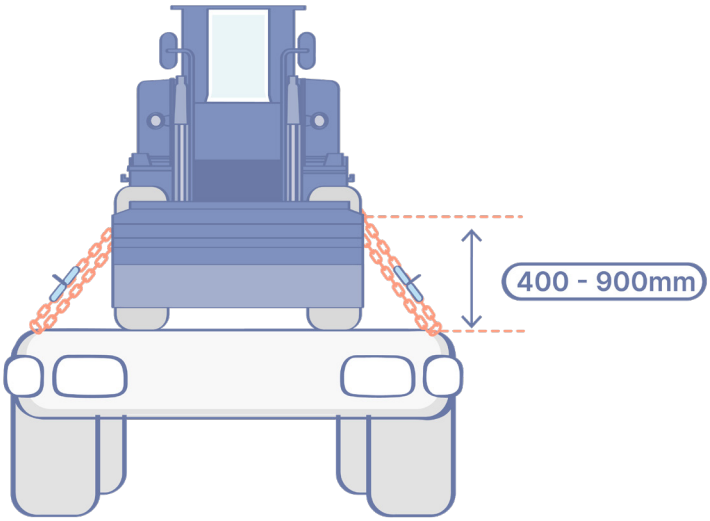
Tracked plant must be placed on plain industrial rubber minimum of 10mm thick.

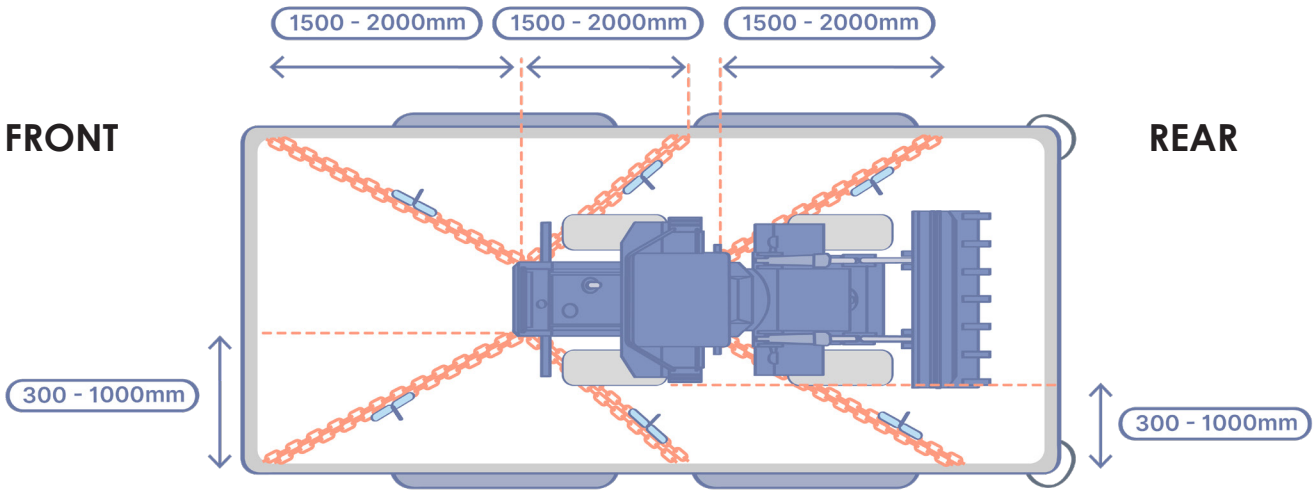


Earth Moving Equipment Load Restraint between 17.2t - 26t

Wheeled plant, unblocked, minimum of 6 x 10mm looped chain





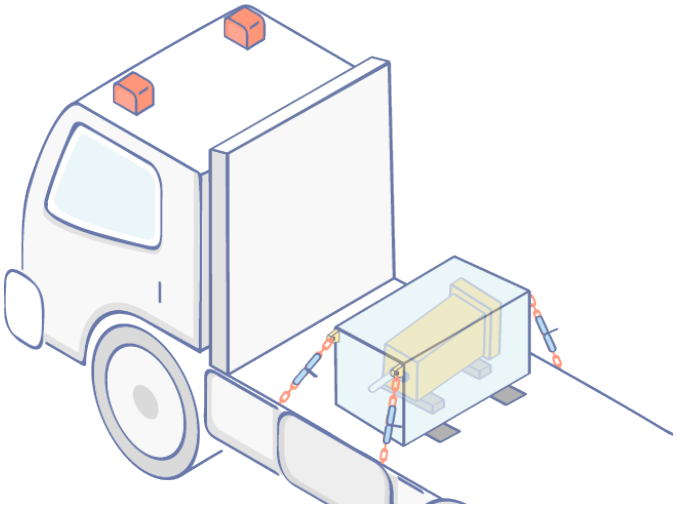


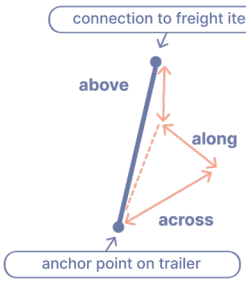
Engistics

Accessories

General

- ✓ When securing accessories independent of plant ensure the correct size and quantities of chain are used for the given weight. (see table below)
- ✓ Ensure there are no loose items left on the deck. Loose items can be secured singularly, nested in other accessories or packed in a rated stillage or storage box.
- ⚠ Steel on steel contact reduces friction. Where possible use anti-slip, industrial rubber or timber to increase surface friction.





Select the distance **along** the coaming rail to tie off to achieve the desired mass restraint.

Measure height **above** the deck of the anchor point.

Measure the horizontal distance **across** the deck to the anchor point.

Engineered Maximum Permissible Restrained Mass

Direct Restraint Table - 4 lashings placed on timber or industrial rubber frictional coefficient 0.4

	Anchor Point Across Deck (mm)	Location Along Combing Rail for Lashing (mm)	Mass per 4 × 50mm Webbing	Mass per 4 × 8mm Chain
Height of Anchor Point (mm) 300 - 599	250 - 499	0 - 249	900 kg	3000 kg
		250 - 500	1500 kg	5000 kg
	500 -750	0 - 249	617 kg	2000 kg
		250 - 500	1100 kg	3500 kg
Height of Anchor Point (mm) 599 - 1000	250 - 499	0 - 249	1100 kg	3500 kg
		250 - 500	1500 kg	5000 kg
	500 -750	0 - 249	900 kg	3000 kg
		250 - 500	1300 kg	4000 kg

Accessories

Nesting

- ✓ Restrain accessories such as rippers, rock breakers, grabbers etc. in larger attached buckets using a nesting method and belly chain restraint.
- ✓ Ensure that 1/3 of the accessories overall height is retained in the nest to avoid rotation out of the containment area.
- ✓ Ensure that the belly chain makes contact with the accessory to provide the required unitising force.
- ✓ Once nesting is complete ensure boom and containment bucket is also restrained.
- ⚠ Use of rubber within the bucket to protect the accessories maybe required.