

Industry guidance for the safe operation of tilt-tray vehicles

This document provides practical advice on meeting the Duty of Care requirements of the Occupational Safety and Health Act 1984 (the Act) and the Occupational Safety and Health Regulations 1996 (the Regulations) in regards to the operation of tilt tray self loading vehicles.

This document can be used by people who operate, supervise or manage tilt tray vehicles that are capable of self loading plant and equipment on to the vehicle for transport purposes.

The advice in this document is limited to the operation of tilt tray vehicles where the rear of the truck is capable of being tilted to ground level and the load is drawn on to the bed of the truck using a winch, such as when loading and unloading the following items:

- sea containers and site sheds;
- wheeled equipment;
- self propelled equipment; and
- skid mounted equipment.

Duty of care responsibilities

Responsibilities for safety and health are placed on all parties at the workplace.

Employer's general 'duty of care' obligations for safety and health under the Act include:

- providing a workplace and safe system of work so employees are not exposed to hazards;
- providing employees with information, instruction, training and supervision to enable them to work in a safe manner; and
- consulting and co-operating with employees and safety and health representatives (where they exist) in matters related to safety and health at work.

Employees also have obligations under the Act. They must take reasonable care to ensure their own safety and health at work and avoid putting other's at risk by anything they do or don't do. Employees must also report any situations that may be hazardous.

WorkSafe

Westcentre, 5th Floor, 1260 Hay Street
West Perth, Western Australia 6005
Telephone: 9327 8777 Infoline: 1300 307 877
Facsimile: 9321 8973 Email: safety@docep.wa.gov.au
Internet: www.docep.wa.gov.au



Department of Consumer
and Employment Protection
Government of Western Australia



The employee's duty for safety and health is complementary to the employer's duty, and employees must receive adequate information, instruction, training and supervision to meet their obligation.

Employers who, in the course of trade or business engage contractors (and contractors employees,) have the same responsibilities of an employer towards the contractor in relation to matters over which they have control or the capacity to have control.

For further information on the duty of care obligations, see the Commission's Guidance note: General duty of care in Western Australian workplaces

Description of the operation

The most common method used for loading wheeled equipment and non-wheeled equipment such as sea containers is for the tilt tray truck to be positioned in front of the equipment to be loaded. The tray is then tilted so that the back of the tray is at ground level.

A winch rope is attached to the load using a sling or other means of attachment. The operator uses the hydraulic controls of the winch to draw the load on to the truck. When the load is completely supported by the tray of the truck the tray is returned to the flat position and the load secured for transport.

In carrying out this operation there are a number of hazards present for the operator and people near the loading operation. In preserving the safety of the operator and others in the workplace, no one element of the operation is more important than any other. This means that operator training, selection of equipment, inspection, maintenance and adjustment of equipment must all be addressed to ensure the safety of people carrying out this work.

Training

Training must be provided to operators, offsidors and supervisors to ensure they are fully aware of the dangers of drawing loads on to a tilt tray truck. The training should include:

Site safety, including:

- soft ground;
- uneven or sloping ground conditions;
- unacceptable practices;
- congested work sites;
- exclusion zones when loading /unloading;
- inadequate lighting;
- adverse weather conditions;
- awareness of dangers associated with working on or adjacent to roads; and
- site hazards and the security of themselves and others on site.

Assessment of the job, including:

- recognition of the different characteristics of loading a wheeled or a non wheeled load

Inspection and selection of attachment equipment, including:

- the use of various slings and attachments used on the vehicle and how the various in-service configurations can de-rate the load bearing capacity of the item;
- any additional precautions which must be taken because the sling or attachments are not strong enough to sustain the full pull of the winch;
- how the included angle between two slings will reduce the load limit on the sling;
- selection and use of slings which are provided for use only when loading particular pieces of equipment.

Methods of attachment, including:

- the principles of selecting appropriate load attachment points on various loads.

Use of winch, including:

- recognising defects in the winch rope and winch rope hook;
- ensuring a free and unencumbered path for winching the item on to the tray;

Securing the load prior to transport, including:

- methods of securing loads to the winch rope
- selection and security of tow point
- strength of hold down equipment
- assessment of load exerted on equipment
- selection of hold down equipment

Hydraulic winches

General hazards

Any winch and associated controls used for pulling loads on to the tray of a tilt tray truck must be in good working order. A competent person should carry out regular inspection and maintenance. A record of any maintenance or repairs carried out on the winch should be maintained.

The bolts used to hold the winch to the truck, and their location, must be in accordance with the manufacturer's instructions.

The method of securing the winch rope hook or other attachment to the winch rope and the method of attaching the winch rope to the winch drum must also be in accordance with the manufacturer's instruction. Ideally, a swivel hook with a safety latch should be fitted to the winch rope.

Winch ropes are easily damaged if load is put on a rope that is tangled on the drum. Devices are available which ensure the rope does not get tangled and such devices can be retro fitted to an existing winch. Further information can be obtained from the winch manufacturer.

Winch operation

Ongoing supervision must be provided to ensure the operator carries out the loading task in accordance with approved procedures and does not change those procedures for easier but less safe procedures.

Winch control location and position of operator

Some positions can be safer than others and when installing or relocating controls consideration should be given to ensuring the operator is in the safest position.

From a practical point of view there is no safe operator position when an attachment breaks. It is very important that every precaution is taken to prevent any item in the winching train (sling, attachment, winch rope etc) from breaking.

Most winches can be fitted with remote controls. An inexperienced operator may carry the remote control and move into a position very close to the winch rope and chain slings, significantly increasing the risk to themselves.

Load attachment equipment

Selection of attachment equipment

To meet duty of care obligations under the Act, winch ropes, hooks, slings and fittings must be selected, used and maintained to ensure the safe working load limit of any item is not exceeded by the maximum force exerted by the winch.

A competent person would normally carry out hydraulic system adjustments.

The simple solution is to limit the maximum force exerted by the winch through adjustment of the hydraulic system. The force exerted by the winch should be limited to the working load limit of any attachment device used to attach the load to the winch.

There are a number of reasons for this including:

- the operator has no way of knowing how much force they are putting on each individual part of the equipment during loading;

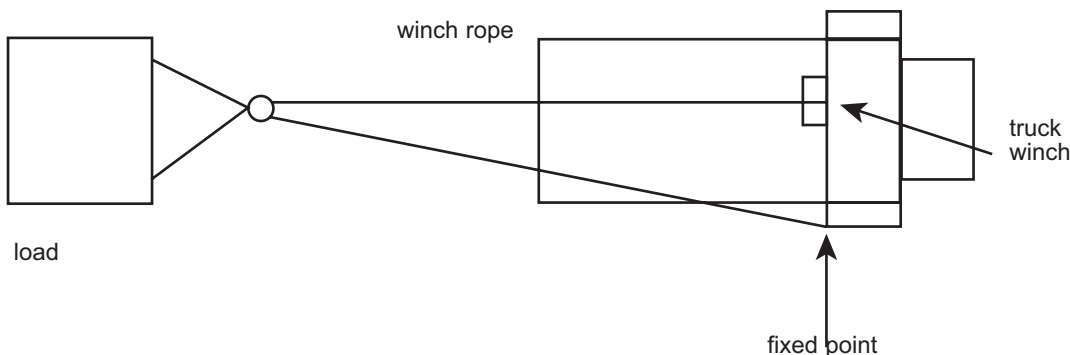
- if the load is prevented from being drawn on to the tray of the truck the force exerted by the winch increases very quickly. The operator has almost no warning that the working load limit of attachment, slings or equipment has been exceeded and that the winch should be shut down immediately until the obstruction is removed; and
- where the working-load-limit of chains and equipment is exceeded, the weakest point between the winch drum and the point of attachment to the load can fail with fatal consequences.

Most hydraulic winches are capable of exerting a pull in excess of 15 tonnes. To provide attachment equipment capable of safely withstanding the maximum pull of the winch may be impracticable. The maximum pull required to carry out all normal tasks is usually much lower than can be delivered by a winch. Therefore, the pull of the winch should be limited to the maximum amount of pull required to carry out the heaviest task.

Use of a snatch block

Where the winch rope is passed round the pulley of a snatch block and the winch rope hook is secured to the truck or some other fixed point the “winch pull” is approximately doubled. Any slings or equipment attached to the hook of the snatch block must be appropriately sized to ensure the increased “winch pull” is not able to exceed the working load limit of any sling or piece of equipment.

Sketch of snatch block arrangement



Use of draw bar for sea containers

Equipment is available for attaching a winch hook to a sea container for loading /unloading the container in a controlled manner. The equipment consists of a metal draw bar which can be attached to the container in place of chain slings. The equipment manufacturer’s instruction should be followed at all times.

Draw bars are recommended when loading ISO containers because they eliminate the misuse of chains and miscellaneous attachments. The draw bar also eliminates the need for slings to have an excessive angle.

Use of ejector device for sea containers

Special equipment is available for ejecting a sea container from the tilt tray. This equipment uses hydraulic rams and can be retro fitted to a wide variety of trucks. The manufacturer's instruction should be followed at all times when using this equipment.

Inspection of attaching equipment

An inspection should be carried out by the operator each time a sling or a piece of equipment is used. The operator must be given enough training to allow them to properly inspect the slings and equipment.

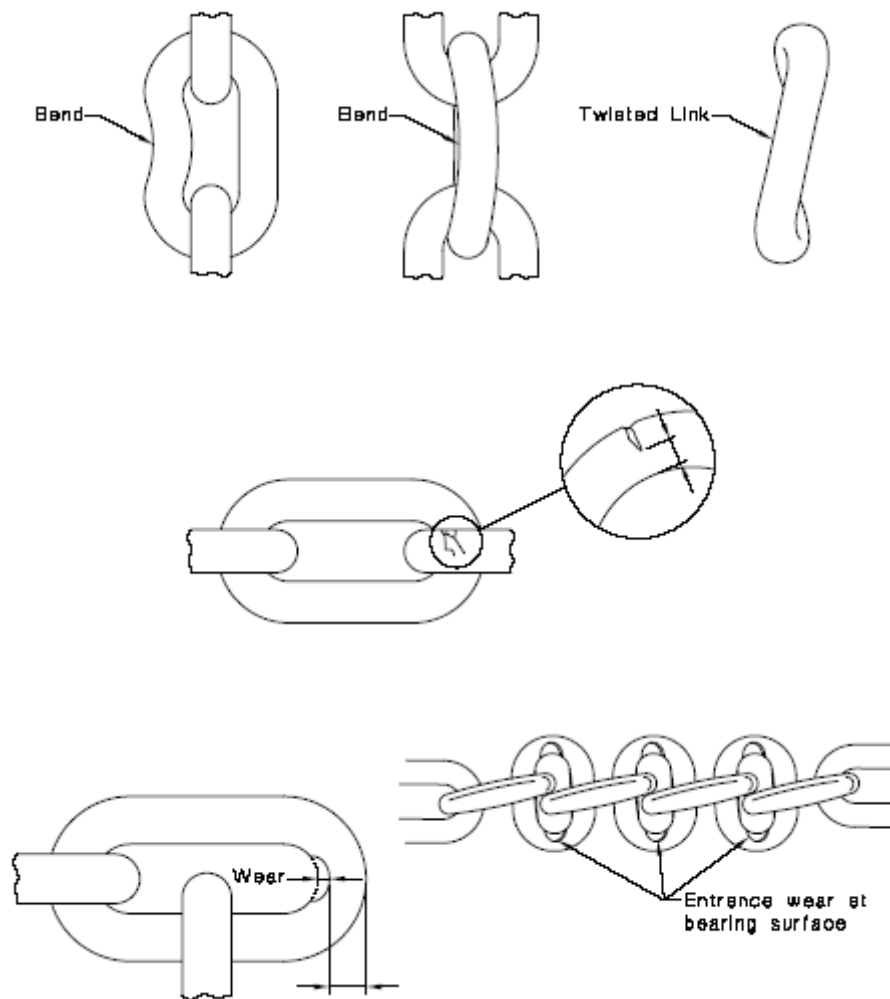
In addition, a person who has a combination of experience, practical knowledge and academic qualification to enable them to recognize and assess defects in slings, chains and lifting attachments should be engaged to inspect the slings and equipment. on a regular basis.

Irrespective of the equipment being used it is important that:

1. The operator be trained to inspect and recognise visual faults associated with each piece of the equipment.
2. The operator can reliably determine safe anchor points on the load.
3. The operator has been provided with training on how to safely use each piece of attachment equipment carried by the truck.
4. Slings and attachments appropriate for the task are provided for each truck. Any old or defective attaching equipment should not be carried on the truck, but should be damaged beyond repair ,and disposed of to prevent use by another person.

Chain and chain slings

What to look for:



If a link in a chain shows any sign of elongation the whole sling must be discarded.

Wire rope slings

If there is any visible damage to any part of the wire rope or eye fixings the sling must be inspected by a competent person before further service.

Web belts

If there are visible cuts or damage to any part of the webbing fabric, or deterioration of any stitching, the sling must be inspected by a competent person before further service.

Hooks

All hooks must be provided with a safety catch. The mouth of the hook must not be opened out. The hook must be free from any damage.

Chain grabs / shorteners

Chain shorteners are used to reduce the length of a chain or to form an eye in a chain. Care should be taken that the chain grab is the correct size for the chain it is being used on. If there is any visible damage to any part of a chain grab it must be inspected and assessed before further service. Appropriate down rating of the safe working load limit must be applied in respect of the configuration of the attachment.

Winch and winch rope

The winch attachment fixings should be regularly inspected to ensure their security and any looseness or damage must be rectified by a competent person before further service.

If there is any visible damage to any part of the winch rope or winch hook attachment, the rope should be inspected by a competent person before further service.

Load restraint

Whilst chains can be used to secure an ISO container to the tray of a truck the number and size of the chains would normally make this practice uneconomical. The recommended method is to use twist locks installed into the bed of the truck. Other equipment such as skid mounted containers and wheel mounted loads must be secured in accordance with the recommendations below.

Securing ISO containers

A written procedure detailing the method of securing each type of load should be provided in each vehicle, in addition to the operator being provided with training.

ISO Containers represent a significant load restraint problem and the following general information is provided.

Container restraint without twistlocks

The Load Restraint Guide (the Guide) states that a load must be restrained in such a manner that it will not shift when subjected to forces of:

0.8 x Weight of load in a forward direction

0.5 x Weight of load rearwards and to either side

0.2 x weight of load upwards

The Guide also states that containers carried without the use of twistlocks for restraint should be supported on timber dunnage and/or a rubber load mat.

The carriage of containers without the use of twistlocks, dunnage or load mat cannot be recommended due to the difficulty of adequately securing a steel container on a steel deck.

Any system of load restraint that does not use any of the above must be certified by an engineer as being capable of meeting the requirements of the Guide.

Stops and tie down

As a result of the very low friction between steel and steel, it is very difficult to achieve an adequate degree of restraint by tie-down alone because tie-down relies on friction between the load and the vehicle deck. In view of this, containers transported without the use of twistlocks should be restrained horizontally by suitable stops at the front, the rear and both sides. The container must then be restrained vertically in accordance with the Guide figures to ensure that it cannot ride over the stops.

For example, a container with a total mass of eight tonnes, restrained front, rear and on each side by stops capable of withstanding the specified horizontal loads, would also need to be restrained vertically by a tie-down system capable of withstanding $0.2 \times W$ or 1600 kgf. A single eight mm chain, tensioned with an over-centre dog is capable of providing approximately 1500 kgf of restraint in a vertical direction. In this case, compliance with the Guide requirements would require two such chains to be used to provide the necessary vertical restraint.

Tie-down only

If tie-down alone is used on the same container, on a smooth steel deck, friction between container and deck must be relied upon to provide the necessary horizontal restraint.

In dry conditions, a minimum of 22 properly tensioned chains would be required in order to ensure compliance.

In wet conditions, friction between container and deck may be reduced to the extent that compliance using tie-down is not possible.

As a result, the use of tie-down methods only to secure a container on a steel deck is not an acceptable practice.

Cross chaining

Cross chaining, as illustrated for lateral restraint in the Guide, can also be used for longitudinal restraint. This is a method of direct restraint, where the restraining forces are exerted by the lashings themselves and friction does not play a major role as it does when using tie-down methods.

The 8 tonne container in the earlier example could be restrained by cross chaining at both sides and at each end. Each chain would need to have a minimum capacity of 3.8 tonnes and would need to be appropriately tensioned with a suitably rated turnbuckle.

To restrain this container fully would require the use of 8 chains and 8 turnbuckles and the time needed to fit and tension all of them. Attaching the chains to the upper corner castings of the container would also require the issue of working at heights to be addressed.

In addition, it is unlikely that the lashing rails on a commercial vehicle body would have a suitable load capacity, so the design and fitting of additional lugs would be necessary.

Use of loading equipment for restraint

Use of any winch or other loading device as part of the restraint system is only acceptable if the equipment in question is certified as suitable for that additional purpose.

Personal protective equipment

The operator must wear a high visibility vest and safety shoes. A hat, sun glasses, sun screen, gloves, eye and ear protection may be required where appropriate.

Witches hats or marker cones must be carried on the vehicle to enable the operator to establish a temporary safe working area around the truck. This is especially important when the operator is required to work on public highways or sites where other traffic may be a danger to the operator.

Useful information

Australian standard AS 3775.2 – 2004 chain slings - grade T part 2 : Care and Use.

Occupational Safety and Health Regulations 1996

Load Restraint Guide – Transport Commission and National

Road & Traffic Authority NSW

This bulletin is available on request in other formats to assist people with special needs.