February 2017

LOAD SAFETY SERIES

Information Sheet

Safe Load Securing of Round Timber

Due to their size, weight and configuration, consignments of round timber are high-risk loads, where the consequences of load shift or load shed can be extremely serious. Round timber is a 'live' commodity, which can lead to independent movement of parts of the load if the restraint used is not adequate. It is essential that timber is not loaded to such a height, or in such a way, that the vehicle or load could become unstable.

What the Law requires

Load securing is covered specifically by Road Traffic legislation, which requires that loads carried by vehicles must be properly secured at all times. It is an offence for a vehicle to be overloaded or to discharge material onto the public road[1].

Occupational Health and Safety legislation[2] also applies to load securing. Employers have a legal duty to:

- make sure systems of work are planned, performed and maintained for securing and transporting loads;
- provide drivers and loading / unloading staff with instruction, information and training about securing loads;
- make sure that adequate equipment is provided and maintained for securing loads; and
- have appropriate plans and procedures in place in the event of an emergency such as a load shifting or shedding.

The law also requires that employers co-operate, so where several parties are involved in ensuring the safe transport of a load, there should be adequate co-ordination and co-operation between the parties and clear responsibilities laid down.

Figure 1. Round timber transport operation

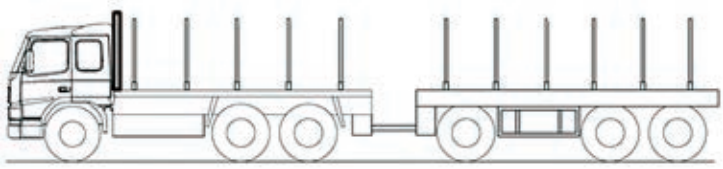

Figure 2. Example of a round timber vehicle equipped with headboard and stanchions

[1] *S.I. No. 190/1963: ROAD TRAFFIC (CONSTRUCTION, EQUIPMENT AND USE OF VEHICLES) REGULATIONS, 1963, Reg 96*

[2] *Safety, Health and Welfare at Work Act 2005 (No.10 of 2005)*

HEALTH AND SAFETY AUTHORITY
www.hsa.ie

www.garda.ie

RSA
Údarás Um Shábháilteacht Ar Bhóithre
Road Safety Authority
www.rsa.ie

Restraint Equipment

Requirements for round timber loads

Even though a round timber load is heavy, the weight of the load alone cannot be relied on to hold it in place. If the load lifts off the bed, even momentarily, static friction is lost. Therefore friction alone cannot be relied on to hold a round timber load in place. For round timber loads the use of the 'tie-down' method on its own is not recommended, as it relies on the combined friction generated by the weight of the load and the 'tie-down' force of the lashings alone.

The appropriate method to secure round timber loads is using a combination of the:

- 'tie-down' method using suitable lashings (to increase friction), and
- 'direct restraint' methods
  - suitable headboard (to provide blocking), and
  - side stanchions (to provide containment) on a timber specific bunk

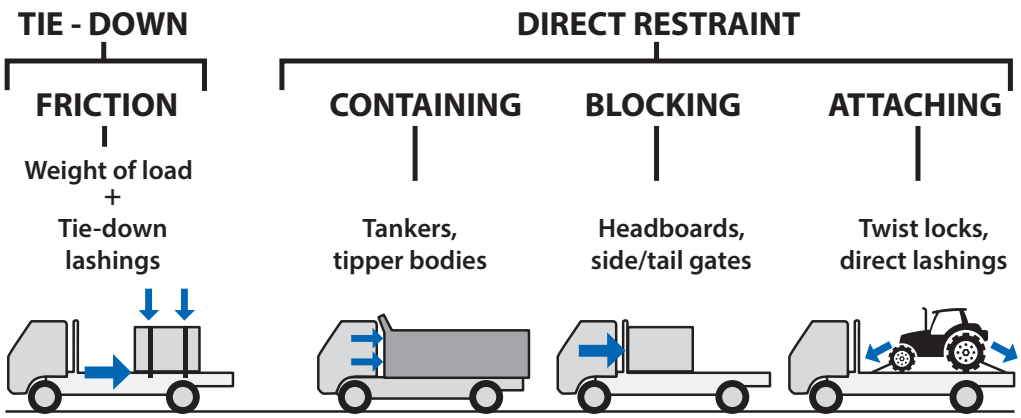

Figure 3. Load restraint methods (To control forward + rearward motion)

The load restraint system should be able to withstand:

- 80 percent of the payload weight in the forward direction,
- 50 percent of the payload weight in the sideways direction, and
- 50 percent of the payload weight in the rearward direction.

For sea travel additional requirements apply. Refer to EN12195

In certain circumstances, vertical movement of the load may occur. This movement must be resisted by the restraint system in use.

The system should be able to withstand:

- 20 percent of the payload weight vertically upwards.

Webbing straps and ratchets

When designing a direct restraint system and deciding the required number of restraints, it is the lashing capacity (LC) and not the breaking force which must be taken into account. When designing an indirect (tie-down) restraint system, it is the standard tension force (STF), not the lashing capacity of the strap, which is relevant for the calculation of the number of straps needed.

Lashing capacity = Maximum allowable tension in the strap.

Breaking force = Maximum force the web lashing withstands when tested complete with ratchet and end fittings. The breaking force of the lashing assembly will be twice the lashing capacity.

- Lashing capacity is NOT to be mistaken for the allowable weight of product the lashing can safely restrain.
- A 2-tonne lashing capacity webbing strap will be denoted by LC 2000daN.
- A 2-tonne lashing capacity webbing strap will typically allow an STF of 300 – 600kg[3].

Lashing capacity	**LC.... daN**
Standard hand force* Standard tension force	**S_{HF} 50 daN S_{TF} .... daN**
Webbing material	**POLYESTER**
Length	**...m**
	"NOT FOR LIFTING"
Name of manufacturer or supplier	
Manufacturer's traceability code	**CODE NR #### ####**
Year of manufacture	**DD MM YYYY**
Standard	**BS EN 12195-2**

Figure 4. Webbing strap with label description

Requirements for webbing straps:

- Straps should comply with the EN12195-2 standard, identified by a label on the web strap and a classification on the ratchet.
- The strap should have a hand-operated ratchet tensioner.
- Straps should be long enough for the securing method.
- Straps should be visually inspected before every journey.
- Straps with holes, tears or fraying should be thrown away.
- The end fitting of the strap (web lashing) should be suitable for the type of lashing point used.
- Straps should be attached to suitably rated lashing points[3] **not** rope hooks.

WARNING: Do not use mechanical aids such as levers or bars, unless the tensioning device is specially designed to be used with them. The average user is capable of applying the rated Standard Hand Force (SHF) for tensioning the strap.

It is recommended[4] that all lashings should have a **Lashing Capacity (LC) of at least 1600 daN with a pre-tension of at least 400 daN.**

Figure 5. Load lashing should always be added vertically on round timber loads

[3] *The lashing points should comply with EN 12640*

[4] *European Best Practice Guidelines on Cargo Securing for Road Transport (2014)*

Transport chains and tensioners

When designing a restraint system using chains and determining the required number of restraints, it is the lashing capacity and not the breaking force which should be taken into account.

- Lashing capacity = the maximum allowable tension in the chain.
- Lashing capacity is NOT to be mistaken for the allowable weight of product the lashing can safely restrain.
- A 4-tonne lashing capacity chain will be denoted by LC 40kN.

Breaking force = *Maximum force the complete chain lashing, including load binder and connection components, can withstand.* The breaking force of the lashing assembly will be twice the lashing capacity.

Requirements

- Lashing chains should comply with the EN12195-3 standard, identified by means of a metal tag attached to the chain.
- Lashing chains should be visually inspected before every journey. Damaged or worn restraints, fittings or load binders must not be used.
- The use of spring links (over centre load binders) is not advised due to kick back hazard.
- The end fitting of the chain should be suitable for the type of securing point used.

Figure 6. Over centre load binder (not recommended)

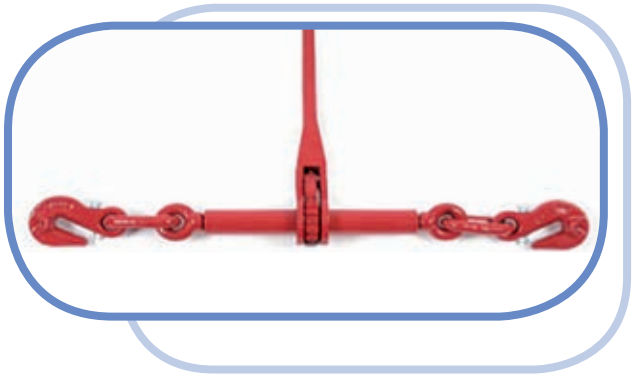

Figure 7. Bottle tensioner (recommended)

Wire rope lashing

In many countries steel wire ropes are used as suitable lashings for round timber loads. Single part wires should never be used for lashing as they cannot easily be assessed for serviceability and any failure will result in complete failure of the restraint. Wire ropes used for load securing should comply with the EN12195-4 standard.

Number of lashings needed

The number of lashings required can be calculated using the procedures outlined in the EN 12195-1 standard[5]. This will depend on the nature of the load (weight, dimensions, centre of gravity), the static friction between the load and the load bed, the securing method used (direct, indirect or a combination of both) and the rated capacity of the lashings used.

WARNING: Because of different behaviour and elongation under load conditions, chain lashings and web lashings must not be used in combination to secure the same load.

[5] For detailed calculations refer to **EN 12195** and associated guidance

Vehicle mounted cranes

Vehicle mounted cranes are **not** designed to be a part of the load restraint system and cannot be used in calculating the number of lashings required. Lashings **should not** pass over the crane jib to assist in securing a load package. This procedure can lead to weakening of the crane structure creating a possible route to failure. The crane should be secured for transport in accordance with the manufacturer's operating instructions.

Note: In accordance with the requirements of legislation[6], vehicle mounted cranes are subject to a scheme of Thorough Examination by a competent person (GA1 form).[7]

Best practice for safe transport of round timber

When securing a round timber load the general principles of load distribution should be followed, and it is important to make sure that the load is blocked against the headboard whenever possible.

Care should be taken in the case of each individual load bay to ensure that no part of the load is in contact with any moving part of the vehicle (particularly the wheels of the trailer) or in contact with the road, as this could make the transport of the load a danger to the driver or other road users.

The use of chain or web lashings with tensioner is recommended and all lashings should be checked and kept tight during the whole transport operation. In other countries wire rope lashings are widely used.

Use of headboards and restraints

Best practice requires that a headboard should be fitted between the driver's cab and the timber load with strength in accordance with standard EN12642 class XL and the load should be loaded no higher than the headboard.

Where possible, the front round timber bay should be loaded so that it is against the headboard of the vehicle. This allows the headboard to become part of the load securing system by blocking the load from moving forward under braking or emergency conditions. This will also allow for fewer lashings being needed, than for a load loaded away from the headboard. The headboard should be strong enough to prevent the load from moving forward[8]. The headboard offers critical protection to the driver, and therefore the load should not be loaded above the height of the headboard unless precautions have been taken to stop it moving forward.

Figure 8. No headboard = no blocking capacity

6 *Safety Health & Welfare at Work (General Applications) Regulation 2007 (SI no. 299 of 2007)*

7 *This form may be used to record the thorough examination and testing of Lifting Equipment, as set out in the Safety, Health and Welfare at Work (General Application) Regulations, 2007. This form is produced by the HSA to facilitate the recording of information, as per Schedule 1 Part E of these regulations. This is not an approved or statutory form. Reports of Thorough examination may be produced in other formats.*

8 *Best practice suggests that the strength of the superstructure should meet the requirements laid down in EN 12642 (L-XL). In addition, the end wall should be able to withstand 40% of the payload, up to a maximum of 50 KN*

If it is not possible to load to the headboard or:

- there is no headboard fitted, or
- the headboard is of inadequate strength, or
- the load is designed for loading away from headboard (not usual for round timber)

then there is a need to make sure that the load is well secured to stop it sliding forward uncontrollably. Use more tie down lashings on the load or in addition use alternatives such as loop lashings around the load bay.

Top-over lashings or similar, creating a vertical pressure on the timber, should be tightened over each bay in the following numbers:

- at least one lashing if the bay consists of timber with bark still present, up to a maximum length of 3.3m;
- at least two lashings if the bay is longer than 3.3m or irrespective of the length if the bark has been removed.

The top-over lashings should be placed across each bay as symmetrically as possible.

If a vehicle is not fitted with a headboard of sufficient strength, more lashings will be needed:

- 2 lashings up to a length of the timber of 3.3m,
- 3 lashings up to 5m, and
- 4 lashings from 5m up.

Figure 9. Rear view of log transport using chains for tie down

Placing and securing the load

The centre of the top logs on the outside edge of each bay must be no higher than the stanchions. The top of the middle timbers should be higher than the outside timbers to 'crown' the load and allow for it to be properly tensioned by the lashings, as illustrated above:

The logs should rest on tapered stanchions of a timber specific bunk.

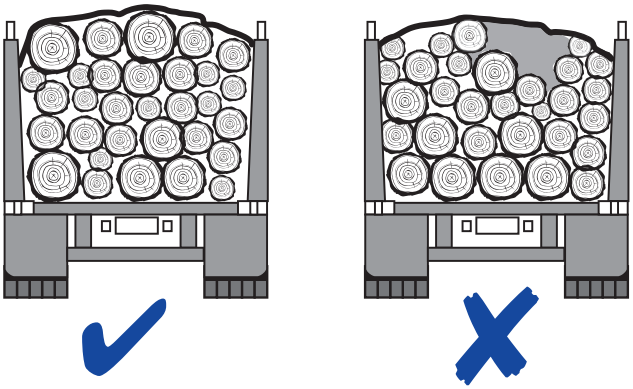

Figure 10. Correct (left) and incorrect (right) loading of round timber

Sliding bunks should be secured in place once timber packages have been loaded, adjusted and secured for transport. This should be checked prior to departure from the loading area.

It is Important that the load and lashings are checked before passing from a forest track onto a public road.

For further information and guidance visit
www.loadsafe.ie