

Sortimo practical hints for

Load securing



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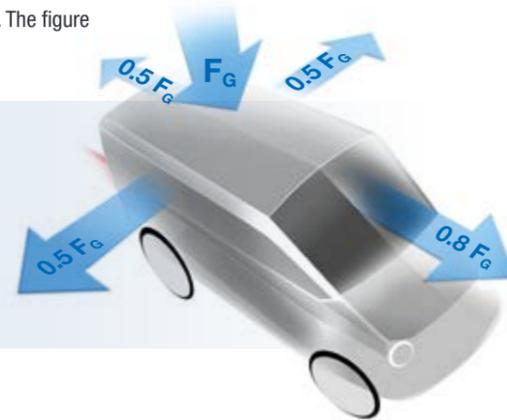
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Intelligent Mobility



Forces on the move

Forces are exerted on the load while driving. These forces are defined in VDI 2700. The figure illustrates these forces. The following abbreviations are commonly used:

- F_G = Weight (force) of the load (A load with mass $m = 100$ kg equates approximately to a weight (force) of $F_G = 100$ daN)
- C = Acceleration factor (0.8 forwards, 0.5 to the side and rear)
- F_S = Securing force (The load needs to be secured to counteract this force)
- μ = Coefficient of friction

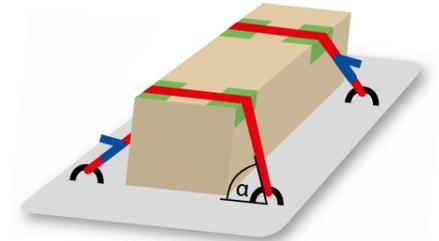


Methods of load securing

A few general points need to be considered with regard to adequate and correct load securing. There are essentially two securing methods:

1. Friction locking

Friction-locked load securing is provided using lashing means that presses the load onto the loading surface (e.g. belt with ratchet turnbuckle). A minimum of two tensioning straps are then tensioned over the load. This is also known as 'lashing down'. The lashing angle α preferably needs to be 90° to obtain a good contact force. The contact force is only to increase the friction between the load and the load surface. This is the most common method of securing loads, although positive-locking load securing is better.

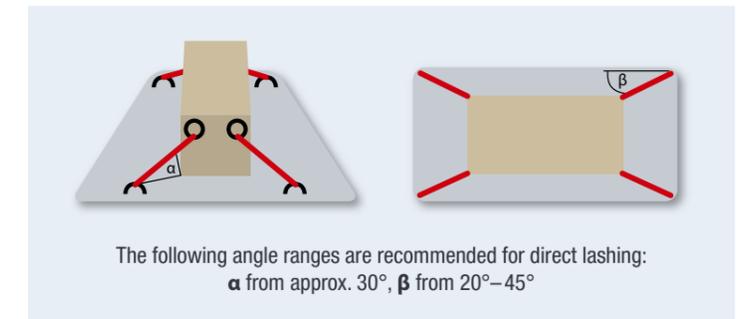


2. Positive locking is better than friction locking

Positive locking refers to the loading of goods directly against the front panel, rear panel or side panels. The load is loaded in the vehicle with as few gaps as possible. If the load cannot be stowed without gaps, it will need to be additionally secured by means of auxiliary or lashing equipment.



Restraint poles, crossbeams, square tubular restraints or load securing nets can all be used. The load can additionally be secured using other lashing means, either by lashing it down as described or using positive-locking lashing methods, also known as direct lashing. The load is held in place directly by the lashing means, not by friction alone. Direct lashing of loads is therefore preferable to lashing down where possible. Positive-locking direct lashing can be achieved particularly easily, quickly and reliably with a certified load securing net. There is also an option of securing loads to lashing rails on the side panel or ProPartition in a positive-locking manner. Head lashing is a



very effective positive method of lashing and is often used with very heavy loads.

For example, a roundsling is thrown over the top edge of the load in the direction of travel. A lashing strap is then attached to each side of this roundsling and connected to lashing points on the load surface. It is essential to ensure that the lashing means is always held in place



Combined load securing net and crossbeams

during transport. The head lashing can also be used on both sides.

A combination of multiple load securing means is recommended with very heavy loads. The selection of a suitable lashing method and the correct load securing means always depends on the type of load.



Head lashing with roundsling

max. 150 kg

max. 200 daN

max. 15 cm

Permitted lashing forces

All Sortimo lashing points have a permitted load-bearing capacity of **200 daN**.

The load to be secured may have a **max. mass of 150 kg** with securing points on the side panel or ProPartition.

The permitted load-bearing capacity of the original lashing points can be found in the operating instructions for your vehicle.

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Basic rules and checklist

As a shipper, dispatcher and carrier, you are always jointly responsible for securing the load.

- All securing equipment must be in perfect condition.
- The driver must be suitable for the job and trained.
- The vehicle must be suitable for transporting the goods:
 - Pay attention to the permitted loading weight of the vehicle.
 - When transporting gases, the vehicle must have adequate ventilation (floor and roof vents).
 - The load surface must be swept clean.
 - The lashing equipment must have adequate load-bearing capacity and must be suitable to secure the load.
- The load must be secured from slipping and tipping over.
- The load must not impair vehicle handling and stability. The centre of gravity of the vehicle and the load as well as the permissible total weight of the vehicle must be considered.
- The vehicle and load must be checked for roadworthiness before setting off.
- The load securing needs to be re-checked after sharp braking or other unusual loading.

Completion of a load securing training course is recommended for further information on different lashing methods and to precisely calculate the securing forces required.

Coefficients of friction

The following coefficients of friction “ μ ” can be used to calculate the securing forces required.

Material	SoboPro	SoboFlex
Normal wood	0.32	0.33
Planed wood	0.26	0.37
OSB	0.30	0.32
Pressboard	0.28	0.34
Phenol resin coating	0.07	0.17
Aluminium	0.16	0.20
steel	0.17	0.18
Anti-slip mat	0.70	0.57

It should be noted that these coefficients can be greatly reduced if the protective coating is worn or soiled. When transporting steel, the coefficient of friction is also greatly reduced by corrosion. Anti-slip mats can be used to counteract this in these cases.

Calculating the securing forces

Inertia force [daN] = $F_G \times C$ Friction force [daN] = $F_G \times \mu$ Securing force F_S [daN] = inertia force – friction force
The securing force must be absorbed by load securing means when the vehicle is in motion.

Example: A load weighing 100 kg is to be secured. The table gives a figure of $\mu = 0.3$. The securing force to the front is to be calculated, which needs to be absorbed by load securing means in the direction of travel:

Inertia force = $F_G \times c = 100 \text{ daN} \times 0.8 = 80 \text{ daN}$ **Friction force** = $F_G \times \mu = 100 \text{ daN} \times 0.3 = 30 \text{ daN}$
 $F_S = \text{inertia force} - \text{friction force} = 80 \text{ daN} - 30 \text{ daN} = 50 \text{ daN}$

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