

Instructions for use of the KARGOTEC® anti-slip mats

The **KARGOTEC®** anti-slip mats from KRAIBURG Relastec GmbH & Co. KG are designed as an aid for the highest and most efficient applications in load securing for truck, ship and air transport and have been tested by independent testing institutes according to VDI 2700, pages 14 and 15.

1. Characteristics

The slip-resistant **KARGOTEC®** anti-slip mats consist of rubber granules and PU binders and are made according to a specially developed process of more than 90% recycled material in an environmentally friendly manner. The temperature resistance of the **KRAITEC®** anti-slip mat is between -30 ° C and + 100 ° C. They are limitedly resistant to acids and alkalis. The **KARGOTEC®** anti-slip mats are suitable as reusable anti-slip mats due to their good qualities. It is necessary to replace them as soon any damages, tears or excessive fouling are visible.

2. Coefficient of friction

The coefficient of friction is highly dependent on the external boundary conditions, e.g. temperature, humidity, load and soiling. The particular material pairs also have a different effect on the coefficient of friction. The friction coefficients and surface loads of the **KARGOTEC®** anti-slip mats can be found in the corresponding documentation.

3. Storage

KARGOTEC® anti-slip mats must be stored dust-free, dry and free segregated by emissions from other materials. They should be inspected before use for damage and contamination (such as dirt, solvent containing liquids, etc.), especially in multiple reuse. Long-term contact with petrol, diesel or other resources may lead to damages of the surfaces and may as well affect the coefficient of friction negatively, which are ultimately discard criteria.

4. Preparations before loading

- Requirements for loading area:

The platform of the vehicle must be designed in such a way that it can safely receive the load to be transported. Furthermore, these vehicle superstructures must possess a fully functional load securing device. The contact surfaces must be clean, dry and free of impurities. Otherwise, the stated coefficient of friction will be significantly lower and this must be taken into account when calculating the required safety forces.

- Lashing points on the platform of the vehicle

If lashing points are installed on commercial vehicles, they must comply with DIN EN 12640. DIN EN 12640 stipulates how many lashing points must be available and how much the load-bearing capacity of each lashing point must be at the least.

- Lashing straps:

The European standard DIN EN 12195-2, "Lashing straps made of chemical fibers" has been in force since February 2001. All lashing straps manufactured since February 2001 (see lashing strap label) must comply with the requirements of this standard.

The relevant directives and standards contain the following usage instructions, which must be observed during the handling and use of lashing straps:

- Only use undamaged lashing straps.
- Place lashing straps equally over the load which need to be secured. Do not overstrain any lashing straps.
- Lashing straps need to be free of any knots.
- Place the lashing straps so that they are not twisted and are able to bear with their full width.
- Do not use lashing straps as lifting devices for lifting loads. Do not place any loads on top of the strap.
- A clearly readable identification mark must be available.
- Do not strain lashing straps over sharp edges or pull them over roughened surfaces.

Further aids for protecting the load-carrying material and for protecting the lashing strap are e.g. edge protection profiles.

- Selection of anti-slip mat:

The **KARGOTEC®** anti-slip mats should be selected depending on the relevant surface pressure and the required coefficient of friction (at least $\mu = 0.6$). Choose the size and strength of the **KARGOTEC®** anti-slip mats so that they have a deflection of max. 30 % of the mat thickness. The goods must be placed over the entire surface with the support points on the mat in such a way that there is never any direct contact with the loading surface. It is also important to ensure that the **KRAITEC®** anti-slip mats have an overhang around the circumference in order to avoid tilting.

An overstressing of the anti-slip mat can cause damage which leads to the state of discard.

To prevent early damage, the selection of the **KARGOTEC®** anti-slip mats should be adapted to the required technical values. Various **KARGOTEC®** anti-slip mats with different technical characteristics are available for this purpose:

- | | |
|-------------------------------|--|
| KARGOTEC® basic | - Anti-slip mat for everyday loads |
| KARGOTEC® spezial plus | - Antirutschmatte for medium heavy loads |
| KARGOTEC® protect | - Anti-slip mat for loads which are prone to discoloration |
| KARGOTEC® secure | - Anti-slip mat for high loads |

Determination of the correct anti-slip mat by formula (surface pressure):

Surface pressure: $F = \frac{P}{A}$

F = maximum pressure load on the anti-slip mat (specified by the manufacturer)

P = maximum pressure (load weight)

A = Contact surface for anti-slip mat

- sample applications:

Pallets and lattice boxes

The use of the **KARGOTEC®** anti-slip mats under pallets or mesh boxes significantly increases the friction between the loading area and the load. Therefore, the necessity for tensioning belts is declining.



Metal rod coils

Metal rod coils should ideally be transported in coils. The use of **KARGOTEC®** anti-slip mats prevents dangerous slipping which avoids a change in the center of gravity.



Papercoils

The flexible, robust and tear-resistant **KARGOTEC®** anti-slip mats ensure heavy loads such as transversal paper rolls on smooth loading surfaces of transport vehicles against sideward slipping. They should be laid underneath and between the paper coils, thus supporting and relieving them. This requires significantly less lashing straps.



Tubes

If the pipes are loaded longitudinally in the saddle, special care must be taken to prevent slipping in the longitudinal direction as well as to the side. This will be prevented by using **KARGOTEC®** anti-slip mats under the wedges and under the tubes.



5. Loading

The **KARGOTEC®** anti-slip mats, or the blanks underneath the load, should be used for visual inspection. Make sure that holes and cracks in the loading area are not a disadvantage for the bearing points. If the mat is not recessed, the load does not have any direct contact with the loading area. For multi-layered cargo, it is recommended to use **KARGOTEC®** anti-slip mats in the intermediate layers.

The correct and approved use as well as the accurate selection of **KARGOTEC®** anti-slip mats can significantly reduce the required number of lashings. Please be advised that the use of anti-slip mats does not completely replace the use of lashings. Additional securing actions, e.g. lashing the goods down are obligatory at all times. The full contact area of the cargo and the **KARGOTEC®** anti-slip mat must be ensured in any traffic situation.

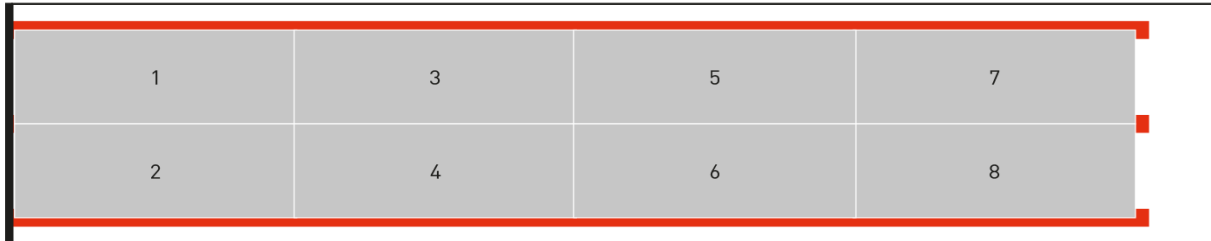
A form-fit and non-positive securing can be achieved by means of down or diagonal lashing with suitable and approved lashing straps (see above).

Important information:

The permissible payload and load spreading must be checked and observed in each individual case. Furthermore, independent checks on lashing must be carried out.

- Computational procedure

Example 1: Loading surface area (curtainsider L) + load (MDF panels, 8 packages)



■ Load ■ Anti-slip mats

- Weight of the load 24,400 kg MDF plates divided into 8 packages bundled
- Vehicle configuration: curtainsider L
- Friction partner smooth clamping plate / MDF plate on screen printing floor $\mu = 0,2$
- Required lashing straps: 48 pieces with a pretensioning force of 500daN
- Lashing angle: $\alpha = 80^\circ$
- Form closure to the front

Cost without anti-slip mats ($M = 0,2$) (calculation according to DIN EN 12195)	Cost	Costs with anti-slip mats ($\mu = 0,6$) (calculation according to DIN EN 12195)	Cost
8 lashing straps per transport (per package 6 belts) Purchase: 10 € / piece = 480 €: 250 days = 1.92 € Per transport	1,92 €	16 belts per transport (2 straps against lifting per package) Purchase: 10 € / piece = 160 €: 250 days = 0.64 € Per transport	0,64 €
Holding time of the truck = 80 € / hour		Holding time of the truck = 80 € / hour	
= 218.40 € per transport (168 min) Apply time per belt approx. 2 min = 48 belts / transport 96 min.		Apply time per belt approx. 2 min = With 16 belts / transport approx. 38 Min.	
Shelf time (incl. Reeling) per belt 1.5min = 48 belts per transport 72 min		Shelf time (incl. Reeling) per belt 1.5min = 16 belts per transport 24 min	
At a cost of 30 € / h = 84 € per transport	302,40 €	At a cost of 30 € / h = 30 € per transport	110,00 €
Edge protection profile per transport 96 pieces = 96 angle x 0.50 € = 48 € / year = 48 €: 250 days = 0,19 € per transport	0,19 €	Edge protection profile per transport 32 pieces = 32 angle x 0.50 € = 16 € / year = 16 €: 250days = 0,06 € per transport	0,06 €
		Cost anti-slip mats (15 strips of 6mm x 200mm x 2500mm) 75 € per truck for an average of 10 transports	7,50 €
		Laying out the anti-slip mats for each transport approx. 5 min For labor costs of 30 € / h = 2.50 €	2,50 €
Cost per transport	304,51 €	Cost per transport	120,70€
Costs / year (250 working days)	76.127,50 €	Costs / year (250 working days)	30.175,00 €

6. State of discard

As already mentioned at point 3 - Storage, the **KARGOTEC®** anti-slip mats should be inspected and possibly disposed of for any damage such as abrasive traces or cracks etc. before each use. (**KARGOTEC®** anti-slip mats may be disposed of as domestic waste). According to VDI 2700 Part 15, the laying-off strength of the mats, strips or pads is achieved and compulsory with the following criteria:

- Strong mechanical damage, such as holes, fractions and cracks
- Strong remaining deformations or pressure points, which interrupt the total contact
- Broken and abraded layers
- Damage caused by aggressive substances that cause swelling or perforation
- Embrittlement and hardening
- Contamination which cannot be removed, which can lead to functional impairment

7. Note

The stated coefficients of friction as well as further technical data have been determined and calculated under ideal test and laboratory conditions according to VDI 2700 and the corresponding DIN EN standards. Outer conditions and production-induced fluctuations can affect both the positive and negative values.

The **KARGOTEC®** anti-slip mats are permanently monitored by self-testing.

Disclaimer:

With our data, we would like to advise you on the basis of our experiments and experiences to the best of our knowledge and belief. However, KRAIBURG Relastec GmbH & Co. KG cannot assume any guarantee for the processing result in its individual case because of the multitude of possible uses and the storage, processing and environmental conditions outside its influence for its **KARGOTEC®** products. Self-tests have to be carried out. Our technical customer service is at your disposal