ANTI-SLIP MATS
FOR SECURING CARGO

for freight transport by road,
rail, sea and air.

>>>

Perfect protection for cargo and driver.

KFI
CARGO CONTROL

Your partner for expertise in

Load Securing, lifting technology, testing service,
occupational safety & hygiene, commercial vehicle spare parts

www.kfi-cargo.com

PLAY IT SAFE WITH ANTI-SLIP MATS!

THE RIGHT SOLUTION FOR ANY CARGO

A significant percentage of traffic accidents in freight transport are caused by inadequate securing of cargo. According to section 22 of the StVO (Germany's Road Traffic Act), all cargo must be properly secured to ensure that it is held in place on the vehicle even in extreme situations such as emergency braking, abrupt evasive manoeuvres, accidents or poor road surfaces.

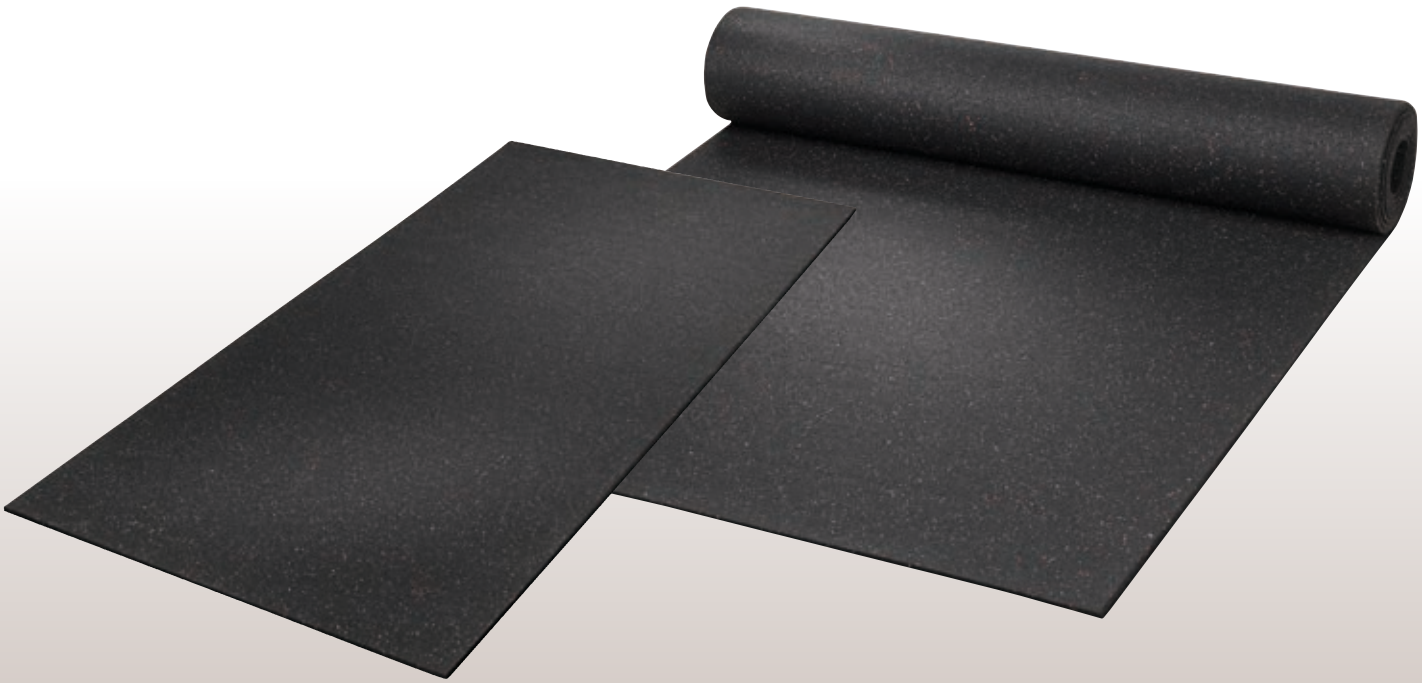
Cargo must therefore be secured with the sufficient securing force to keep the cargo on the loading surface in such situations.

According to the current road traffic requirements, each piece of cargo must be secured with 80% of its weight toward the front and 50% to the side and to the back. The aim of securing cargo is to prevent it from coming loose as the result of centrifugal and inertia forces, especially when the vehicle is braking or cornering.

One important element of securing cargo is friction, which keeps the cargo firmly on the surface up to a certain point and helps to stop the cargo from slipping.

This is where the anti-slip mats come in: with their high sliding friction coefficients, the anti-slip mats reduce slippage on smooth surfaces. The risk of the cargo slipping is reduced, the pre-tensioning force required for tie-down lashing is significantly lowered and as a result fewer lashing devices are needed. This saves time and money.

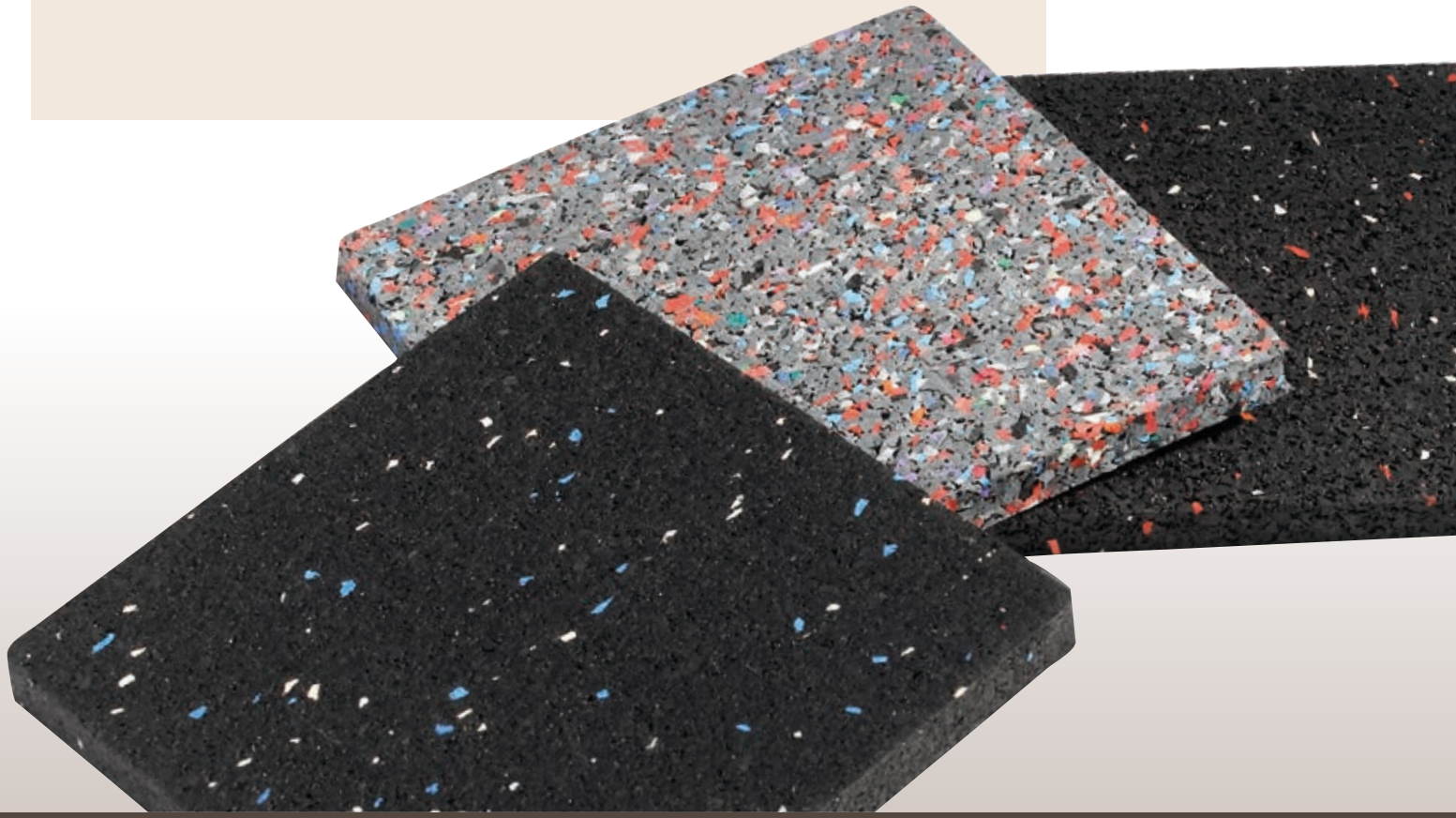
Like lashing straps, anti-slip mats are an outstanding cargo securing tool and they can be used under any type of cargo.



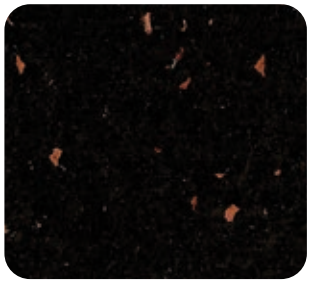
THE VERSATILE ANTI-SLIP MAT

The anti-slip mat was developed to cover a wide range of safety requirements. One of the key goals in the development phase was to achieve a high sliding friction coefficient μ of up to 0.92.

The various material thicknesses that are available provide very good maximum distributed load values in a range between 125 and 500 t/m^2 and thus enable exact adjustment to suit your specific securing needs.



THE RIGHT MATERIAL FOR ANY CARGO



Basic

Technical data
Standard product for a wide range of cargo types
Material PU-bound recycled rubber granulate
Thicknesses: Slabs: 4,5,6,8,10,12 mm ± 0.5 mm Strips: 3, 4, 5, 6, 8, 10, 12 mm ± 0.5 mm
Max. permitted distributed load (with max. 30% compression in acc. with VDI 2700 Part 15) Approx. 100 t/m² with 3 mm thickness Approx. 120 t/m² with 8 mm thickness
Sliding friction coefficient μ Min. 0.70* with 3, 4, 5, 6, 8, 10, 12 mm thickness
Elongation at break: min. 60% (DIN EN ISO 1798)
Tensile strength Min. 0.6 N/mm² (DIN EN ISO 1798)

Special Plus

Technical data
Standard product for medium-weight cargo
Material PU-bound recycled rubber granulate
Thicknesses: Slabs and strips: 3, 4, 5, 6, 8, 10 mm ± 0.5 mm
Max. permitted distributed load (with max. 30% compression in acc. with VDI 2700 Part 15) Approx. 180 t/m² with 3 mm thickness Approx. 290 t/m² with 8 mm thickness
Sliding friction coefficient μ Min. 0.81* with 3, 4, 5, 6, 8, 10 mm thickness
Elongation at break: min. 60% (DIN EN ISO 1798)
Tensile strength Min. 0.6 N/mm² (DIN EN ISO 1798)

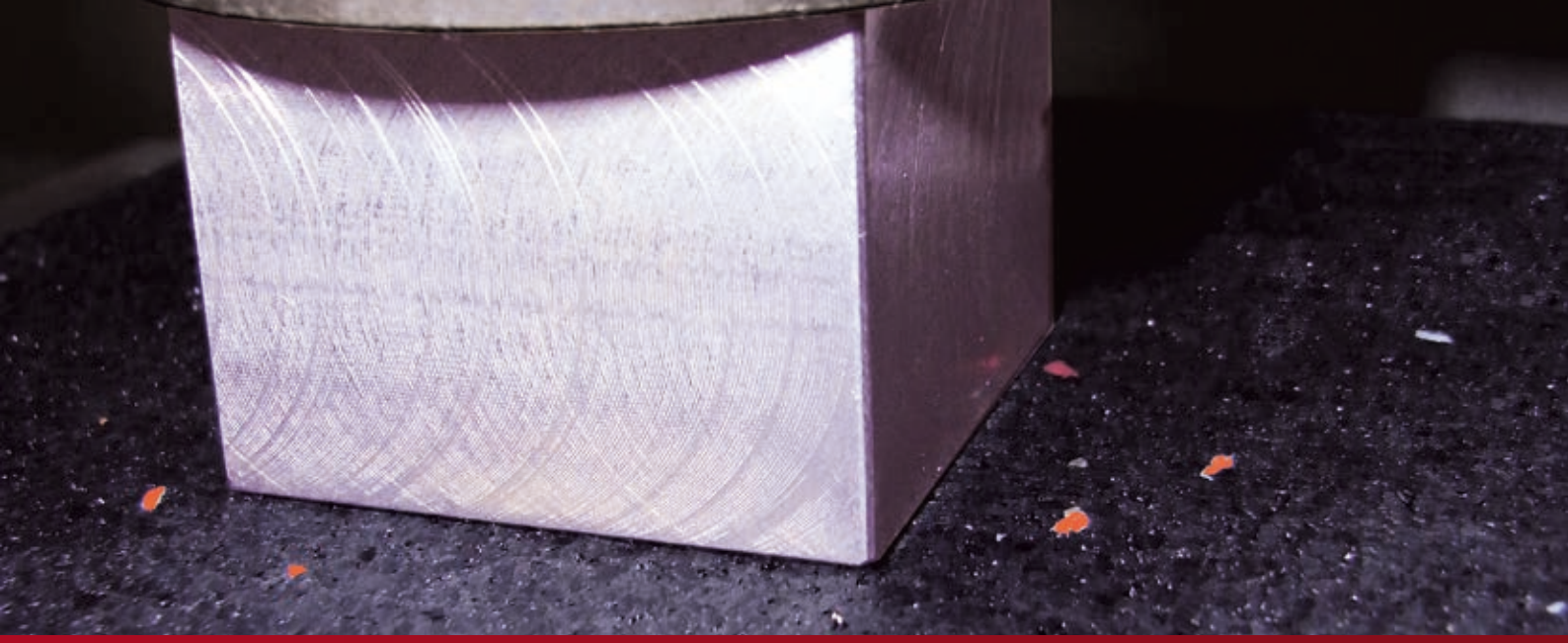
Protect

Technical data
Standard product for high friction coefficients * Colours: multi-coloured rubber recycling granulate
Material High-specification PU-bound recycling rubber granulate
Thicknesses: Slabs: 6, 8, 10 mm ± 0.6 mm Strips: 3, 5, 6, 8, 10 mm ± 0.6 mm
Max. permitted distributed load (with max. 30% compression in acc. with VDI 2700 Part 15) Approx. 270 t/m² with 3, 5, 6, 8, 10 mm thickness
Sliding friction coefficient μ Min. 0.92* with 3, 5, 6, 8, 10 mm thickness
Elongation at break: min. 120% (DIN EN ISO 1798)
Tensile strength Min. 0.8 N/mm² (DIN EN ISO 1798)

Secure

Technical data
Standard product for high loads (heavy-duty transport); protected and registered colour marking (black with blue and white colour particles)
Material PU-bound recycled rubber granulate
Thicknesses: Slabs and strips: 8, 10 mm ± 0.5 mm
Max. permitted distributed load (with max. 30% compression in acc. with VDI 2700 Part 15) Approx. 500 t/m² with 8, 10 mm thickness
Sliding friction coefficient μ Min. 0.80* with 8, 10 mm thickness
Elongation at break: min. 80% (DIN EN ISO 1798)
Tensile strength Min. 1.0 N/mm² (DIN EN ISO 1798)

* Contact surface: wood pallet, phenolic ply flooring dry (in acc. with VDI 2700 Part 14)



ADVANTAGES AT A GLANCE

QUALITY – WITH SAFETY

- Wear-resistant, durable, can be re-used until no longer fit for use
- Long-term solution
- Certified safety, high quality
- High coefficient of friction
- Made from recycled material, so environmentally friendly
- Quick and easy handling, so saves time
- Saves costs, as less lashing is needed

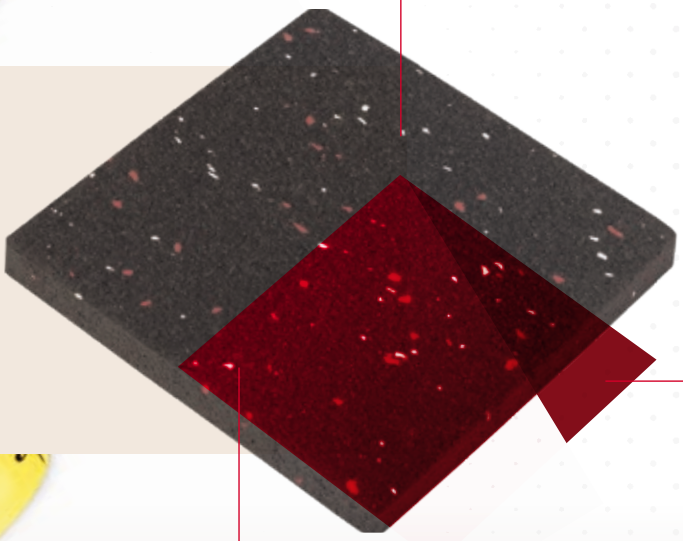
A GRIP
THAT WON'T LET YOU DOWN!

ANTI-SLIP MATS WITH

GRIP AND **MADE TO MEASURE!**

Choose the material and size you need for your anti-slip mats. As one of the few companies with an in-house cutting machine, we can supply custom cuts promptly!

Custom cuts of pads and rolls, made to measure



Multiple cutting machines for more flexibility

Manufactured to customer specifications

Made in Germany

APPLICATION EXAMPLES

Pallets and pallet cages

Using anti-slip mats underneath pallets or pallet cages significantly increases the amount of friction between surface and cargo. This means that far fewer tension belts are needed.

Metal rod coils

Metal rod coils should ideally be transported in coil troughs. To prevent hazardous slippage, which would cause the centre of gravity to be displaced, anti-slip mats should be placed between the cargo and the trough to keep the cargo secure.

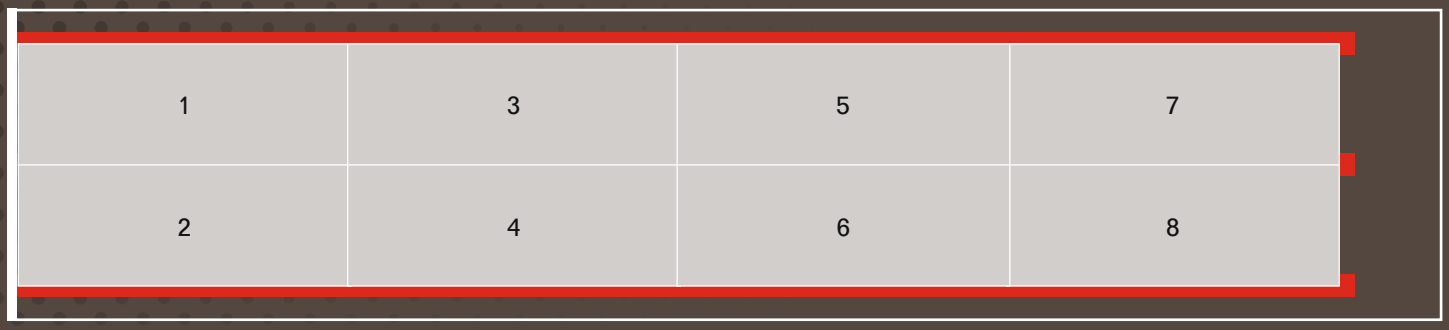
Paper coils

The flexible, robust and tear-resistant anti-slip mats secure heavy loads such as transverse paper rolls on smooth surfaces in transport vehicles to prevent them from slipping to the side. The mats should be placed under and between the paper coils, where they provide support and reduce load. This greatly reduces the number of lashing straps needed.

Pipes

When pipes are transported in the trailer in a longitudinal position, it must be ensured that they cannot slip to the side or forward or backward. Using anti-slip mats under the wedges and under the pipes prevents slippage in all directions.

Loading area (curtainsider L) + cargo (MDF panels in 8 packages)



Load Anti-slip mats

COST SAVINGS FROM USING ANTI-SLIP MATS

- Weight of cargo 24,400 kg MDF panels bound and grouped in eight packages
- Vehicle body: Curtainsider L
- Contact surface smooth chipboard / MDF panel on phenolic ply flooring μ = 0.2
- Lashing straps needed: 48 pieces with a pre-tensioning force of 500 daN
- Lashing angle: R = 80°
- Form-locking to the front

Costs without ARM (μ=0.2) (calculation as per DIN EN 12195)	**Costs**	**Costs with ARM (μ=0.6) (calculation as per DIN EN 12195)**	**Costs**
48 lashing straps per transport (6 straps per package) Purchase: € 10 / pc. = € 480: 250 days = € **1.92** per transport	**€ 1.92**	16 straps per transport (2 per package straps against lifting off) Purchase: € 10 / pc. = € 160: 250 days = € **0.64** per transport	**€ 0.64**
Truck idle time = € **80/h** = € **218.40** per transport (168 min) Fitting time per strap, approx. 2 min. = 48 straps / transport **96 min**. Removal time (incl. roll-up) per strap 1.5 min = 48 straps per transport **72 min**. At labour costs of € 30/ h = € **84** per transport	**€ 302.40**	Truck idle time = € **80/h** Fitting time per strap, approx. 2 min. = with 16 straps / transport, approx. **38 min**. Removal time (incl. roll-up) per strap 1.5 min = 16 straps per transport **24 min**. At labour costs of € 30/ h = € **30** per transport	**€ 110.00**
Angle edge guards per transport 96 pc. = 96 angles x € 0.50= € 48 / year = € 48: 250 days = € **0.19** per transport	**€ 0.19**	Angle edge guards per transport 32 pc. = 32 angles x € 0.50= € 16 / year = € 16: 250 days = € **0.06** per transport	**€ 0.06**
		Cost of anti-slip mats (15 strips, 6mm x 200mm each x 2500mm) € 75 per truck for 10 transports on average	**€ 7.50**
		Laying out of anti-slip mats per transport, approx. 5 min At labour costs of € 30/ h = € 2.50	**€ 2.50**
Costs per transport	**€ 304.51**	Costs per transport	**€ 120.70**
Costs / year (250 workdays)	**€ 76,127.50**	Costs / year (250 workdays)	**€ 30,175.00**
		Savings for one truck per year: approx. € 45,953	

RESPONSIBILITY FOR SECURING YOUR CARGO

THE LAW IS CLEAR

Under public law (section 22 of the German Road Traffic Act, StVO), the driver and the shipping agent are responsible for securing the cargo.

- The shipping agent, forwarding agent and driver are obliged to secure the cargo in accordance with section 22 StVO.
- The vehicle owner is obliged to equip the vehicle in accordance with section 31 StVZO (the German Road Traffic Licensing Regulations)

Under retail law (section 412 of the German Commercial Code, HGB), it is the sender and the carrier who are responsible.

- Under section 412 HGB, the sender is responsible for loading the cargo in a way that ensures it can be transported safely.
- Under section 412 HGB, the carrier is responsible for loading the cargo in a way that is consistent with safe operation of the vehicle.

Since 1991, VDI Guideline 2700 has governed when cargo is deemed properly secured and when due diligence obligations are breached.

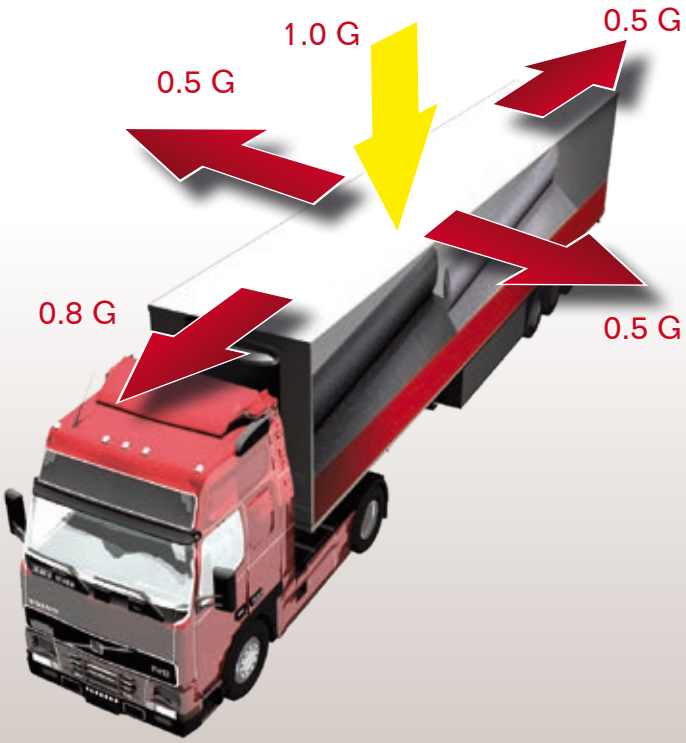
SECURING PRINCIPLES

COUNTERACTING
ACCELERATION FORCES—
THESE VALUES NEED TO BE MET:

1.0 G = weight force of the cargo

For transport by lorry, the applicable regulations specify that the cargo must be secured with **50%** of the cargo weight to the back and to the side, and with **80%** of the cargo weight to the front. For rail and ship transport, the values are correspondingly higher.

Using high-quality anti-slip mats makes it much easier to fulfil these requirements.



VDI GUIDELINES 2700

SECURING CARGO ON ROAD VEHICLES

General points

The VDI guideline series VDI 2700, 'Securing Cargo on Road Vehicles', has been recognised as the fundamental reference work for securing cargo for many years. It describes what forces act on cargo during transport and the basic principles for how cargo can be secured on road vehicles.

The guidelines are used in control measures implemented by the traffic police and also in legal disputes.

VDI 2700 Part 15 – Requirements for Anti-Slip Mats (ASMs)

VDI-FML, the VDI Society for Materials Handling, Materials Flow and Logistics, defines the requirements for anti-slip mats in Part 15 of VDI Guideline 2700. An anti-slip mat has sufficient quality/strength if it achieves a tensile strength of at least 0.6 newtons per square millimetre (N/mm^2) and if its elongation at break is at least 60%. Non-slip materials (NSMs) / anti-slip mats must be inspected by an independent institute and they can then be used until they are no longer fit for use.

The concept of being 'fit for use'

Anti-slip mats can fundamentally be used multiple times. In certain cases, however, continued use is prohibited.

The corresponding criteria are defined in VDI 2700 Part 15 and must be checked before the anti-slip mats are used. If any of the following apply to the ASM, it is no longer 'fit for use' and any further use is not permitted:

- *Permanent deformations or indentations*
- *Cracks*
- *Abrasion on the surface*
- *Patches of material missing*
- *Swollen areas*
- *Damage caused by exposure to aggressive substances*
- *Brittleness*
- *Function impaired by soiling*

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