

# GENERAL INDICATIONS CONCERNING LOAD RESTRAINT AND THE LASHING STRAP

## Lashing straps made of chemical fibres

WISTRA lashing straps are manufactured according to the new valid regulation DIN EN 12195.2:2000 Safety Part 2: "Lashing straps made of chemical fibres" (replaces DIN 60 060).

## Area of application

This standard sets down the safety requirements for lashing straps for the safe transportation of loads on vehicles and vehicle trailers, both on roads, ships and by rail and / or in corresponding combinations for multiple use with manually-operated tensioning elements with a maximum manual traction of 50 daN.

## Terms

### Load-restraint devices

Consist of the tensioning devices (e.g. strap, chain, cord), tensioning element (e.g. ratchet strap, hoist, tightener) and in some case, the connecting element (terminal bracket, hook).

### Lashing strap

A lashing load-restraint device consisting of the tensioning element or a webbing clamp and webbing with or without connecting element.

### Webbing

Woven textile strip.

### Tensioning element

A mechanical device for conducting traction into a load-restraint device.

### Terminal bracket piece

A device for connecting the lashing strap or tensioning element with the lashing point or securing point of the load.

### Tension indicator

A device that indicates the tensile stress in the lashing system.

### Single lashing strap



A load-restraint device that consists of a textile strap and a tensioning element (use of free-moving terminal bracket pieces is possible)

### Double lashing strap



A load-restraint device that consists of two woven textile straps, one with a tensioning element, both with one terminal bracket piece each.

### IG length – single lashing strap

Measured from the webbing end up to the outer turn radius of its connection with the tensioning element

### IGF – fixed end



Measured from the bearing point of the terminal bracket piece up to the outer turn radius of its connection with the tensioning element

### IGL length – loose end



Measured from the webbing end up to the bearing point of the terminal bracket piece

### Minimum breakage force BF<sub>min</sub>

The breakage force for which a lashing strap is designed

### Lashing capacity LC

The highest force for use in straight traction for which a lashing strap is designed

### Functional factor/safety factor

The relation between fixed minimum breakage force BF<sub>min</sub> and lashing capacity LC

2 – for tensioning element and terminal bracket

3 – for webbing

### Hand force H<sub>F</sub>

Force on the grip of the tensioning element that produces traction in the lashing strap

### Standard hand force S<sub>HF</sub>

Prescribed hand force of 500 N = 50 daN on the label

### Standard tension force S<sub>TF</sub>

The remaining force after the grip of a ratchet strap has been let go at the prescribed hand force of 50 daN..

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## Legal basis

StVO §§ 22, 23  
HGB §§ 412  
DIN EN 12195-2

StVZO §§ 30, 31  
VDI guideline  
UVV BGV D 29 – Vehicles

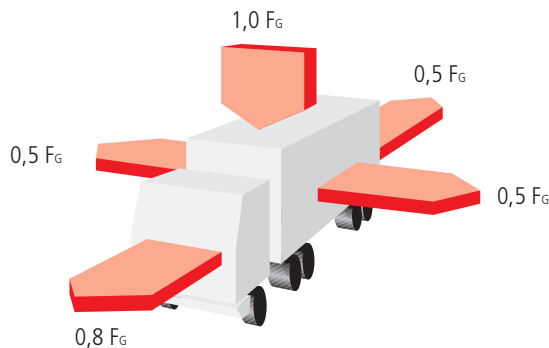
## Physical basis

### Weight

$$F_G(N) = m(\text{kg}) \times a \quad (m7s^2)$$

( 1 daN = 10 N )

Mass-forces affect the load during transportation by road, rail and on water. During road transportation, forces in the direction of travel of 0.8 FG can occur, especially during braking procedures.



### Friction force

$$F_R(N) = \mu \times F_G(N)$$

Friction force FR counters load displacement and is dependent on material coupling.

### Sliding friction values

Material coupling	dry	wet	oily
Wood/wood	0,20 – 0,50	0,20 – 0,25	0,05 – 0,15
Metal/wood	0,20 – 0,50	0,20 – 0,25	0,2 – 0,10
Metal/metal	0,10 – 0,25	0,10 – 0,20	0,01 – 0,10
Concrete/wood	0,30 – 0,60	0,30 – 0,50	0,10 – 0,20

The use of anti-slip mats to raise friction values is recommended, especially during tying down.

## Means of transportation

### Suitability

A vehicle suited to the load should be used. Vehicle superstructures must be equipped so that the load is secured or can be secured against impermissible slipping, toppling, rolling, rotation or falling and in the case of tankers, against leakage.

## Distribution of load

The load must be stowed so that the centre of gravity of the overall load is located as much as possible over the longitudinal middle axis of the vehicle. The centre of gravity should be kept as low as possible. The load distribution layout must be complied with (request from vehicle or superstructure manufacturer if necessary).

## Lashing points

Requirement areas and purpose are set down in DIN 75 410 "Lashing points on utility vehicles for the transportation of goods". Lashing points are anchorages for load-restraint devices on the vehicle, such as oval links, hooks, eyes and lashing rails.

## Loaded goods

It is a requirement that the packaging or the lashing points used on the load are capable of bearing the forces provoked by the respective securing method and during operation under normal traffic conditions (these include full braking, change manoeuvres and poor roads).

## Securing the load

If no opportunity for securing the load is provided by the vehicle superstructure alone, then suitable means of assistance should be deployed.

## Gravity-activated restraint

When tying down using lashing straps, lashing cords and lashing chains, the securing force is generated by increasing the friction force. The required lashing forces should be ascertained. Sharp edges must be covered in order to prevent damage to the load-restraint device.

## Form-locked restraint

Collision of the loaded goods with front or lateral walls / stakes or even against load securing devices is understood as form locking. The superstructure or load-restraint device used must be able to take the forces resulting from the load.

## Combined restraint

Form-locked and gravity-activated restraint methods can be combined to achieve the required restraint forces.

## Calculation

The calculation of effective forces is described in VDI 2702 "Lashing capacities" or in DIN EN 12195-1 "Calculation of lashing capacities" (draft).

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## Risk situations

The loosening of loads or parts of the load due to improper load restraint presents direct or indirect danger for the life of persons, animals or goods in the risk area of the vehicle (see also EN 12195-2 Appendix A).

## Practical indications on the use and maintenance of lashing straps according to EN 12 195-2 Appendix B (normative)

- B.1 The required traction together with the usage type and the type of load to be lashed must be taken into account when selecting and using lashing straps. The size, shape and weight of the load determine the correct selection, but also the intended usage type, the transportation environment and the type of load. For reasons of stability, at least two lashing straps must be used for tying down and two pairs of lashing straps for diagonal lashing.
- B.2 The selected lashing strap must be both strong and long enough for the intended use and be of the correct length with regard to the lashing type. It is always good lashing practice to consider: the attachment of removal of the lashing straps should be planned before the journey commences. Partial unloading should be taken into account during a longer journey. The number of lashing straps must be calculated according to prEN 12195-1:1995. Only those lashing systems which are designed for tying down, with S TF on the label, should be used for tying down.
- B.3 Due to varying behaviour and due to length changes under stress, varying load-restraint devices (e.g. lashing chains and lashing straps made of chemical fibres) must not be used to lash the same load. If additional fitting parts and lashing devices are used, care must be taken to ensure that these are appropriate for the lashing strap.
- B.4 During use, flat hooks (see D2 in Figure 1) must lie on top of the hook base in their entire width.
- B.5 Opening the tie-down: Before opening, it should be ensured that the load remains fast even without restraint and cannot fall down and endanger the person unloading. If necessary, load-securing devices planned for further transportation should be attached to the load beforehand, in order to prevent the load from falling down and / or toppling. This also applies if tensioning elements are used that enable safe removal.
- B.6 Before unloading begins, the tie-downs must be loosened sufficiently to free the load.
- B.7 Attention must be paid to the proximity of any low-hanging overhead cables during loading and unloading.
- B.8 The materials from which lashing straps are produced have varying resistance to chemical effects. The manufacturer's or supplier's indications must be complied with if the lashing straps are likely to be exposed to chemicals. In doing so, it must be taken into account that the effects of the chemical influence increase as temperatures rise.
- B.9 Lashing straps in accordance with this section of European Norm EN 12195 are suitable for use in the following temperature ranges:
  - a) - 40 °C to + 80 °C for polypropylene (PP)
  - b) - 40 °C to + 100 °C for polyamide (PA)
  - c) - 40 °C to + 120 °C for polyester (PES)

## The resistance of synthetic fibres to chemical effects is summarised in the following:

- a) Polyamides are resistant against the effect of alkalis. However, they are attacked by mineral acids.
- b) Polyester is resistant against mineral acids, but is attacked by leachates.
- c) Polypropylene is rarely attacked by acids and leachates and is suitable for applications where high resistance against chemicals (except for a number of organic solvents) is required.
- d) Harmless acid or leachate solutions can become so concentrated due to evaporation that they cause damage. Contaminated lashing straps must be decommissioned immediately, rinsed in cold water and air dried.

**These temperature ranges can change depending on the chemical environment. In this event, the recommendations of the manufacturer or supplier should be obtained.**

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**A change in ambient temperature during transportation can have an effect on the force in the webbing. The lashing capacity must be checked following arrival in warm regions.**

B.10 Lashing straps must be decommissioned or sent back to the manufacturer for repair if they show signs of damage. The following points should be considered as signs of damage:

- in the case of webbings (which must be decommissioned): tears, cuts, indentations and breakages in the load-bearing fibres and seams, distortions due to the influence of heat;
- in the case of terminal brackets and tensioning elements: distortions, tears, strong signs of wear and corrosion.

**Only lashing straps that display identifying labels may be repaired. In the event of accidental contact with chemicals, the lashing strap must be decommissioned and the manufacturer or supplier must be consulted.**

B.11 Care must be taken to ensure that the lashing strap is not damaged by the edges of the load to which it is attached. A regular visual check before and after every use is recommended.

B.12 Only lashing straps that are legibly identified and provided with labels must be used.

B.13 Lashing straps must not be overloaded: the maximum hand force of 500 N (50 daN on label; 1 daN approx. 1 kg) must only be applied with one hand. No mechanical aids such as rods or levers etc. should be used, unless these are part of the tensioning element.

B.14 Knotted lashing straps must not be used.

B.15 Damage to labels must be prevented by keeping them away from the edges of load and, if necessary, from the load.

B.16 Webbings must be protected against friction and abrasion and against damage due to loads with sharp edges by means of protective covers and/or edge protectors.

## NOTE

We organise seminars and training courses which deal with these topics explicitly. We will let you know about them in good time, or you can simply take a look at our website. You will find the current topics and dates there, but it is also possible to hold these events at your company or at any location of your choice. Just give us a call.



# Sales and Delivery Terms & Conditions

## I. General

1. These sales and delivery terms & conditions are deemed as accepted by the client upon closure of the contract, or, at the latest, upon receipt of the goods and / or the rendering of part payment. Unless expressly agreed otherwise, these terms & conditions shall be a component of all future sales and deliveries to the client.
2. The client's terms & conditions of purchasing and/or business do not obligate us and are deemed as rejected, even when we do not expressly contradict.

## II. Offers and Acceptance of Assignments

1. Our offers are subject to confirmation, provided that nothing to the contrary is contained in writing. Applicable documents, such as brochures, illustrations, drawings etc. are not binding for us in terms of construction, dimensions, weights etc., unless these are identified by us as binding. We reserve the right of proprietorship and copyright on these documents.
2. Assignments will be accepted by us in writing only (including by fax). Spoken agreements or agreements by telephone shall be binding only upon writing confirmation. Supplements, alterations, cancellations or supplementary agreements likewise require written confirmation in order to become effective.

## III. Pricing and Terms of Payment

1. Our prices apply with free HGV consignment from our provisions warehouse in Lübeck, excluding packaging, carriage, insurance, customs fees and value added tax. Our invoices are payable 30 days following date of invoice, plus value added tax.
2. The acceptance of drafts and cheques is at our discretion and shall take place only for payment. Discount and collection costs shall be charged to the purchaser. If the payment deadline is exceeded – date of receipt of the payment is decisive – we shall be entitled to charge default interest amounting to 4% above the respective discount rate of the German Federal Bank. Particular formal notice of default shall not be necessary.
3. Incoming payments will be charged by us to the oldest due claim.
4. Non-fulfilment of payment terms, or the coming to light of circumstances that may impair the creditworthiness of the purchaser, shall entitle us, irrespective of the agreed payment terms, to assert our full claim for payment immediately. We shall also be able to assert those claims for which we have accepted drafts as payment, in which case it shall make no difference whether the drafts are still in our possession or have been forward for purposes of discount or collection, provided that it can be proven that the payee has not yet redeemed the draft. We shall then have the option to deliver outstanding deliveries, particularly partial deliveries, only against advanced payment or, if the client has come into default with the obligation to immediate payment, to withdraw from the delivery contract or to demand compensation for damage due to non-fulfilment.
5. The withholding of payments or the upholding of any claims of the client are excluded. This also applies in the event of any defects observed in the delivered items.

## IV. Dispatch and Transfer of Risk

1. Risk associated with storage in the Lübeck warehouse shall be transferred to the client upon dispatch of the goods, even when carriage-free delivery has been agreed.
2. In the absence of a particular agreement, the choice of dispatch route and mode of transportation shall be made at our discretion, under the exclusion of any form of liability.
3. If the client is responsible for a delay in dispatch, risk shall be transferred to the client upon announcement of readiness for dispatch. We shall be entitled to choose to place the goods into storage at the expense and risk of the client and to have them insured against every form of risk.

## V. Delivery Dates/Delays

1. The delivery periods agreed with us shall commence only after the assignment has been clarified in full. They should be considered only as being approximate. Compliance with them presupposes that the client has fulfilled contractual obligations.
2. Acts of god, together with events that are beyond our control, e.g. manufacturing disruptions and discontinued raw material supply, shall extend the delivery period as appropriate. Events of this kind shall not be attributable to us even during an existing delay. If, due to events of this kind, a delivery can no longer be made in the appropriate timeframe, we shall be able to withdraw from the contract in full or in part with the sole consequence that the rendered down payments are reimbursed.
3. The delivery period shall be deemed as complied with if readiness for dispatch is announced or the delivery object has left the factory before the period expires.
4. We shall then only come into default if the client has set us a subsequent deadline of at least 30 days and this has now lapsed.
5. Client claims for damages due to inability to render the service and due to delay are herewith expressly excluded.
6. We are entitled to make partial deliveries. They shall apply as partial fulfilment of the contract. To this extent, a withdrawal by the client is excluded.

## VI. Retention of Title/Cession of Claims/ Right of Seizure

1. Our deliveries take place under retention of title. The goods shall remain in our possession up until full payment of all claims existing from the business relationship with the client. In the case of running accounts, the conditional proprietorship shall be deemed as

security for our remaining claims.

2. If the conditional goods become associated or mixed with other objects, then we shall be the owner or co-owner of the new object or the mixed stock.

If the conditional goods are processed into new items, then they shall remain our property at every manufacturing stage. Acquisition of ownership by the client in accordance with § 950 German Civil Code is excluded. Processing shall always take place for us. The processed goods shall be our security to the sum of the value of the conditional goods. In the event of the client's processing with other goods not belonging to us, we shall be entitled to co-ownership of the new items in proportion with the value of the conditional goods compared with the other processed materials. The new items arising from processing shall be deemed as conditional goods in the understanding of these terms & conditions.

3. The client is obliged to store the conditional goods with due businesslike care. We are entitled to insure the goods at his expense.
4. The pledging or transfer by way of security of conditional goods is forbidden to the client. He must inform us immediately of pledges and other impairments of our rights by third parties.
5. The client is entitled to sell the conditional goods within the scope of proper business; however, he must pass on the retention of title in the extent enjoyed by us.
6. For reasons of security, the client cedes his claims arising from the re-sale of the conditional goods, with all ancillary rights, to us with immediate effect.
7. So long as the client fulfils his payment obligations, he is authorised to call in claims (ceded to us) arising from the re-sale. The earnings to which we are entitled must be transferred to us immediately upon arrival. At our request, the client must inform us of the names of debtors for the ceded claim and inform these debtors of the cession. We are authorised to notify purchasers of the cession in the client's name.
8. Conditional ownership shall be transferred immediately to the client as soon as our claims have been settled to the full extent. If the value of the securities due to us exceeds our total claims against the client by more than 20%, then we shall be obliged to release the claims at our discretion at the client's request.
9. In the event of a due or asserted claim (see III.4), we shall be entitled to take – following a previous unsuccessful request for restitution including by way of self-help – immediate possession of the goods delivered by us. In this event, the client shall waive the domestic authority to which he is entitled once we take steps to involve at least one neutral witness during the course of the seizure and inform the client immediately that the seizure has taken place, disclosing the identity of the witness(es).
10. Restitution on the grounds of the retention of title or the exercising of the statutory right of seizure shall not amount to a withdrawal from the contract.

## VII. Guarantee

1. The purchaser must make written complaints concerning our deliveries immediately after arrival of the goods at the place of destination – within two weeks at the latest; otherwise, any guarantee shall lapse. This shall not apply for defects that cannot be detected even during the most thorough inspection. In this case, notification of defects must be made in writing immediately after the defect has been noted.
2. We are authorised to have contested deliveries inspected. Any form of guarantee shall lapse if the purchaser makes alterations or has alterations made on the contested goods without our express consent.
3. If material and construction errors can be proven to exist, then we have the choice of eliminating the error, providing a free replacement of the original delivery object or – against a return – to issue credit to the amount of the value charged. Additional claims, e.g., compensation for damage, reimbursement of subsequent damage etc. are excluded.
4. Guarantee claims lapse in 6 months following commissioning, at the latest, however, 9 months following delivery of the goods.
5. Guarantee by us for external products delivered to us is initially excluded. However, we shall cede to the client our respective guarantee claims against our supplier and/or manufacturer with indication of the company, address, assignment number and any other data required for asserting this claim. If it is, or will be, impossible or unreasonable for the client to claim from our supplier or manufacturer despite an insistence on the provision of a guarantee (e.g. rejection or refusal of the guarantee or deterioration of the assets of the supplier / manufacturer), our obligation to provide a guarantee shall be renewed. Irrespective of the regulations in the preceding paragraph, we shall be liable within the scope of the statutory guarantee in the event of grossly negligent or deliberate breaches of contract.

## VIII. Place of Execution and Place of Jurisdiction

Place of execution and place of jurisdiction is Lübeck. At our discretion, the place of residence of the client shall also be the place of jurisdiction

## IX. Ineffectiveness

The ineffectiveness of individual sections of these terms & conditions will not result in the ineffectiveness of the remaining sections or of the purchase agreement.