Guideline to Cargo Securing

Cargo Securing For Transport On Road And In Maritime Area A

VERSION 11

Forankra
Secures everything in transit™

Forankra is a leading European supplier of cargo securing, cargo optimization and lifting equipment. With our expertise, quality assured products and customized solutions, we help our customers secure all goods in transit.

Guideline to Cargo Securing

Every day, goods of great value are transported around the world. In all these situations it is important to ensure that appropiate cargo securing is applied for the goods as well as for the cargo carrier throughout the transport route. Cargo that is poorly secured can cause serious personal injury and damage to goods and it is therefore vital that the correct method of securing cargo is used in each situation.

To secure cargo reliably, you need to use approved products and ensure that lashing equipment is used correctly. In our “Guideline to Cargo Securing”, we have gathered information that is important to consider in order to achieve safe cargo securing solutions.

You probably already know that:

Forankra AB delivers both standard products and customized cargo securing solutions. Our products are quality assured and comply with applicable EU regulations.
We always strive for the highest possible quality and are certified according to ISO 9001-2015 and ISO 14001-2015.

Contact us

Please contact our experts with any questions or for advice on securing loads. You can easily reach us on +46 (0)322-66 78 00, info@forankra.se or via our website www.forankra.se.

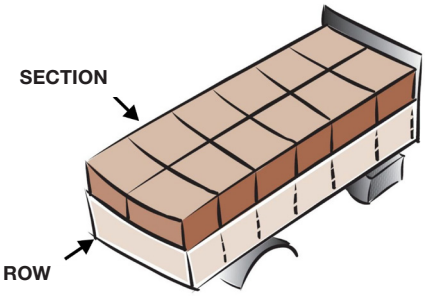
Forankra’s “Guideline to Cargo Securing” has been produced in cooperation with MariTerm AB, www.mariterm.se.

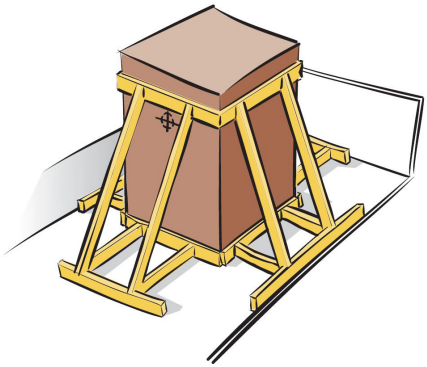
CONTENTS

FIVE CARGO SECURING METHODS

Cargo securing must prevent goods from shifting, sliding or tipping during transit.

Cargo that is poorly secured can cause serious personal injury and damage to goods and it is therefore vital that the correct method of securing the cargo is used in each situation.





1. BLOCKING AND BRACING

Blocking means that the cargo is stowed against the fixed blocking structures on the cargo carrier. Clumps, wedges, timber, inflatable dunnage bags and other devices, which are supported directly or indirectly by fixed blocking structures, are also considered as blocking.

Blocking is primarily a method to prevent the cargo from sliding, but if the blocking reaches high enough, it also prevents tipping. Blocking should be used whenever possible.

When blocking, the sum of void space between cargo units or between cargo units and the vehicle component must not exceed 15 cm.

Void space must always be minimized when heavy and rigid goods are being blocked.

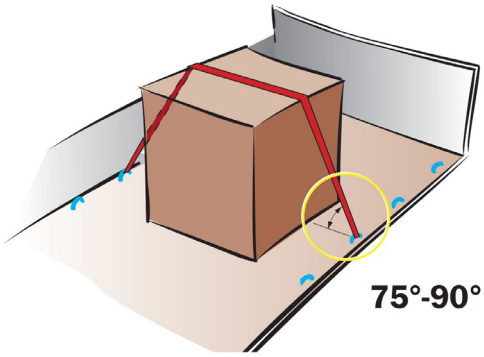
2. TOP-OVER LASHING

When using top-over lashing, the angle between the webbing and the platform bed is of great importance.

If the angle is 30°–75°, double the number of lashings are needed (or halve the values in the tables). If the angle is less than 30°, another cargo securing method should be used.

The table values in this folder are valid for an angle between 75° and 90°.

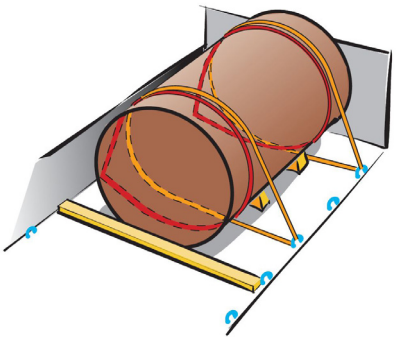
Read more about the importance of the lashing angle on page 9.

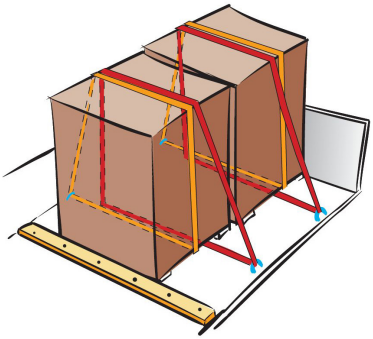


3. LOOP LASHING

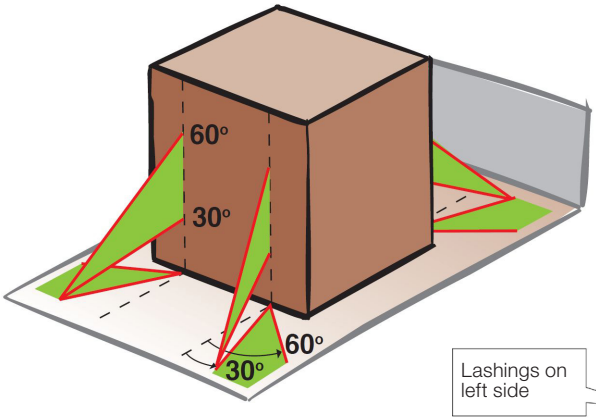
A pair of loop lashings prevents cargo from sliding and tipping sideways. At least one pair of loop lashings per section should be used.

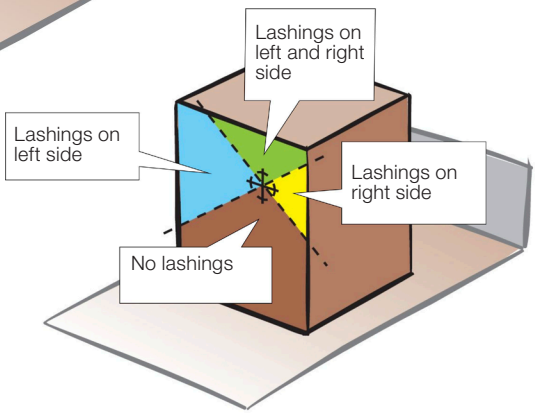
When long cargo units are secured with loop lashings, at least two pairs of loop lashings must be used to prevent the cargo from twisting.





FIVE CARGO SECURING METHODS





4. STRAIGHT LASHING

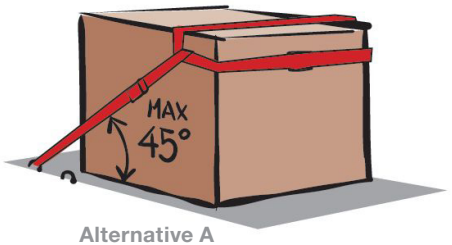
The tables are valid for an angle of 30°–60° between the lashing and the platform bed.

Sideways and lengthways the lashing angle should lie between 30°–60°.

If the lashing is placed at an angle of 90° to the cargo, it only secures against sliding and tipping in one direction and the cargo weight in the tables can then be doubled.

The permissible areas for fixing lashings to the cargo are bounded by two straight lines drawn through the centre of gravity at an angle of 45°.

When the lashings are fixed above the centre of gravity, the unit may also have to be blocked at the bottom to prevent sliding.



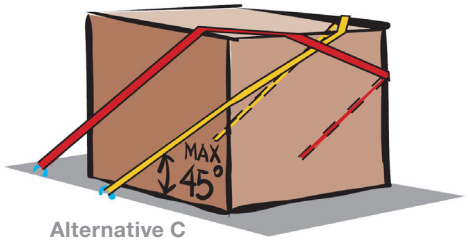
Alternative A

Alternative A *is a typical spring lashing*

Alternative B *is not as effective in preventing tipping.*

Alternative C *has two parts per side and thus secures double the value given in the tables.*

Alternative B



Alternative C

5. SPRING LASHING

Spring lashings are used to prevent the goods from sliding and tipping forward or rearward.

The angle between the lashing and the platform bed must not exceed 45°.

Spring lashings can be carried out in several ways, as shown in the above illustrations.

If the spring lashing doesn't act on the top of the cargo, the weight prevented from tipping is decreased.

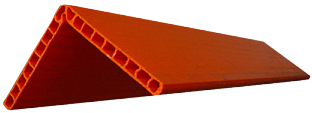
For example,
if the spring lashing acts at half the cargo height, it secures only half the cargo weight given in the tipping tables.

To prevent tipping, the spring lashing has to be dimensioned for the weight of the outer section only.

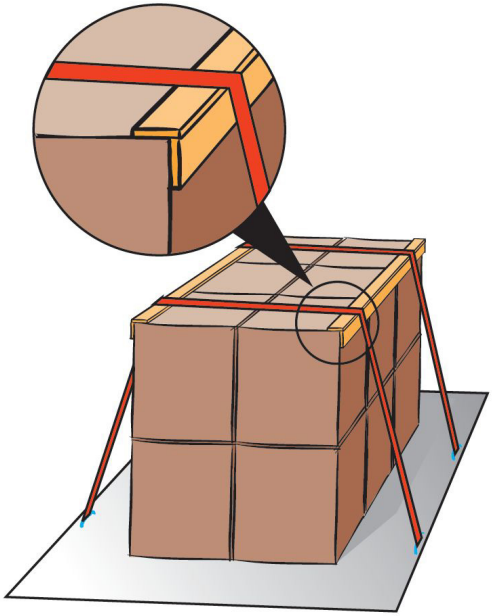
BASIC CARGO SECURING REQUIREMENTS

SUPPORTIVE CORNER PROTECTIONS

In some cases, fewer lashings are needed than the number of sections that are to be secured. Since each unit has to be secured, the lashing effect may be spread out by supportive corner protections. However, at least one lashing on each end section and on every other section should always be used.



The supporting edge beams must be made of heavy-duty boards (at least 25x100 mm) or of other materials with at least the same strength.



ROLLING GOODS

If wheeled units are not blocked, stop blocks with a height of at least 1/3 the wheel radius, must be used. If the unit is secured by lashings ensuring that the wheels cannot roll out of the stop blocks, the blocking height does not have to exceed 20 cm.

BOTTOM BLOCKING

Bottom blocking that prevents goods from sliding must have a height of at least 5 cm unless lashings preventing the goods from climbing over the bottom blocking are used.

NON-RIGID GOODS

If the goods are not rigid in form (bags, bales, etc.), more lashings than prescribed in this quick lashing guide may be needed.

BASIC CARGO SECURING REQUIREMENTS

EFFECT OF LASHING ANGLE ON TOP-OVER LASHINGS

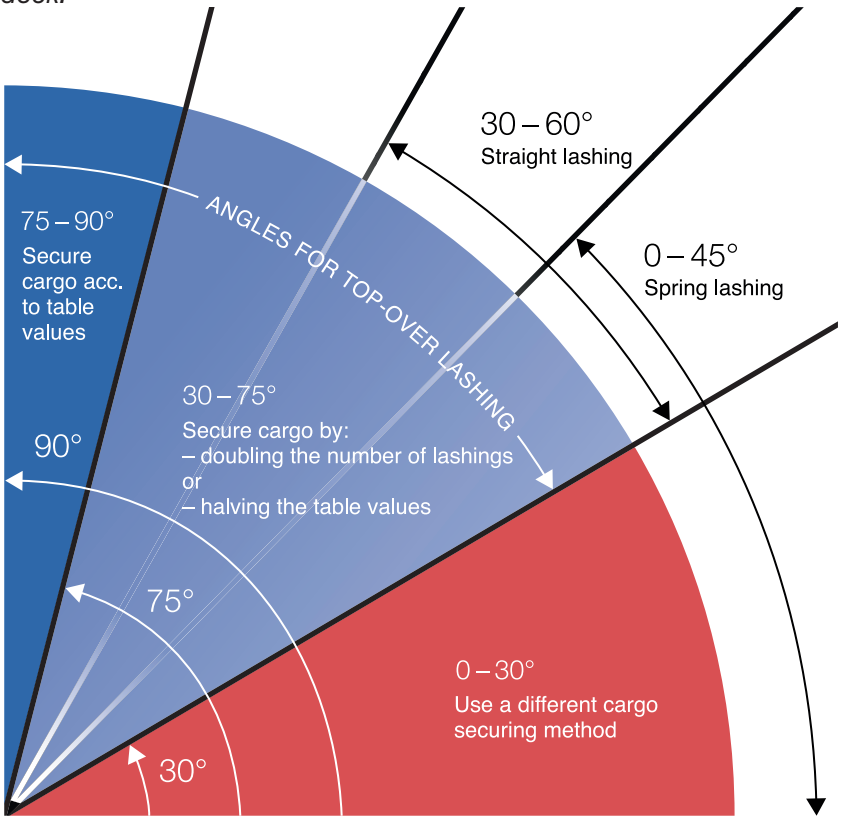
The illustration shows how the lashing angle affects the choice of cargo securing method.

At angles between 30–75°, double the number of lashings are needed to ensure sufficient tension force.

Example:
The tension force on the lashing is halved at a 30° angle from the cargo deck.

At angles below 30°, a cargo securing method other than top-over lashing must be used, e.g. loop lashing, spring lashing and blocking.

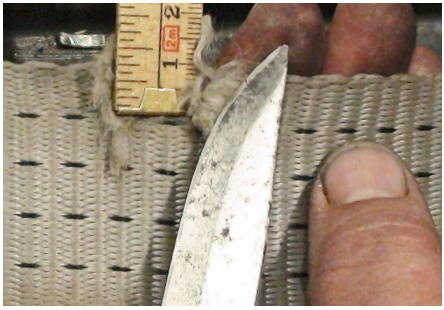
Our table values are based on a lashing angle of at least 75°.



BASIC CARGO SECURING REQUIREMENTS

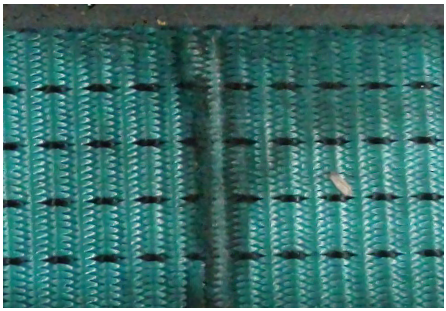
WEAR & TEAR OF LASHING EQUIPMENT

Lashing equipment should be replaced if any of the following defects are detected:



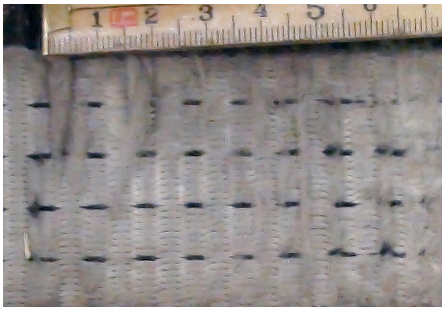
Edge damage

Lashings with cuts or other edge damage exceeding 10% of the width.



Cut damage

Lashings with clear cut marks across the width.



Wear damage

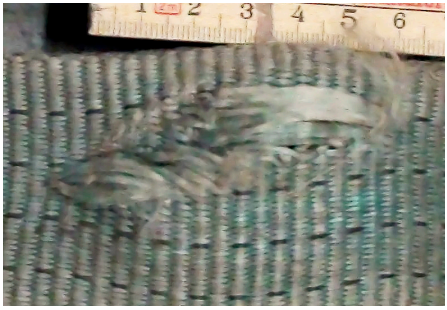
Lashings with prominent wear due to rubbing.

WEAR & TEAR OF LASHING EQUIPMENT

Lashing equipment should be replaced if any of the following defects are detected:

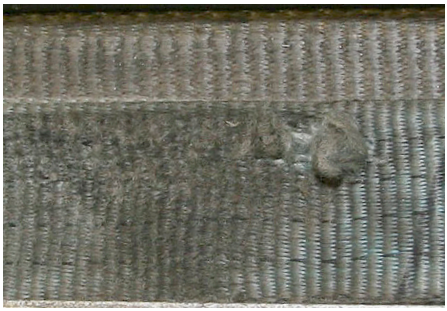
Tear damage

Lashings with tear damage through the webbing.



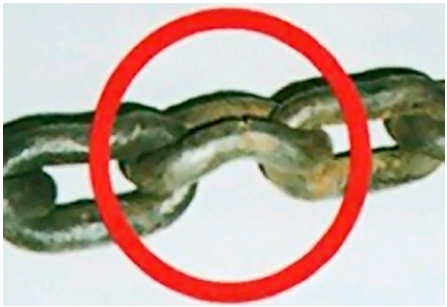
Dirt and age

Lashings for which the original colour is hard to determine.



Broken or damaged links

Chain lashings with broken or deformed links or hooks.



SLIDING – FRICTION

Different material contacts have different coefficients of friction. The table below shows recommended friction values for some common contact surfaces.

The values are valid only if both contact surfaces are clean and free of frost, ice and snow.
The values are for static friction.

Table values according to TFS 2017:25* (EN 12195-1:2010) or IMO/ILOUNECE CTU Code**

Material combination in contact area	Friction (μ) Dry or wet
SAWN TIMBER/WOODEN PALLET against	
Plywood/wood	0.45
Grooved aluminium	0.4
Shrink film	0.3
Stainless steel sheet	0.3
PLANED WOOD/TIMBER against	
Plywood/wood	0.3
Grooved aluminium	0.25
Stainless steel sheet	0.2
PLASTIC PALLET against	
Plywood/wood	0.2
Grooved aluminium	0.15
Stainless steel sheet	0.15
STEEL AND OTHER METAL (STEEL CRATE) against	
Plywood/wood	0.45
Grooved aluminium	0.3
Stainless steel sheet	0.2
STEEL AND SHEET METAL	
Unpainted rough sheet metal against unpainted rough sheet metal	0.4 [1]
Painted rough sheet metal against painted rough sheet metal	0.3 [1]
Unpainted sheet metal with smooth surface against unpainted sheet metal with smooth surface	0.2 [1]
Painted sheet metal with smooth surface against painted sheet metal with smooth surface	0.2 [1]
Unpainted rough sheet metal against sawn timber	0.45 [2]
Painted rough sheet metal against sawn timber	0.45 [2]

[1] The values are only valid for dry surfaces and can be found in the CTU Code
[2] The values are only valid for dry surfaces and can be found in VVFS 1998:95

SLIDING – FRICTION

Table values according to TFS 2017:25* (EN 12195-1:2010) or IMO/ILOUNECE CTU Code (cont.)**

Material combination in contact area	Friction (μ) Dry or wet
CARDBOARD (untreated)	
Cardboard against cardboard	0.5 [1]
Cardboard against wooden pallet	0.5 [1]
BIG BAG against	
Wooden pallet	0.4 [1]
CONCRETE against SAWN TIMBER	
Rough concrete surface	0.7
Smooth concrete surface	0.55
FRICTION MAT	
Rubber	0.6
Other materials	as certified

[1] The values are only valid for dry surfaces and can be found in the CTU code
[2] The values are only valid for dry surfaces and can be found in VVFS 1998:95

*** From TSFS 2017:25:**
The above friction tables may be used for cargo securing. However, it must be verified that the friction factors used are suitable for the actual transport. Surfaces may be dry or wet, but they must be clean and free of oil, grease, frost, ice and snow. Friction factor μ=0.2 must be used if (a) the contact surfaces are not clean and free of oil, grease, frost, ice and snow, or if (b) a current material combination is missing from the friction table above and cannot otherwise be verified. Use a value greater than 0.2 for friction factor μ when (a) or (b) requires certification, e.g. from a friction test. Special precautions should be taken on oily or greasy surfaces.

**** From CTU Code 2014, Swedish translation 31/01/2017:**
The values apply if both surfaces are clean and free of dirt. It must be ensured that the correct friction factor is used for the current transport. If the current material combination is missing from the table above or cannot otherwise be verified, use the friction factor (μ) 0.30. If the contact surfaces are not clean, the maximum friction factor 0.3 may be used. When the contact surfaces are not free of frost, ice and snow, the friction factor 0.2 must be used, unless friction for the current material combination is lower, according to the table. For oily or lubricated surfaces, use the friction factor (μ) 0.10 [3].

[3] For maritime transport, see also the CSS Code, Annex 13, Section 7.2 "Balance of forces and moments"

Cargo weight in tons prevented from sliding per tag washer			
Friction between tag washer and cargo or platform		SIDEWAYS/REARWARD	
		Ø 95 mm	48×65 mm
With friction	μ = 0.2	1.0	0.58
With friction	μ = 0.3	1.5	0.88
		FORWARD	
With friction	μ = 0.2	0.38	0.22
With friction	μ = 0.3	0.43	0.25

Load stoppers must be used in combination with lashings to ensure a proper grip against both surfaces.

TIPPING, WANDERING

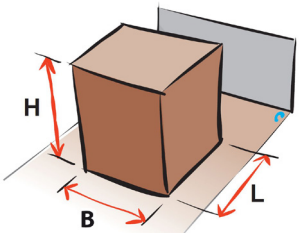


Figure 1

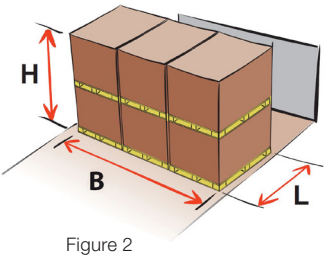


Figure 2

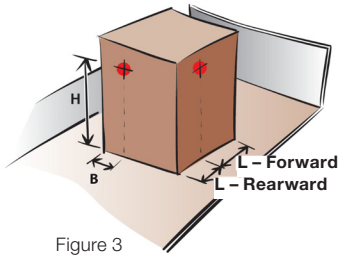


Figure 3

TIPPING

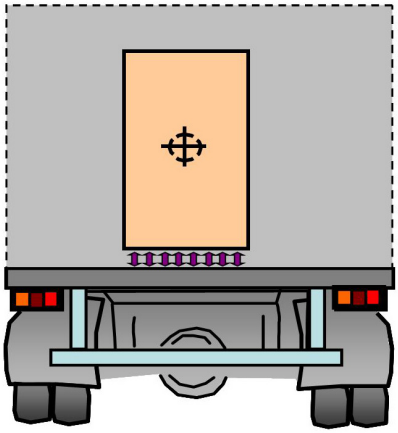
The definition of H, W and L to use for tipping when the centre of gravity is close to the geometrical centre is shown in Figure 1 and Figure 2.

The definition of H, W and L to use for tipping when the centre of gravity is away from the geometrical centre is shown in Figure 3.

WANDERING

If there is no risk of sliding or tipping, the goods may be transported without lashings.

However, since unlashed goods may wander during transport, goods that are not close to a blocking device must be lashed or blocked.



DIMENSIONING PRINCIPLES

This Quick Guide to Cargo Securing has been based on the principles in following documents:

- The European standard EN 12195-1 (2010)
- IMO/ILO/UN ECE Guidelines for Packing of Cargo Transport Units including IMO Model Course 3.18.

The values indicating secured cargo weight in the tables on page 20–23 in this guide have been calculated so that both these documents are complied with for road transport.

For maritime transport, only the IMO/ILO/UNECE Guidelines have been considered.

The following accelerations, expressed in parts of the gravity acceleration (1g = 9.81 m/s^2), have been used when calculating the secured cargo weights for Forankra cargo securing equipment:

Mode of transport	SIDEWAYS		FORWARD		REARWARD	
	S	V	F	V	R	V
Road	0.5/0.6*	1.0	0.8/1.0**	1.0	0.5	1.0
Maritime Area A (Baltic Sea)	0.5	1.0	0.3	0.5	0.3	0.5

V = Vertical acceleration to be used in combination with horizontal accelerations sideways (S), forward (F) and rearward (R).

* To be used when there is a risk of tipping

** To be used according to IMO/ILO/UN ECE Guidelines

All references to ton in this guide are based on a metric ton of 1000 kg.

DIMENSIONING PRINCIPLES

LASHING CAPACITY (LC)

Lashing capacity (LC) is the lashing capacity of the cargo lashing between the end fittings, i.e. the strength used when calculating the weight of cargo that loop lashing or straight lashing can secure. LC is given in daN for webbing lashings and in kN for chain lashing.

STANDARD TENSION FORCE (STF)

Standard Tension Force (STF) is the tension force achieved when the tensioner is pulled with the specified SHF (normally 50 daN).

FORANKRA BASIC

LC *= 2000 daN*
STF *= 350 daN*

1 daN = 1 kg

REQUIRED NUMBER OF LASHINGS

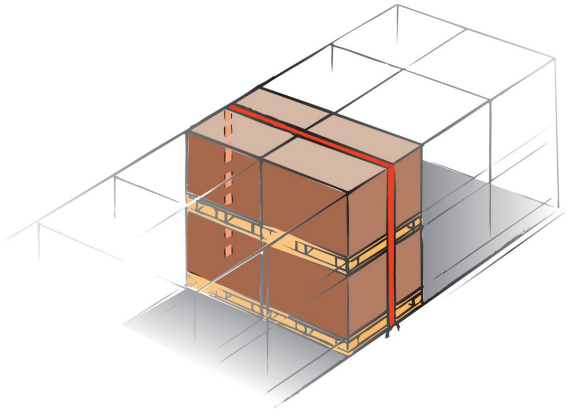
The required number of lashings to prevent goods from sliding and tipping is calculated using the tables on pages 20–23 as follows:

1. Calculate the number of lashings to prevent sliding.
2. Calculate the number of lashings to prevent tipping.
3. Use the maximum number of lashings from the calculations in points 1 and 2.

If lashing equipment with different performance is used, the table values can be multiplied by conversion factors, see page 18.

The values in the lashing tables are based on Forankra BASIC's performance.

DIMENSIONING PRINCIPLES



CARGO IN MULTIPLE LAYERS

When calculating the number of top-over lashings required for cargo stowed in more than one layer, the following steps should be followed:

1. Calculate the number of lashings needed to prevent sliding using the weight of the entire section and the friction for the bottom layer.
2. Calculate the number of lashings needed to prevent sliding using the weight of the top platform bed and the friction between the top and bottom layers.
3. Calculate the number of lashings needed to prevent tipping using the weight of the entire section.
4. The largest number of lashings in steps 1 to 3 must be used.

LASHING EYES

The lashing eyes should have at least the same strength in LC as the lashings.

For loop lashings, the lashing eyes must have the strength of at least 1.4 × LC of the lashings if both ends of the lashing are fixed to the same eye.

DIMENSIONING PRINCIPLES

CONVERSION TABLE FOR DIFFERENT LASHING EQUIPMENT

The values in the tables are based on BASIC lashing with LC 2000 daN and STF 350 daN and can be multiplied by conversion factors as shown below in order to obtain the secured cargo weight for other types of lashing equipment.

Standard lashing

Textile load binder

Load binder

EQUIPMENT				CONVERSION FACTORS			
Part no.	Product	STF	LC	Top-over lashing	Loop lashing	Straight lashing	Spring lashing
Standard lashing							
130510008	Basic 35	200	1000	0.57	0.50	0.50	0.50
130610092	Basic 50 2000	350	2000	1.00	1.00	1.00	1.00
130610093	Basic 50 2500	300	2500	0.86	1.25	1.25	1.25
130610130	Basic 50 2000 ERGO	500	2000	1.43	1.00	1.00	1.00
130610138	Basic 50 2500 ERGO	500	2500	1.43	1.25	1.25	1.25
130510010	Premium 35	270	1000	0.77	0.50	0.50	0.50
130610135	Premium 50 2000	400	2000	1.14	1.00	1.00	1.00
Textile load binder							
150210026	For lashing chain 6–8 mm	400	2000	1.14	1.0	1.0	1.0
150210027	For lashing chain 6–8 mm	400	2000	1.14	1.0	1.0	1.0
150210028	For lashing chain 6–8 mm	400	4000	1.14	2.0	2.0	2.0
Load binder							
150210023	With lashing chain 6 mm *	1800	2200	5.14	1.10	1.10	1.10
150210024	With lashing chain 8 mm *	3000	4000	8.57	2.00	2.00	2.00
150210003	With lashing chain 10 mm *	3000	6300	8.57	3.15	3.15	3.15
150210008	With lashing chain 13 mm *	3000	10000	8.57	5.00	5.00	5.00

** "Lashing chain" means a short-link grade 8 chain.*

CONVERSION TABLE FOR DIFFERENT ONE-WAY LASHINGS

One-way buckle A-lock with polyester webbing

One-way buckle Key-lock with polyester webbing

EQUIPMENT				CONVERSION FACTORS			
Part no.	Product	STF	LC	Top-over lashing	Loop lashing	Straight lashing	Spring lashing
One-way lashings type OWL							
140210242	One-way buckle 35 mm, 300 kg, A-lock						
*A35.01**	Comb. with 140110245	150-370**	1900***	0.43-1.05**	0.95	0.95	0.95
140210005	One-way buckle 50 mm, 5000 kg, A-lock						
*A50.05**	Comb. with 140110006	150-370**	2700***	0.43-1.05**	1.35	1.35	1.35
140210001	One-way buckle 50 mm, 2000 kg, Key-lock						
*K50.01**	Comb. with 140110002	150-370**	1300***	0.43-1.05**	0.65	0.65	0.65
*K50.05**	Comb. with 140110010	150-370**	1700***	0.43-1.05**	0.85	0.85	0.85

* *Combination designation, not item number*

** *STF value depends on type of tensioning tool*

*** *According to CTU Code 2014, a higher proportion of the breaking strength may be used to calculate the MSL (Maximum Securing Load). Contact Forankra AB if the cargo is to be secured according to the CTU Code.*

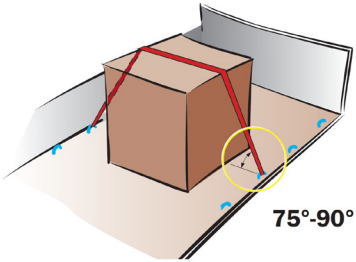
TOP-OVER LASHING – TABLE

FORANKRA BASIC

The table values are valid for lashings with LC = 2000 daN and STF at least 350 daN (350 kg).

The values in the tables are proportional to the STF tension of the lashing.

Forankra Basic



Cargo weight in tons prevented from sliding per top-over lashing			
µ-STATIC	SIDEWAYS	FORWARD	REARWARD
0.15	0.27	0.13	0.27
0.20	0.42	0.18	0.42
0.25	0.63	0.25	0.63
0.30	0.94	0.33	0.94
0.35	1.5	0.43	1.5
0.40	2.5	0.55	2.5
0.45	5.6	0.71	5.6
0.50	no slide	0.92	no slide
0.55	no slide	1.2	no slide
0.60	no slide	1.7	no slide
0.65	no slide	2.4	no slide
0.70	no slide	3.9	no slide

Cargo weight in tons prevented from tipping per top-over lashing								
SIDEWAYS							FORWARD	REARWARD
H/W	1 row	2 rows	3 rows	4 rows	5 rows	H/L	per section	per section
0.6	no tip	no tip	no tip	5.6	2.6	0.6	no tip	no tip
0.8	no tip	no tip	4.8	1.9	1.3	0.8	no tip	no tip
1.0	no tip	no tip	1.9	1.1	0.85	1.0	no tip	no tip
1.2	no tip	3.9	1.2	0.80	0.64	1.2	no tip	no tip
1.4	no tip	2.0	0.86	0.62	0.51	1.4	4.6	no tip
1.6	no tip	1.3	0.68	0.51	0.43	1.6	2.0	no tip
1.8	no tip	0.99	0.56	0.43	0.36	1.8	0.3	no tip
2.0	no tip	0.79	0.48	0.37	0.32	2.0	0.92	no tip
2.2	5.6	0.66	0.41	0.32	0.28	2.2	0.73	6.3
2.4	3.1	0.56	0.37	0.29	0.26	2.4	0.60	3.1
2.6	2.1	0.49	0.32	0.27	0.23	2.6	0.51	2.1
2.8	1.6	0.44	0.27	0.24	0.21	2.8	0.44	1.6
3.0	1.3	0.39	0.27	0.22	0.20	3.0	0.39	0.3

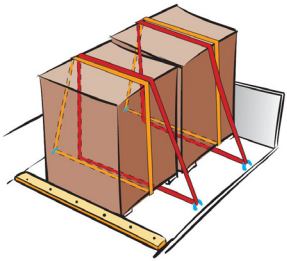
If there is a risk of forward and rearward tipping, the lashing must only be dimensioned for the weight of the outermost section. Top-over lashing, which is used to prevent both forward and rearward tipping, must be placed in the centre of the goods.

LOOP LASHING – TABLE

FORANKRA BASIC

The table values are valid for lashings with LC = 2000 daN and STF at least 350 daN (350 kg). For loop lashings, the lashing eyes must have the strength of at least 1.4 × LC of the lashings if both ends of the lashing are

Forankra Basic



Cargo weight in tons prevented from sliding per loop lashing	
µ-static	**SIDEWAYS**
0.15	5.9
0.20	6.7
0.25	7.7
0.30	9.1
0.35	11
0.40	13
0.45	17
0.50	no slide
0.55	no slide
0.60	no slide
0.65	no slide
0.70	no slide

The values in the table are proportional to the lashing capacity (LC) of the lashing.

Cargo weight in tons prevented from tipping per loop lashing					
SIDEWAYS					
H/W	**1 row**	**2 rows**	**3 rows**	**4 rows**	**5 rows**
0.6	no tip	no tip	no tip	8.1	5.1
0.8	no tip	no tip	7.0	3.9	2.9
1.0	no tip	no tip	3.8	2.5	2.0
1.2	no tip	5.8	2.6	1.9	1.6
1.4	no tip	3.7	2.0	1.5	1.3
1.6	no tip	2.8	1.6	1.3	1.1
1.8	no tip	2.2	1.4	1.1	0.93
2.0	no tip	1.8	1.2	0.94	0.82
2.2	6.4	1.6	1.0	0.83	0.73
2.4	4.6	1.4	0.92	0.75	0.66
2.6	3.6	1.2	0.83	0.68	0.60
2.8	3.0	1.1	0.76	0.62	0.55
3.0	2.5	0.98	0.70	0.58	0.51

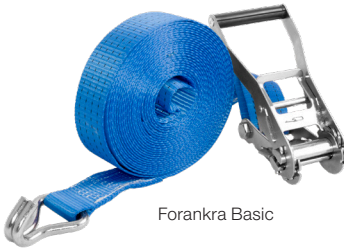
The values in the table are proportional to the STF tension of the lashing.

STRAIGHT LASHING – TABLE

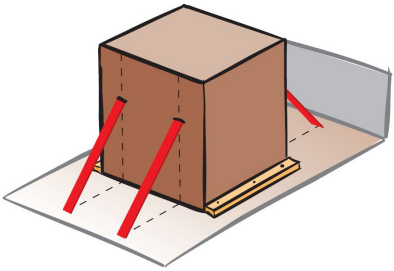
FORANKRA BASIC

The table values are valid for lashings with LC = 2000 daN and STF at least 350 daN (350 kg).

The values in the tables are proportional to the lashing capacity (LC) of the lashing.



Forankra Basic



Cargo weight in tons prevented from sliding per straight lashing			
µ-STATIC	**SIDEWAYS PER SIDE**	**FORWARD**	**REARWARD**
0.15	1.8	1.0	1.8
0.20	2.2	1.2	2.2
0.25	2.7	1.4	2.7
0.30	3.3	1.6	3.3
0.35	4.1	1.8	4.1
0.40	5.2	2.1	5.2
0.45	6.8	2.4	6.8
0.50	no slide	2.8	no slide
0.55	no slide	3.2	no slide
0.60	no slide	3.7	no slide
0.65	no slide	4.4	no slide
0.70	no slide	5.2	no slide

Cargo weight in tons prevented from tipping per straight lashing				
H/W	**SIDEWAYS PER SIDE**	**H/L**	**FORWARD**	**REARWARD**
0.6	no tip	0.6	no tip	no tip
0.8	no tip	0.8	no tip	no tip
1.0	no tip	1.0	no tip	no tip
1.2	no tip	1.2	no tip	no tip
1.4	no tip	1.4	10	no tip
1.6	no tip	1.6	4.7	no tip
1.8	no tip	1.8	3.2	no tip
2.0	no tip	2.0	2.5	no tip
2.2	5.1	2.2	2.1	16
2.4	3.9	2.4	1.9	8.7
2.6	3.3	2.6	1.7	6.1
2.8	2.8	2.8	1.6	4.8
3.0	2.5	3.0	1.5	4.1

SPRING LASHING – TABLE

FORANKRA BASIC

The table values are valid for lashings with LC = 2000 daN and STF at least 350 daN (350 kg).

The values in the tables are proportional to the lashing capacity (LC) of the lashing.

Forankra Basic

Cargo weight in tons prevented from sliding		
µ-STATIC	**FORWARD**	**REARWARD**
0.15	4.7	8.3
0.20	5.1	9.5
0.25	5.6	11
0.30	6.1	13
0.35	6.8	15
0.40	7.5	19
0.45	8.3	24
0.50	9.3	no slide
0.55	11	no slide
0.60	12	no slide
0.65	13	no slide
0.70	15	no slide

Cargo weight in tons prevented from tipping per spring lashing.		
H/L	**FORWARD**	**REARWARD**
0.6	no tip	no tip
0.8	no tip	no tip
1.0	no tip	no tip
1.2	no tip	no tip
1.4	67	no tip
1.6	33	no tip
1.8	24	no tip
2.0	19	no tip
2.2	17	127
2.4	15	69
2.6	14	50
2.8	13	40
3.0	12	35

VERTICAL BLOCKING – CARGO BARS

Blocking capacity (BC) is a tested value which, together with the friction factor between the cargo and the platform bed, lets us calculate the cargo weight that can be blocked with a cargo bar.

Without regards to friction (friction factor set to 0.0), the cargo bar can be used to securely block the cargo according to the tables below:

Cargo bars	Gas/spring pressure	WITH friction mat under lower foot		WITH friction mat under lower foot		WITH friction mat under lower foot	
		Length, m	BC, daN	Length, m	BC, daN	Length, m	BC, daN
Gas bar, Short	1200 N	1.9-2.1	140	2.1-2.55	125	-	-
Gas bar, Long	1200 N	2.35-3.0	125	-	-	3.0-3.35	100
Ergobar, Short	800 N	1.9-2.4	100	-	-	-	-
Ergobar, Standard	1500 N	2.4-2.6	150	2.6-2.8	130	-	-
Ergobar, Nordic	1500 N	2.67-2.95	150	2.96-3.20	130	3.21-3.47	100

Cargo bars	Gas/spring pressure	WITHOUT friction mat under lower foot		WITHOUT friction mat under lower foot		WITHOUT friction mat under lower foot	
		Length, m	BC, daN	Length, m	BC, daN	Length, m	BC, daN
Gas bar, Short	1200 N	1.9-2.55	110	-	-	-	-
Gas bar, Long	1200 N	2.35-3.35	100	-	-	-	-
Ergobar, Short	800 N	1.9-2.4	60	1.9-2.4*	90*	-	-

** In the case of floors made of diagonally grooved aluminium*

VERTICAL BLOCKING – CARGO BARS

The table below shows the cargo weight that can be blocked rearward, sideways and forward according to EN 12195-1, when the bar presses between clean and dry surfaces and with no sliding between the bar and the

The table shows the capacity rearward, sideways and forward (forward in brackets).

Friction factor [1]	BC 150 daN	BC 140 daN	BC 130 daN	BC 125 daN	BC 110 daN	BC 100 daN	BC 90 daN	BC 60 daN
0.0 [2 3]	150 kg (94 kg)	140 kg (88 kg)	130 kg (81 kg)	125 kg (78 kg)	110 kg (69 kg)	100 kg (63 kg)	90 kg (56 kg)	60 kg (38 kg)

[1] *Friction between goods and cargo carrier*
[2] *Non-braking roll container*
[3] *Dirty surfaces such as grease or oil, snow, slush, ice or loose dirt/debris that reduces friction*

HORIZONTAL BLOCKING – POLES/BEAMS

The table values are valid for the following shoring beams with a blocking capacity of 800 daN:

Shoring/Loading beam (300410005)

Cargo weight in tons prevented from sliding per cargo bar		
µ-STATIC	**FORWARD**	**REARWARD**
0.15	0.92	2.2
0.20	0.98	2.6
0.25	1.05	3.1
0.30	1.1	3.9
0.35	1.2	5.2
0.40	1.3	7.9
0.45	1.4	10
0.50	1.6	16
0.55	1.7	31
0.60	2.0	no slide
0.65	2.2	no slide
0.70	2.6	no slide

Cargo weight in tons prevented from tipping per cargo bar		
H/L	**FORWARD**	**REARWARD**
0.8	no tip	no tip
1.0	no tip	no tip
1.2	3.1	no tip
1.4	1.8	no tip
1.6	1.4	no tip
1.8	1.2	24
2.0	1.0	10
2.2	0.96	7.2
2.4	0.90	5.7
2.6	0.85	4.5
2.8	0.81	3.7
3.0	0.78	3.1

The table values are valid for the following shoring beams with a blocking capacity of 300 daN:

Round shoring pole (300410001)

Safety beam (300410008)

Cargo weight in tons prevented from sliding per cargo bar		
µ-STATIC	**FORWARD**	**REARWARD**
0.15	0.35	0.84
0.20	0.37	0.98
0.25	0.39	1.2
0.30	0.42	1.5
0.35	0.45	2.0
0.40	0.49	2.9
0.45	0.54	3.9
0.50	0.59	5.9
0.55	0.65	12
0.60	0.74	no slide
0.65	0.84	no slide
0.70	0.98	no slide

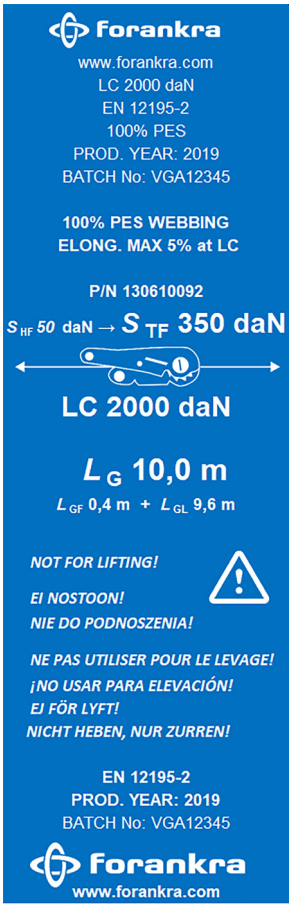
Cargo weight prevented from tipping per cargo bar		
H/L	**FORWARD**	**REARWARD**
0.8	no tip	no tip
1.0	no tip	no tip
1.2	1.2	no tip
1.4	0.69	no tip
1.6	0.52	no tip
1.8	0.44	8.8
2.0	0.39	3.9
2.2	0.36	2.7
2.4	0.34	2.1
2.6	0.32	1.7
2.8	0.31	1.4
3.0	0.29	1.2

TEXTILE LASHING EQUIPMENT – LABELLING

The label on textile lashing equipment should provide the following information according to European standard EN 12195-2:

(unit daN: 1 daN = 1 kg)

- **LC**
  Safe load = 2000 daN
- **SHF**
  Hand force = 50 daN
- **STF**
  Tension = 350 daN
- **Webbing material**
  Polyester 100%
- **Manufacturer**
  Forankra
- **Traceability (Batch)**
  VGA12345
- **Standard**
  EN 12195-2



Label Basic 50 2000, 2-part

Guideline to Cargo Securing

To secure cargo reliably, you need to use approved products and ensure that the cargo securing equipment is used correctly. In our “Guideline to Cargo Securing”, we have gathered information that is important to consider in order to achieve safe cargo securing solutions.

With Forankra as your partner, you can be sure that the products are quality assured and comply with all applicable laws and regulations.

Contact us

If you have any questions or want to discuss which products best meet your cargo securing needs, please contact our experts.

Forankra
Secures everything in transit™

Forankra AB. Box 100, 447 23 Vårgårda, Sweden.
Tel: +46 (0)322-66 78 00 • info@forankra.se • **www.forankra.se**

2024-01-11