

Edition 6



Lifting Guide



GUNNEBO
Industries



Your partner in safe lifting

Lifting operations call for a very high level of safety. The lifting equipment and the way it is used are crucial to your safety on site. For this reason, it is important to choose a responsible supplier. Gunnebo Lifting is a leading manufacturer of lifting equipment. When it comes to quality we leave nothing to chance. That is something you can rely on.

Warning:

Failure to read, understand and comply with following instructions, working load limits and specifications in this publication could result in serious injury or damage to property.

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Lifting Equipment

Introduction

This manual is your pocket guide to the use of lifting equipment. It covers equipment made of synthetic fibre, steel wire rope and chain with associated master links, hooks and couplings.

It consists of four colour-coded sections which can be read individually when required:

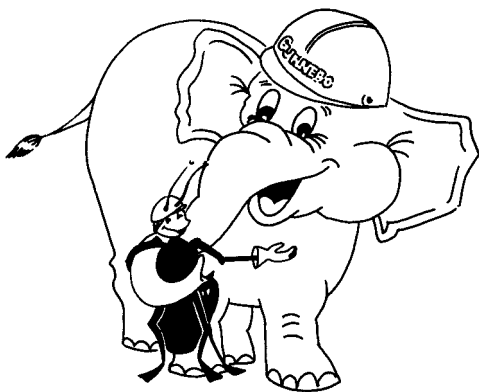
-  **Lifting Equipment in General**
-  **Choosing Lifting Equipment**
-  **When Lifting**
-  **Maintenance**

Gunnebo Lifting does not, however, in any way claim that this manual covers all kinds of lifting equipment or all lifting situations.

The Ant and the Elephant

There are many illustrations in this manual. To make it more comprehensible we have chosen to depict lifting operations with the help of two creatures: the Ant, representing the diligent and orderly working man and the Elephant, representing the strength needed when lifting heavy loads.

The two work as a team. Sometimes they show what you should not do - in red - but more often they show what you should do - in green.



Lifting Equipment

Standards, Laws and Regulations

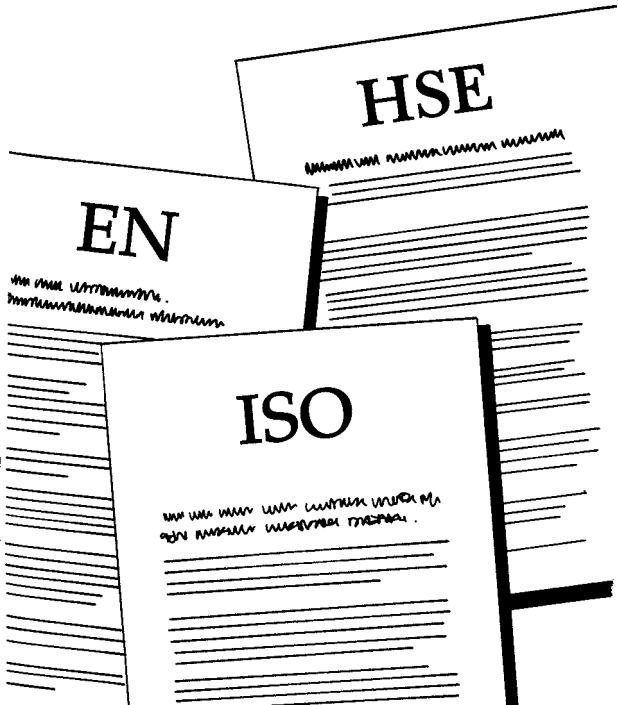
Several organisations are involved in the development of standards, legislation and inspection procedures in the field of lifting. We recommend that you obtain relevant information from your national Health & Safety Authority.

ISO, International Organization for Standardization, develops world-wide standards.
www.iso.org

CEN, Comité Européen de Normalisation, develops European standards.
www.cenorm.org

ASTM, American Standardisation Organizations.
www.astm.org

in General



Lifting Equipment

Expressions and Terms

Lifting equipment is everything used to connect a load to the crane hook, i.e. wire rope slings, chain slings, roundslings, webbing slings, lifting beams etc.

WLL (Working Load Limit) is the maximum mass that the lifting equipment is authorized to sustain in general lifting service.

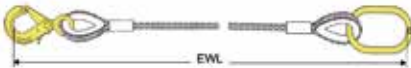
BF (Breaking Force) is the maximum force reached during the static tensile test.

SF (Safety Factor) is the relationship between breaking force and WLL. Note! The safety factors for chain, steel wire rope and soft slings differ.

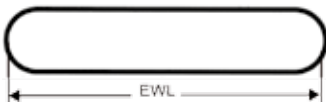
MPF (Manufacturing Proof Force) is the force to which lifting equipment or components are tested prior to delivery, by the manufacturer.

Total ultimate elongation is the elongation of a chain at the moment of breaking, in percent, of the original length. It is a measure of toughness and ductility.

Effective Working Length (EWL) is the length between the load bearing points of an unloaded lifting sling or chain sling.



Effective length of a one-legged lifting sling with two components.



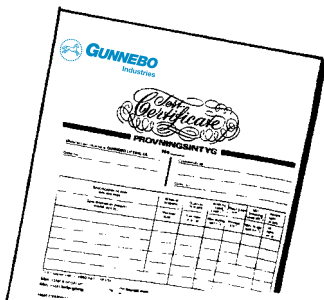
Effective Working Length is stated on endless sling.

Lifting Equipment

Safety and Responsibility

Be aware of the applicable safety regulations for lifting in general. Responsibilities also rest with the supplier/ manufacturer, who must:

- Take responsibility for damage and personal injury caused by inferior equipment (so-called product responsibility).
- Provide instructions for safe usage.
- Mark the equipment with the maximum permitted load and the manufacturer's designation.
- Provide test certificate of proof loading and/or declaration of conformity for equipment when called upon to do so.
- Use a reliable quality assurance system (ISO 9001: 2008).



Product Responsibility

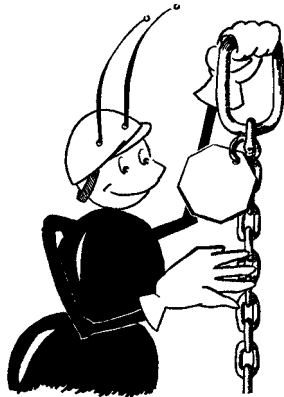
New and more demanding laws on product responsibility have been adopted in the EU. If an injured person is able to prove his/her injury, a defect in the lifting equipment and a connection between the injury and the defect, the manufacturer (or importer) will be held responsible. For this reason, it is important that the manufacturer/importer is adequately insured.

Marking

Lifting assemblies must be supplied with an resistant ID-tag including following information:

- W.L.L. and range of angles
- CE marking
- Individual identification mark
- Grade
- Manufacturers name or symbol.
- Number of legs.

Steel wire rope slings can be marked on the ferrules, while soft lifting slings should have an ID-label.



Lifting Equipment

Safety and Responsibility

Quality Assurance

The demands on suppliers for quality assurance systems, approved according to ISO 9001:2008 are growing even stronger. The ISO 9001 system ensures that the supplier has documented routines for all activities which may influence on customer related quality. A third part auditor continuously assesses the conformity of the quality system.



Environmental responsibility

A manufacturer who is certified according to ISO 14001 takes the necessary measures to reduce the effect of their operations on the environment. Choose a manufacturer that values environmental responsibility to ensure a sustainable environment in the future.

Quality Steel Meets International Standards

By close co-operation with our suppliers we guarantee that the raw material complies with our high demands.

We work continuously to improve our existing range of products and develop new innovative products in order to solve all possible kinds of lifting situations.

Our Quality Assurance & Environmental system, accredited to ISO 9001 and ISO 14001, covers all processes from design to delivered product, e.g. design, development, marketing, production and distribution.

Lifting Equipment

Components of Lifting Equipment

Chain

Chain is divided into grades based on minimum breaking load. The codes relate to the shape

Chain Grade	Surface treatment	Code	Minimum breaking load N/mm ²	WLL
2	Galvanized Z Bright B	KL	240	1
		HL	240	1
8	Yellow U Black B	KL	800	1
		ML	800	1
		LL	800	1
10	Blue A	KL	1000	1

Chain grades are based upon the rated minimum ultimate stress.

of the link, short link (KL), medium length (HL) and long link (LL) chain. Chains are also made in different strength grades. Grade 8 and 10 chain are the most common in lifting equipment.

Only use short link chain for lifting operations.

Load factors

MPF	Breaking force	Typical use
2.4	4.5	Farming, mooring, general use
2.4	5.2	
2.5	4	General lifting (KL), Container lashing (LL). Extra heavy towing (ML), Lashing (KL, LL).
2.5	5	
2.5	5	
2.5	4	General lifting

Grade 2 and all HL, ML & LL chain must not be used for lifting applications.

Lifting Equipment

Extreme Temperatures Conditions

The in service temperature effects the WLL as following:

Temperature (°C)	Reduction of WLL			
	Grade 10 chain (400)	Grade 10 chain (200)	Grade 10 components	Grade 8 chain & components
-40 to +200 °C	0 %	0 %	0 %	0 %
+200 to +300 °C	10 %	Not allowed	10 %	10 %
+300 to +400 °C	25 %	Not allowed	25 %	25 %

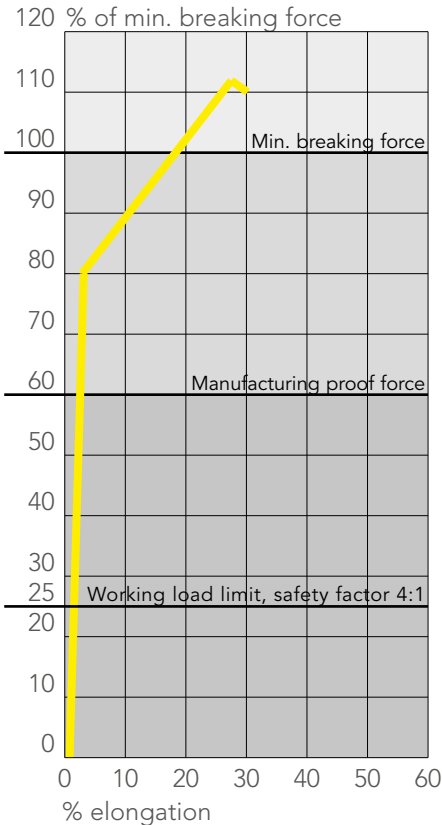
Upon return to normal temperature, the sling reverts to its full capacity within the above temperature range. Chain slings should not be used above or below these temperatures.

The safety factor of grade 8 and grade 10 chain is 4:1, i.e. the max. load must not exceed one quarter of the stipulated minimum breaking force.

All chain produced by Gunnebo Industries is proof loaded with a force more than double the maximum load, as shown in table, page 15.

Grade 8 chain for lifting is manufactured to EN 818-1, 818-2, 818-4 and ISO 3076.

Stress/elongation diagram Chain grade 8, and grade 10 type KL



Lifting Equipment

Steel Wire Rope

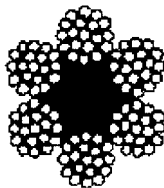
The most common designs of steel wire rope used in lifting equipment are:

- 114-wire rope (6 x 19+FC) with a fibre core (diameter: approx. 3 to 8 mm)
- 216-wire rope (6 x 36+FC) with a fibre core (diameter: approx. 6 to 60 mm)
- 133-wire rope (7 x 19+WSC) with a steel core, intended for hot environments.
- 265-wire rope (6 x 36+IWRC) with a steel core, intended for hot environments.
- 144-wire rope (6 x 24+7FC) for use in shipping and disposable slings.

The nominal breaking strain of individual wires in ropes must be 1770 N/mm². The minimum wire fill-factor of ropes must be 0.40.

216-wire
Warrington-Seale,
fibre core

Filling factor $F = 50\%$



Steel Wire Rope Slings are manufactured according to EN13414-1.

The working load limit can be decided either from standard tables or when the angle to the vertical and the centre of gravity is known through trigonometric calculations.

The following formula can be used for calculating the maximum load in cases where a wire design can't be found in the standard tables. The calculation yields the maximum load on each leg rounded off to the nearest hundred kgs, when the lifting angle is 0°

$$WLL = \frac{F_{min} \times KT}{Z_p \times g}$$

Where:

F_{min} = The minimum breaking load of the rope in kN

KT = allowed factor for the efficiency of the termination

ZP = 5 (Safety Factor)

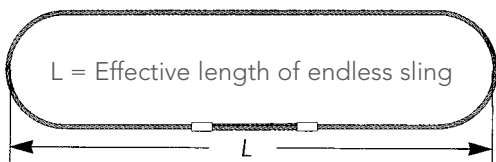
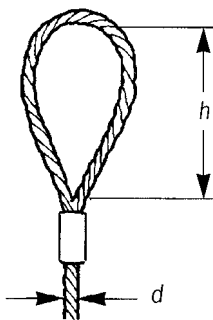
g = 9,81

Lifting Equipment

Location of the Mechanical Splices or Ferrules.

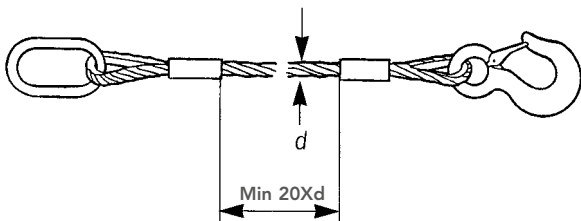
The length (h) of the eye on a steel wire rope must be at least $15 \times d$.

d = rope diameter



The distance between the ferrules on a endless sling must not be less than $3 \times$ the length of the ferrule. (unpressed).

The distance between the two ferrules on lifting slings must not be less than $20 \times d$. For hand spliced lifting slings the minimum length of plain rope shall be at least $15 \times d$.



in General

Multiple Legs

Multi-legged lifting slings may consist of two, three or four legs. A master link joins the legs at the top. The legs of 3- and 4-legged slings are connected into intermediate links.

Note that multi-legged slings must be equipped with thimbles when used with supplementary lifting equipment.



Lifting Equipment

Soft Lifting Equipment

Roundslings

Roundslings consist of an endless load-bearing sling made of polyester fibre, protected from dirt and wear with a single- or double-layered cover of polyester fabric. There are two types of covers: side seam with double cover which gives a stiffer roundsling and the seamless for a softer version.

Endless Webbing Slings

These webbing slings consist of a woven polyester webbing sewn into an endless loop. They can be used in the same way as roundslings but are limited to lower working loads.

Webbing Slings with eyes and Roundslings Strops

A webbing sling is a woven webbing with sewn eye loops at both ends. It is often used to even out and soften the pressure on the load. Roundsling strops may have loops too and the stronger design with a fibre core and cover make them suitable for heavier lifts.

Advice

One single cover heavy duty tube for the roundsling is actually stronger than a double cover tube with two thin layers. Our tests show that the quality of the tube is of utmost importance for the lifetime of the product.

We refute the argument that when the first layer on a double cover sling is damaged you can still use the sling because there is a risk that sharp objects have entered in between the layers and may cause hidden damage.

Another advantage with the single cover roundsling is the protected label which also makes the sling stiffer, so it can be passed through narrow spaces.

Lifting Equipment

Material Properties

- **Polyester** is resistant to acids but not to alkalis, e.g. ammonia and caustic soda.
- The melting point is 260°C, but polyester lifting equipment must not be used with loads or ambient temperatures above 100°C.
- The strength is not affected by water. Water absorption is negligible.
- Note that friction and sharp edges can quickly wear and cut polyester.
- Lifting equipment in polyester has a blue identification tag.
- **Polypropylene** is less resistant to wear than Polyester.
- Polypropylene can be damaged by solvents, tars and paints.
- The melting point is 165°C.
- Polypropylene must not be used with loads hotter than 80°C.
- Lifting equipment in polypropylene has a brown identification tag.

Safety Factor

Roundslings and webbing slings = 7:1 according to EN-standards.

Lifting Components

The grade of the lifting components must match the grade of the chain (usually grade 8 or grade 10). The size designation usually refers to the size of the chain with the same strength, e.g.: G-10-10 = Coupling link, type G, suitable for 10 mm chain, grade 10 (max. load 4.0 tonnes)

Master Links

Master links can be drop forged or forged and welded from round steel. There are two basic designs:

- Single master link, for one- and two-legged lifting slings
- Master link, with sub-links for three- and four-legged lifting slings.

Master Link M



For use with G-links

Master Link MF



For use with G-link or CL & CLD

Master Link MG



"All-in-one" top link.

Master Link MT



For use with G-link or CL & CLD

Master Link MGD



"All-in-one" top link for 2-leg slings.

Lifting Equipment

Couplings

Examples of the most common mechanical couplings are shown below. For chain there are several alternative connection systems: G-coupling link, The SK-system and direct connection to clevis-type hooks.

Coupling Link G



Half Link SKT



For use with matching SK-system components.

Roundsling Coupler SKR



For use with matching SK-system components.

Clevis Shackle GSA



For connection in chain.

Shackle, Dee



Shackle, Bow



C-grab CG



For use with MF Master Link and choke hitch.

C-grab CGD



For use with MF Master Link.

C-lok CL



For use with MF Master Link and choke hitch.

Hooks

Eye hooks for steel wire rope and chain
(GrabiQ CL/CG)(G-coupling link/Berglok BL)

**Safety Hook
BK/OBK**



Will not open when under direct load and prevents the hook from snagging when lifting.

Sling Hook EKN



With latch to help prevent unintentional unloading.

Sling Hook EK



Suitable when latching hooks cannot be used.

Foundry Hook OKE



With a wide opening to accept large diameter.

Grab Hook OG



No load derating.
Supporting bridge prevents chain deformation.

**Swivel Safety Hook
BKL/LBK**



With a swivelling eye to enable rotation.

Swivel Latch Hook LKN



With a swivelling eye to enable rotation.

Lifting Equipment

Clevis-type hooks for direct connection to chain

Safety Hook
GBK/BKG



Will not open when under direct load and prevents the hook from snagging when lifting.

Sling Hook
EGKN



With latch to prevent unintentional unloading.

Sling Hook
EGK



Suitable when latching hooks can not be used.

Rotating Lifting Points



REL P, compact and robust, ideal for top-mounting.



R L P, has an easily dismountable D-ring.



D L P
De-centered Lifting Point



B L P
Ball-bearing Lifting Point

SK-System

Sling Hook
ESKN/SKN,
ESKH/SKH



ESKN/SKN with latch
ESKH/SKH without latch

Master Link
SKG / SKO



SKG closed master link and SKO open master link.

Roller Bearing Swivel
SKLI



Used to insulate the lifted load to enable safe welding. Max. 1000 V. Lubricated, sealed and fully rotational even at maximum load.

Steel Rope Components for Lifting Equipment

Steel Rope Clamp



Clamping Thimble

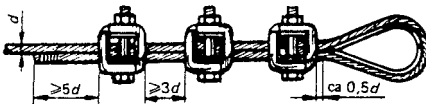
Thimble



Assembly of Clamps

Before assembly, make sure that the clamps are cleaned and that bolts and nuts are greased. The bolts should be tightened gradually and evenly to the correct torque level. After the first loading the bolts should be re-tightened. We recommend that the user will tighten the bolts again after some few weeks of use. (a few days to 3 weeks depending on the amount of use)

Place the clamps like this:



Min. clamps for max work load.

Type	N-6	N-8	N-9	N-10	N-12	N-16	N-20	N-25	N-35
Wire diam mm	5-6	7-8	9	10	11-12	13-16	17-20	21-25	26-35
Min. clamps	3			4		5	6	7	

Reduce the steel rope capacity by 20%.

Lifting Equipment

Crimping Ferrule



Straight Talurit ferrule

Crimping Ferrule



Conical TK ferrule (also available with inspection hole, TKH clamp)

Special Lifting Equipment

Many lifting accessories and components are made for specific load types, e.g.:

- Custom-made lifting beams
- Pallet forks
- Steel plate clamps
- Drum lifters etc.

Checklist for Safe Lifting

- Confirm the weight of the load.
- Choose a safe and suitable lifting method.
- Consider all the angles.
- Choose suitable equipment.
- Attach the load and check:
 - the centre of gravity
 - if there is a risk of rotation
 - if there is a risk of sliding
 - that the load will stay together
- Position yourself - keep your back clear.
- Never stand or walk under the suspended load.
- Test-lift until the load just clears the ground, then check the load distribution.
- Never drag the load with equipment.
- Take note of the max. load. Never overload.
- Ensure the landing area is strong enough to support the load.

Lifting Equipment



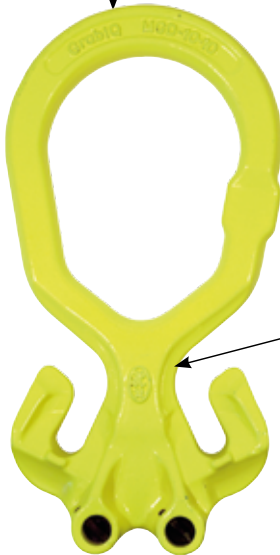
in General

Manufacturer name



Traceability code

Component code,
dimension and grade



Manufacturer
identification H32

Choosing

Types of Lifting Equipment

Check the list below every time you are facing a new lifting situation.

Checklist

- Make a good estimate of the lifting and transportation requirements.
- Find out the weight of the load.
- Choose appropriate lifting equipment.
- Decide the best way to attach the lifting equipment to the load, considering its centre of gravity and configuration.
- Choose appropriate lifting equipment with sufficient capacity. Note that the sling leg loadings rise as the angle between the sling legs increases.

Lifting Equipment Differences

The fields of application for the three main types of lifting equipment (chain, steel wire rope and soft lifting equipment) overlap.

For this reason, you may often choose the type you are most familiar with, but there are differences in properties you should be aware of:

Chain



- Wear resistant, best durability.
- Flexible, the only media possible to shorten.
- A wide range of components to choose from.
- Heat resistant (see p. 16).
- Easy to store.
- 100% recyclable.

Steel Wire Rope



- Lighter than chain.
- Usually hot-dip galvanised for best rust protection.
- Suitable for extremely heavy loads.
- 100% recyclable.
- Difficult to store.

Polyester Lifting Equipment




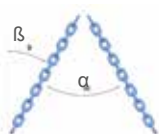
- Light weight
- Very sensitive to sharp edges.
- Sensitive to alkalis.
- Suitable for fragile goods.
- Flexible.
- Easy identification of max. load by colour.
- Easy to store.
- 100% recyclable.

Choosing

Load Table for Grade 10 Chain Slings



Working load limits in tonnes

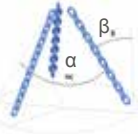
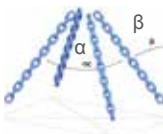
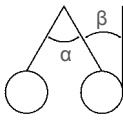
Chain diam. mm	1-leg	2-leg	
			
Chain	—————	β 0-45° α 0-90°	β 45-60° α 90-120°
6	1.5	2.12	1.5
7	2.0	2.8	2.0
8	2.5	3.5	2.5
10	4.0	5.6	4.0
13	6.7	9.5	6.7
16	10.0	14.0	10.0
20	16.0	22.4	16.0
22	20.0	28.0	20.0
26	27.0	38.2	27.0

The above apply to normal usage and equally

Equipment

In the case of asymmetric loading

- 2-legged sling calculated as the corresponding 1-leg sling.
- 3- and 4-legged sling calculated as the corresponding 1-leg sling (If it is certain that 2-legs are equally carrying the major part of the load it can be calculated as the corresponding 2-legged sling).


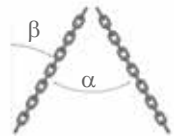
3-leg		4-leg		2-leg choke hitch	
					
β 0-45° α 0-90°		β 45-60° α 90-120°		β 0-45° α 0-90°	β 45-60° α 90-120°
3.15		2.24		1.6	1.2
4.2		3.0		2.2	1.6
5.2		3.7		2.7	2.0
8.4		6.0		4.4	3.2
14.0		10.0		7.4	5.3
21.0		15.0		11.0	8.0
33.6		24.0		17.6	12.8
42.0		30.0		22.0	16.0
57.3		40.5		29.7	21.6

loaded legs.

Choosing

Load Table for Grade 8 Chain Slings, Classic

Working Load Limits in tonnes for chain slings grade 8, according to EN 818-4

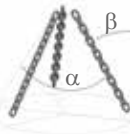
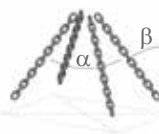

Chain diam. mm	1-leg 	2-leg 	
		β 0-45° α 0-90°	β 45-60° α 90-120°
6	1.12	1.6	1.12
7	1.5	2.12	1.5
8	2.0	2.8	2.0
10	3.15	4.25	3.15
13	5.3	7.5	5.3
16	8.0	11.2	8.0
19	11.2	16.0	11.2
22	15.0	21.2	15.0
26	21.2	30.0	21.2
32	31.5	45.0	31.5

The above loads apply to normal usage and

Equipment

In the case of asymmetric loading

- 2-legged sling calculated as the corresponding 1-leg sling.
- 3- and 4-legged sling calculated as the corresponding 1-leg sling (If it is certain that 2-legs are equally carrying the major part of the load it can be calculated as the corresponding 2-legged sling).




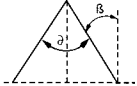
<p>3-leg</p> 	<p>4-leg</p> 	<p>Choked endless sling</p> 
<p>β 0-45° α 0-90°</p>	<p>β 45-60° α 90-120°</p>	
<p>2.36 3.15 4.25</p>	<p>1.7 2.24 3.0</p>	<p>1.8 2.5 3.15</p>
<p>6.7 11.2 17.0</p>	<p>4.75 8.0 11.8</p>	<p>5.0 8.5 12.5</p>
<p>23.6 31.5 45.0</p>	<p>17.0 22.4 31.5</p>	<p>18.0 23.6 33.5</p>
<p>67.0</p>	<p>47.5</p>	<p>50.0</p>

equally loaded legs.

Choosing






Load Table for Steel Wire Rope with Fibre Core

acc.to EN 13414-1

Working Load Limit					
Nom. diam. mm	1-leg			2-leg	
					
	Straight	Choke hitch	Basket hitch	$\alpha 0^{\circ}\text{-}90^{\circ}$ $\beta 0^{\circ}\text{-}45^{\circ}$	
3	0,09	0,07	0,18	0,12	
4	0,15	0,12	0,30	0,21	
5	0,25	0,20	0,50	0,35	
6	0,35	0,28	0,70	0,50	
7	0,50	0,40	1,00	0,70	
8	0,75	0,60	1,50	1,10	
9	0,90	0,80	1,80	1,26	
10	1,20	0,95	2,40	1,70	
11	1,40	1,10	2,80	2,00	
12	1,70	1,30	3,40	2,40	
13	2,00	1,60	4,00	2,80	
14	2,30	1,80	4,60	3,20	
16	3,00	2,40	6,00	4,20	
18	3,80	3,10	7,60	5,30	
20	4,70	3,80	9,40	6,60	
22	5,70	4,60	11,40	8,00	
24	6,80	5,40	13,60	9,50	
26	8,00	6,40	16,00	11,20	
28	9,30	7,40	18,60	13,00	
32	12,00	9,70	24,00	16,80	
36	15,00	12,00	30,00	21,00	
40	19,00	15,00	38,00	27,00	
44	23,00	18,00	46,00	32,00	
48	27,00	22,00	54,00	38,00	
52	32,00	26,00	64,00	45,00	
56	37,00	30,00	74,00	52,00	
60	43,00	34,00	86,00	60,00	

Equipment




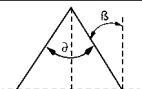
The table below shows the maximum permitted load for the most common steel rope slings, tensile grade 1770/1960 N/mm². (Ø 3-7 mm 114-tr 1770 N/mm², Ø 8-60 mm 216-tr 1960 N/mm²).

in tonnes					
	3- & 4-leg		Endless		
					
$\alpha 90^{\circ}\text{-}120^{\circ}$ $\beta 45^{\circ}\text{-}60^{\circ}$	$\alpha 0^{\circ}\text{-}90^{\circ}$ $\beta 0^{\circ}\text{-}45^{\circ}$	$\alpha 90^{\circ}\text{-}120^{\circ}$ $\beta 45^{\circ}\text{-}60^{\circ}$	Straight	Choke hitch	Basket hitch
0,09	0,19	0,13	0,18	0,14	0,36
0,15	0,31	0,22	0,30	0,24	0,60
0,25	0,50	0,35	0,50	0,40	1,00
0,35	0,70	0,50	0,70	0,55	1,40
0,50	1,00	0,75	1,00	0,80	2,00
0,75	1,60	1,10	1,40	1,20	3,00
0,90	2,00	1,40	1,80	1,50	3,60
1,20	2,50	1,80	2,40	1,90	4,80
1,40	3,00	2,20	2,80	2,30	5,60
1,70	3,60	2,60	3,40	2,70	6,80
2,00	4,20	3,00	4,00	3,20	8,00
2,30	4,80	3,50	4,60	3,70	9,20
3,00	6,30	4,50	6,00	4,80	12,00
3,80	8,00	5,70	7,60	6,10	15,20
4,70	10,00	7,10	9,40	7,60	18,80
5,70	12,00	8,50	11,40	9,20	23,00
6,80	14,30	10,20	13,60	11,00	27,00
8,00	16,80	12,00	16,00	12,80	32,00
9,30	19,50	14,00	18,60	15,00	37,00
12,00	25,50	18,00	24,00	19,50	48,00
15,00	32,00	23,00	30,00	25,00	60,00
19,00	40,00	28,50	38,00	30,00	76,00
23,00	48,00	34,00	46,00	37,00	92,00
27,00	57,00	41,00	54,00	44,00	108,00
32,00	67,00	48,00	64,00	51,00	128,00
37,00	78,00	56,00	74,00	60,00	148,00
43,00	90,00	64,00	86,00	68,00	172,00

Choosing

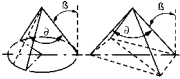



Load Table for Steel Wire Rope with Steel Core

Acc. to EN 13414-1

Lin Ø mm	Working Load				
	1-leg			2-leg	
					
Straight	Choke hitch	Basket hitch	$\alpha 0^{\circ}-90^{\circ}$ $\beta 0^{\circ}-45^{\circ}$		
3	0,10	0,08	0,20	0,14	
4	0,17	0,14	0,34	0,24	
5	0,27	0,22	0,54	0,38	
6	0,38	0,30	0,76	0,53	
7	0,53	0,42	1,06	0,74	
8	0,80	0,65	1,60	1,15	
9	1,05	0,80	2,10	1,45	
10	1,30	1,00	2,60	1,80	
11	1,50	1,20	3,00	2,20	
12	1,80	1,40	3,60	2,60	
13	2,20	1,80	4,40	3,00	
14	2,50	2	5,00	3,50	
16	3,30	2,60	6,60	4,60	
18	4,10	3,30	8,20	5,80	
20	5,10	4,10	10,20	7,20	
22	6,20	5,00	12,40	8,70	
24	7,40	5,90	14,80	10,30	
26	8,70	7,00	17,40	12,10	
28	10,00	8,00	20,00	14,00	
32	13,00	10,40	26,00	18,40	
36	16,60	13,30	33,00	23,00	
40	20,50	16,40	41,00	29,00	
44	25,00	20,00	50,00	35,00	
48	29,50	23,60	59,00	41,00	
52	35,00	28,00	70,00	48,00	
56	40,00	32,00	80,00	56,00	
60	46,00	37,00	92,00	65,00	

Equipment

The table below shows the maximum permitted load for the most common steel rope slings, tensile grade 1770/1960 N/mm². (Ø 3-7 mm 133-tr 1770 N/mm², Ø 8-60 mm 265-tr 1960 N/mm²).

Limit in Tonnes					
	3- & 4-leg		Endless		
					
$\alpha 90^{\circ}\text{-}120^{\circ}$ $\beta 45^{\circ}\text{-}60^{\circ}$	$\alpha 0^{\circ}\text{-}90^{\circ}$ $\beta 0^{\circ}\text{-}45^{\circ}$	$\alpha 90^{\circ}\text{-}120^{\circ}$ $\beta 45^{\circ}\text{-}60^{\circ}$	Straight	Choke hitch	Basket hitch
0,10	0,21	0,15	0,20	0,16	0,40
0,17	0,36	0,25	0,34	0,27	0,68
0,27	0,56	0,41	0,54	0,43	1,08
0,38	0,80	0,57	0,76	0,61	1,52
0,53	1,10	0,80	1,06	0,85	2,12
0,80	1,70	1,20	1,60	1,30	3,20
1,05	2,20	1,80	2,10	1,70	4,20
1,30	2,70	1,90	2,60	2,00	5,20
1,50	3,30	2,30	3,00	2,50	6,00
1,80	3,90	2,80	3,60	3,00	7,20
2,20	4,50	3,20	4,40	3,50	8,80
2,50	5,30	3,80	5,00	4,00	10,00
3,30	6,90	4,90	6,60	5,20	13,20
4,10	8,70	6,20	8,20	6,60	16,40
5,10	10,70	7,70	10,20	8,20	20,40
6,20	13,00	9,30	12,40	10,00	24,80
7,40	15,50	11,10	14,80	11,80	29,60
8,70	18,20	13,00	17,40	13,80	34,80
10,00	21,00	15,00	20,00	16,00	40,00
13,00	27,50	19,70	26,00	21,00	52,00
16,60	35,00	25,00	33,00	26,50	66,00
20,50	43,00	31,00	41,00	33,00	82,00
25,00	52,00	37,00	50,00	40,00	100,00
29,50	62,00	44,00	59,00	47,00	118,00
35,00	73,00	52,00	70,00	55,00	140,00
40,00	84,00	60,00	80,00	64,00	160,00
46,00	97,00	69,00	92,00	74,00	184,00

Choosing

Steel Rope Slings

When planning a lift where technical data on weight, centre of gravity etc. are known, trigonometrics may be used for calculating the maximum load on the lifting equipment. Basis for the calculation is the column for 1-legged slings, or the following formula:

$$WLL = \frac{F_{min} \times K_T}{Z_p \times g}$$

Where

F_{min} = The minimum breaking load of the rope
in kN

K_T = allowed factor for the efficiency of the
termination

Z_P = 5 (Safety Factor)

g = 9,81

The calculation yields the max. load on each leg when the lifting angle is 0°, rounded off to the nearest hundred kgs.

Max. Load for Multi-legged Equipment

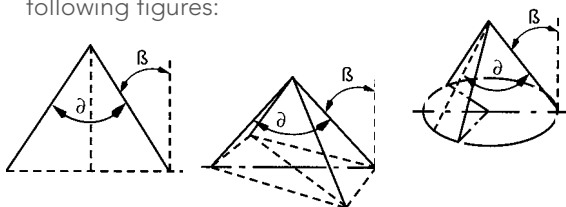
If the table is not used, the max. load must be calculated. The result of the above formula, representing the max. load on a 1-legged sling, shall be multiplied by a factor according to the following table:

Equipment

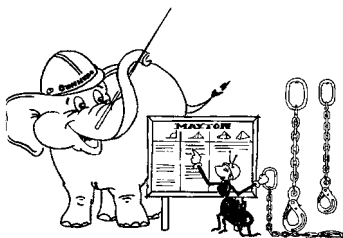
Lifting angle α / β	Factor KL	
	Number of legs	
	2	3-4
0-90°	1.4	2.1
90-120° / 45-60°	1.0	1.5

KL = is the leg factor related to the number of legs and the angle to the vertical.

The lifting angle (α) is measured according to the following figures:



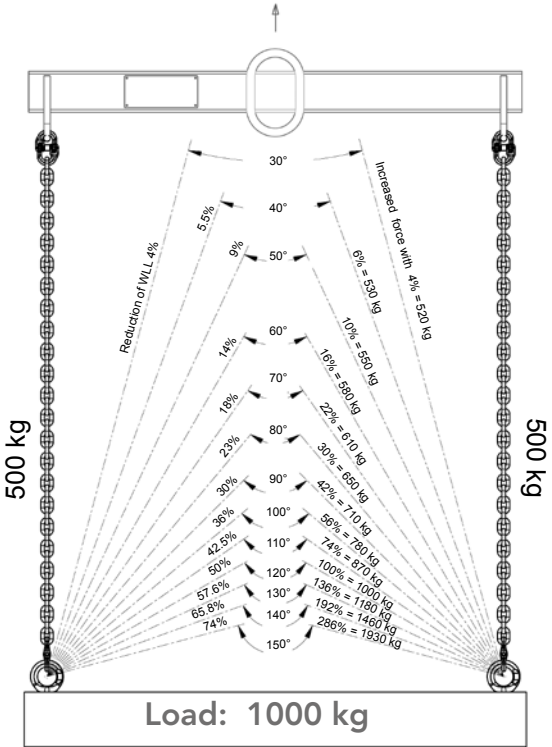
Never exceed lifting angle α 120° or β 60°.



Never exceed the stated max. load at the lifting angle involved. Always check the rated capacity of the equipment before lifting, not after the catastrophe.

Choosing

Effect of Angles

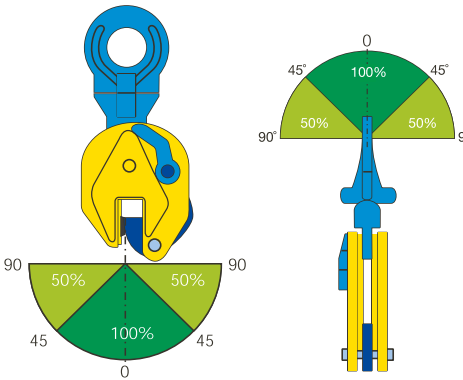


When the top angle is increased, the force in the leg will increase. Subsequently the WLL must be reduced accordingly.

Equipment




For safe lifting use different types of Lifting Clamps when handling steel plates, tubes and beams. It is important to carefully read enclosed instruction regarding loads and angles.

Minimum 10% of WLL is normally required to be able to use Lifting Clamps.



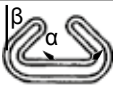


Choosing

Load Table for Soft Lifting Products

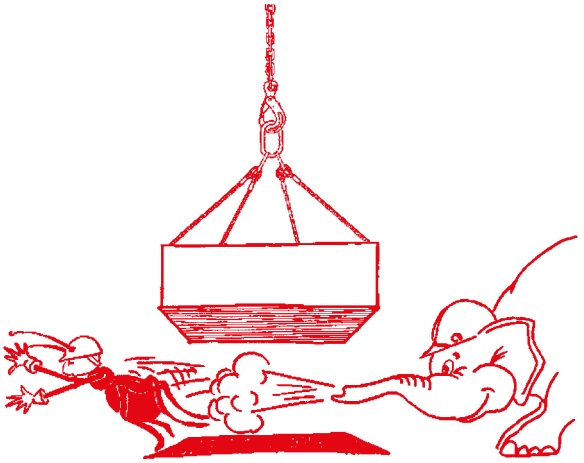
	Straight lift	Choked hitch	Basket	
				
			Parallel	β 0-45° α 0-90°
Cover colour	Working Load			
	1	0.8	2	1.4
Purple	1	0.8	2	1.4
Green	2	1.6	4	2.8
Yellow	3	2.4	6	4.2
Grey	4	3.2	8	5.6
Red	5	4	10	7
Brown	6	4.8	12	8.4
Blue	8	6.4	16	11.2
Orange	10	8	20	14
Orange	12	9.6	24	16.8
Orange	15	12	30	21
Orange	20	16	40	28
Orange	25	20	50	35
Orange	30	24	60	42
Orange	35	28	70	49
Orange	40	32	80	56
Orange	50	40	100	70
Orange	60	48	120	84

Equipment

WLL in tonnes according to EN 1492-1 for flat woven webbing slings and EN 1492-2 for roundslings.

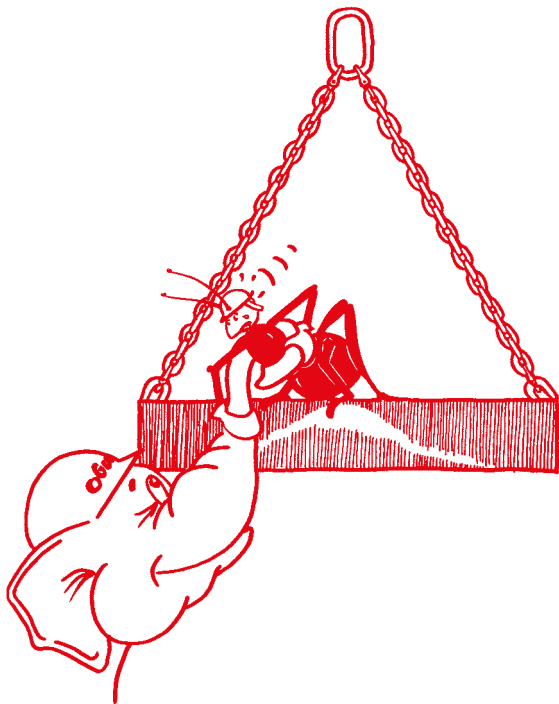
hitch	2-leg		3- and 4-leg	
				
β 45-60° α 90-120°	β 0-45° α 0-90°	β 45-60° α 90-120°	β 0-45° α 0-90°	β 45-60° α 90-120°
Limits in tonnes				
1	1.4	1	2.1	1.5
1	1.4	1	2.1	1.5
2	2.8	2	4.2	3
3	4.2	3	6.3	4.5
4	5.6	4	8.4	6
5	7	5	10.5	7.5
6	8.4	6	12.6	9
8	11,2	8	16.8	12
10	14	10	21	15
12	16.8	12	25	18
15	21	15	31.5	22.5
20	28	20	42	30
25	35	25	52.5	37.5
30	42	30	63	45
35	49	35	73.5	52.5
40	56	40	84	60
50	70	50	105	75
60	84	60	126	90

When Lifting

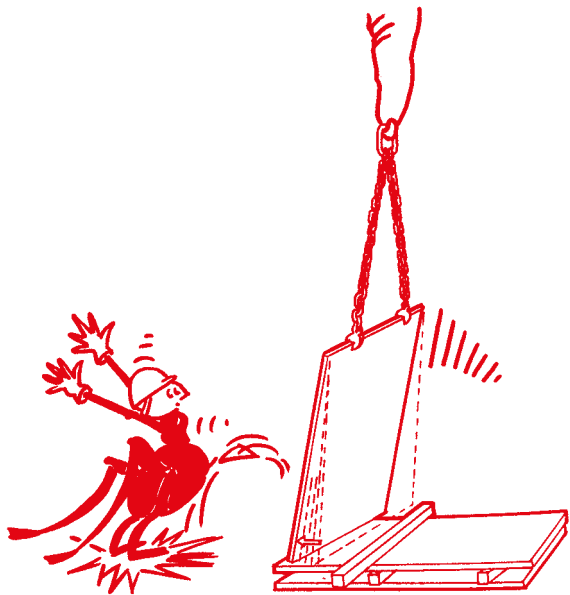


Never stand under the suspended load. People within the working area of the lifting equipment must not be exposed to danger when the load is lifted or moved.

Do not ride on the load.



When Lifting



Be careful where you stand in relation to the load when lifting. The load might slip and cause injury. Keep your back clear.

Lift vertically. Otherwise the load will swing horizontally when clearing the ground.



When Lifting



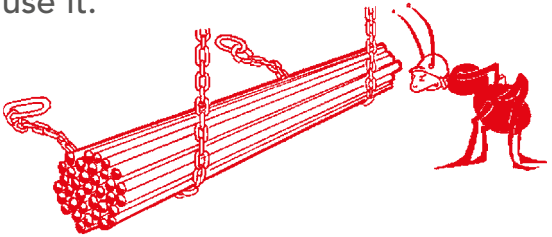
Avoid snatch loading. Do not expose the equipment to unnecessary strain, for example sudden jerks.

Never use lifting equipment for dragging goods.

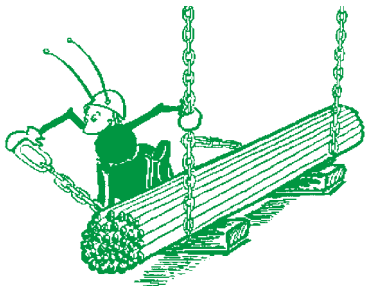


When Lifting

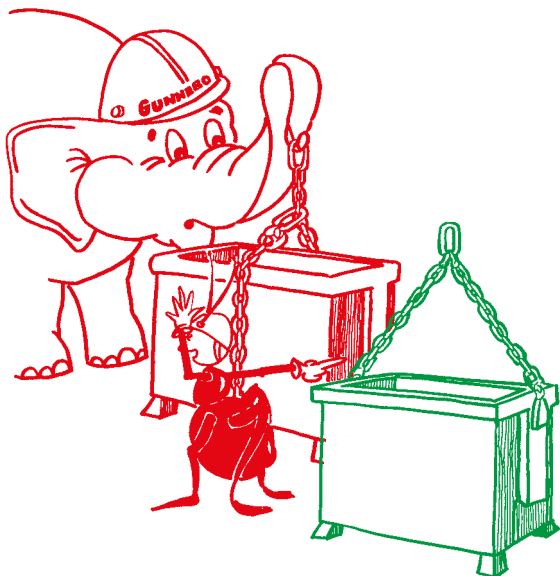
Treat chain with care. Do not pull it clear from under the load without using spacers. The chain can easily become damaged and a weakened chain might break next time you use it.



Always position the load in a way that makes it possible to remove the lifting equipment without using force.

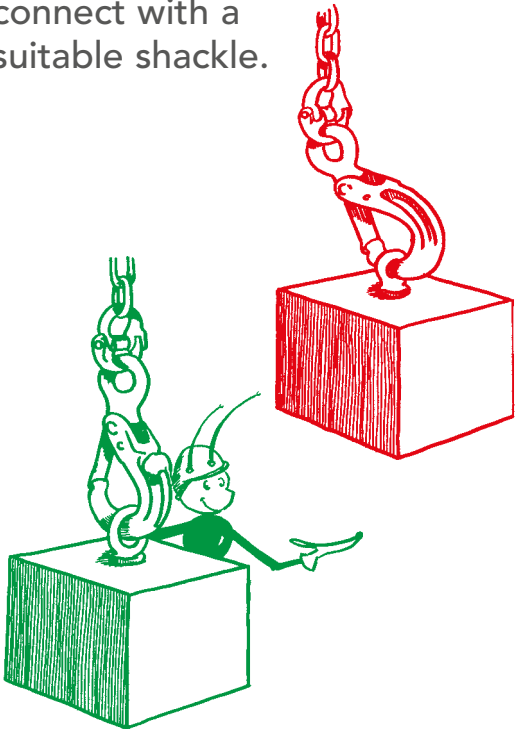


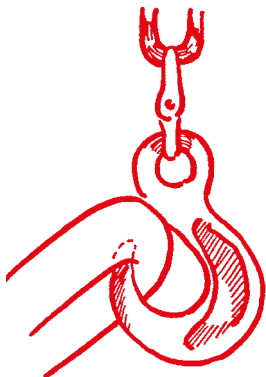
Avoid choke-hitching, as loads can tip over.



When Lifting

Never point load the hook. Use an eyebolt with a larger eye or connect with a suitable shackle.

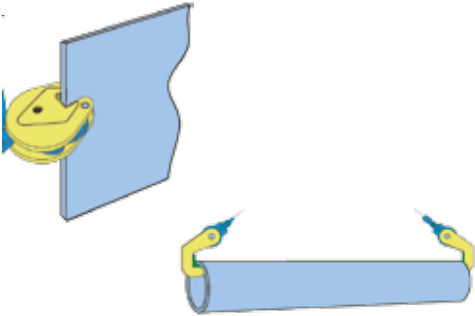




Never force a master link on to a hook. Use a hook with a larger opening. Hooks should be fitted with latches, whenever practicable.

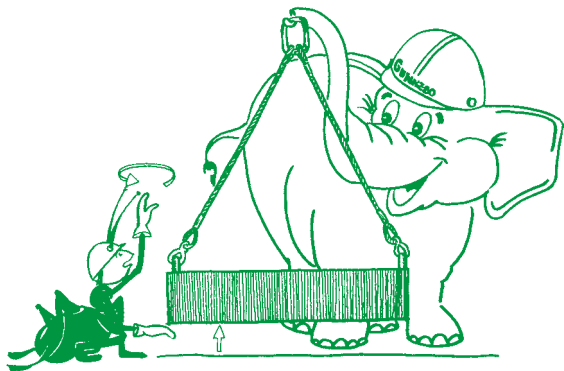


When Lifting



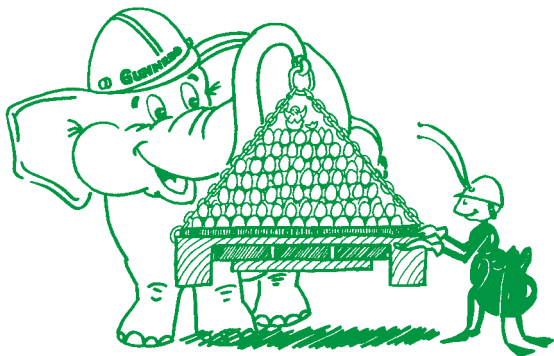
Use sheet-metal clamps when lifting sheet-metal packs. Point loading of hooks is not allowed.

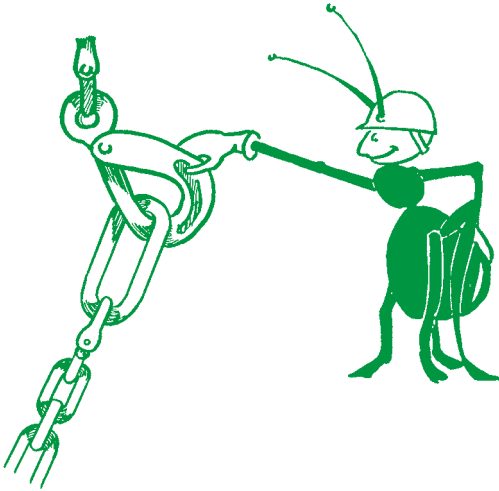
Test-lift by carefully lifting the load just clear of the ground. Check the load security and angles before continuing. When frequently using a sling to its maximum load, we recommend increasing the sling size by one dimension.



When Lifting

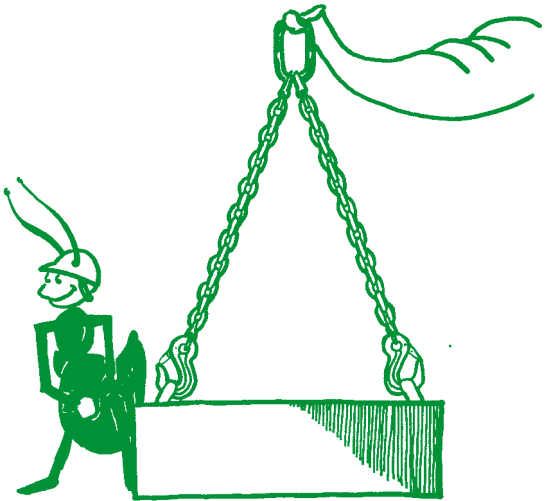
Handle the load with care.
Raise and lower it gently and
avoid snatching.





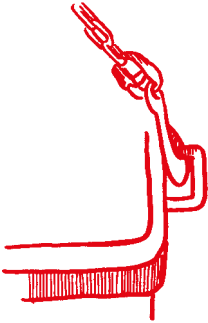
Grip the hook by its sides with your fingertips only, never with your entire hand, otherwise your fingers might be crushed.

When Lifting



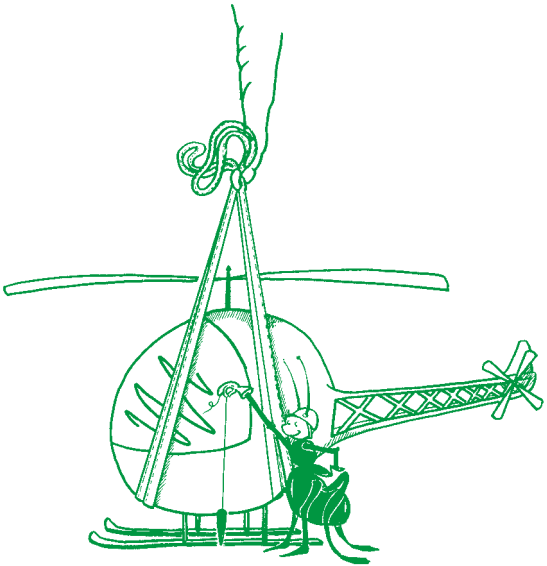
When connecting to lifting eyes, make sure that the hooks/eyes are turned the right way (facing outwards). A rotating lifting point (RLP) will automatically adjust itself to the right position.

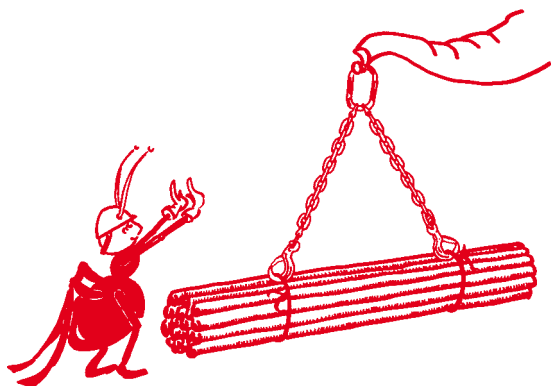
Do not side load the hook.



When Lifting

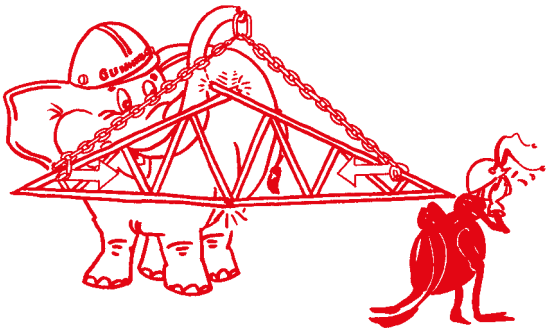
Make sure that the load is distributed as evenly as possible.





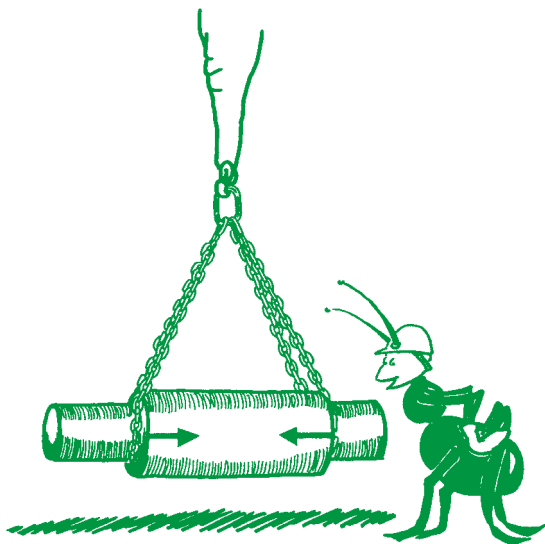
Never lift with ropes or bands intended for wrapping. They are only intended for keeping the goods together, not for lifting.

When Lifting



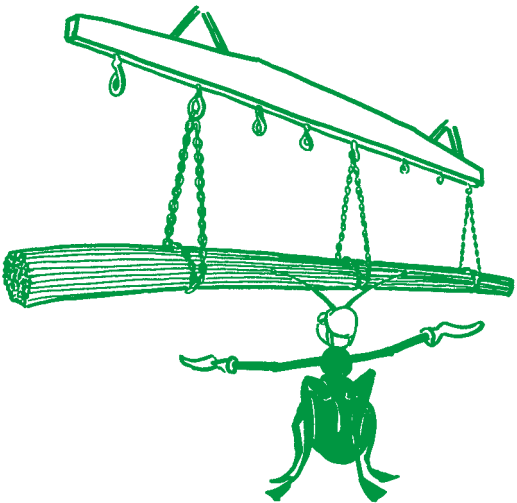
Note that the pressure increases as the lifting angle grows. Use the pressure correctly.

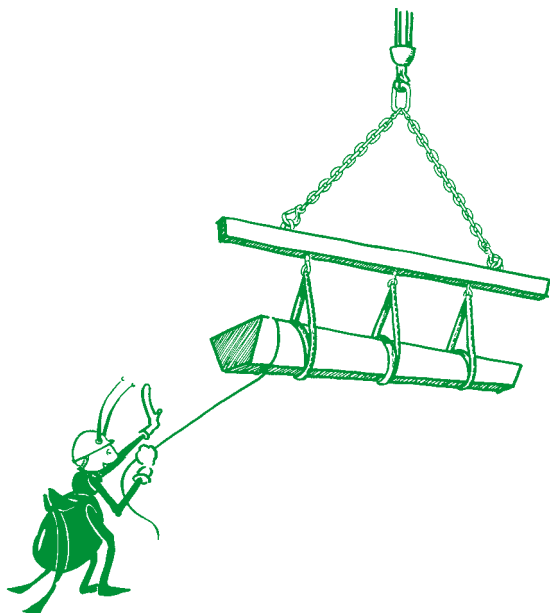
Correct usage of pressure.



When Lifting

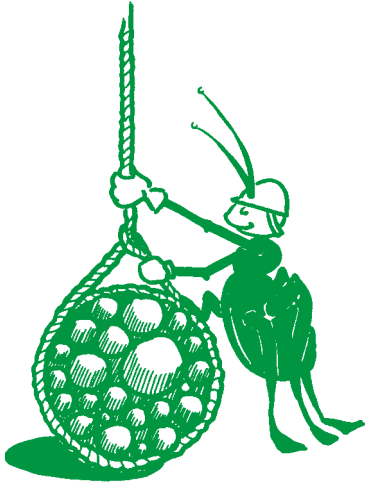
Use a spreader beam. When using basket slings, make an extra turn around the load to get a firm hold. This effectively prevents the load from sliding.





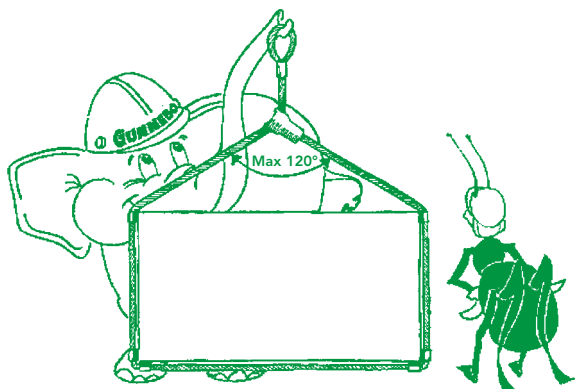
Use a steering rope to control rotation when lifting long loads.

When Lifting

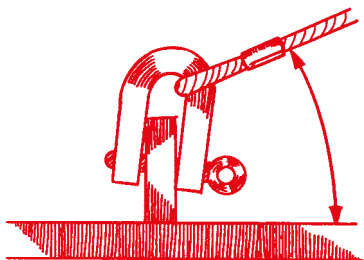


Loads consisting of separate parts should be secured by wrapping the lifting sling(s) around twice to prevent the load from falling apart.

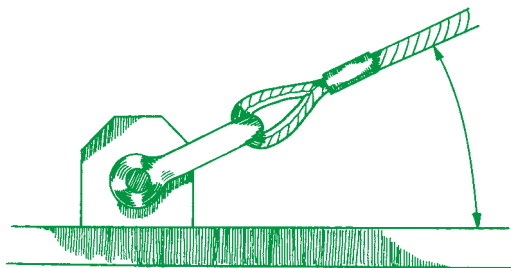
The internal angle of a multi-legged lifting sling should never exceed 120° , or 60° to the vertical. Use edge protection if there are sharp edges. When choke hitching, reduce the WLL by 20%



When Lifting



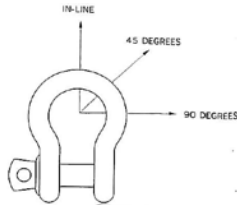
Incorrect alignment causes excessive strain on this shackle when lifting or pulling.



Correct alignment.
(or use RLP/ERLP)

Side load should be avoided as the products are not designed for this purpose. When side loading is unavoidable the working load limit of the shackle must be reduced

<u>Load angle</u>	<u>Reduction for side loading New Working Load (WLL)</u>
0°	100% of original WLL
45°	70% of original WLL
90°	50% of original WLL

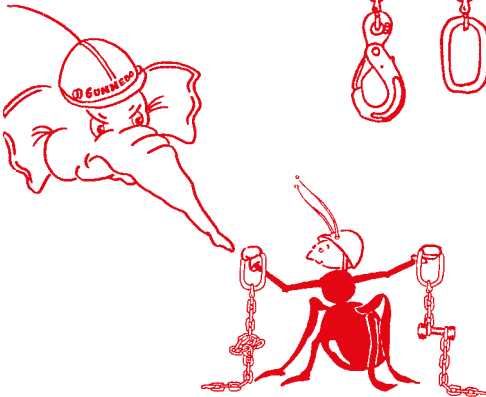


Avoid applications which may cause the shackle pin to rotate.



When Lifting

A chain is never stronger than its weakest link. Do not repair broken chains with wires, bolts or by welding. Replace the entire damaged chain length.



Chain

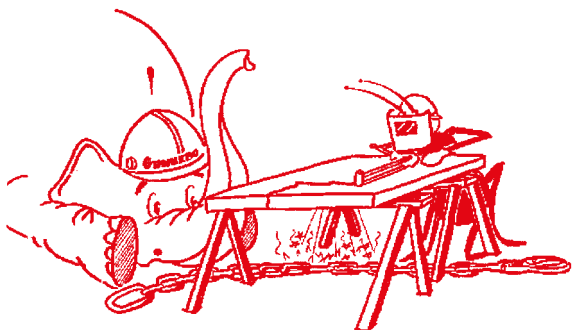
When lifting with several lifting slings in a hook, the lifting angle must not exceed 90°.

The hook can be damaged and there is risk of unhooking.

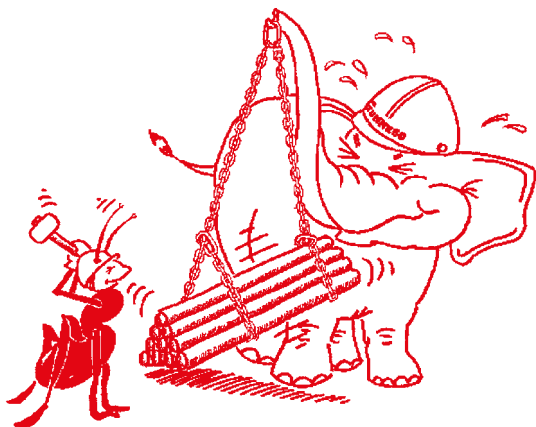


When Lifting

When welding or cutting, make sure that the lifting equipment is not affected by the heat involved, as it can damage the heat treatment of the chain.

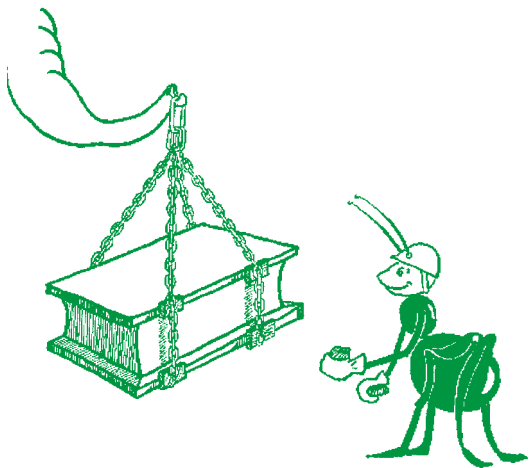


Chain



Do not handle chain violently,
especially when under load.

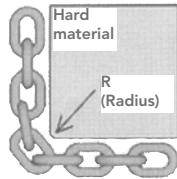
When Lifting



Use edge protection to prevent sharp edges from damaging the lifting equipment. A rule of thumb is that the radius of the edge should be $>2 \times$ chain diameter. When lifting with chain directly on lugs we recommend that the lug diameter $>9 \times$ chain diameter. With a lug diameter which is less than stipulated above, the WLL must be reduced by 50%.

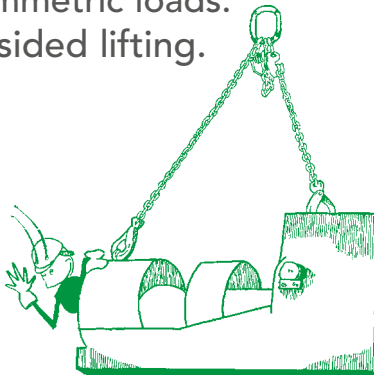
Chain

Use edge protectors to prevent sharp edges from damaging the chain. If lifting over sharp edges reduce the working load with the following reduction factor.



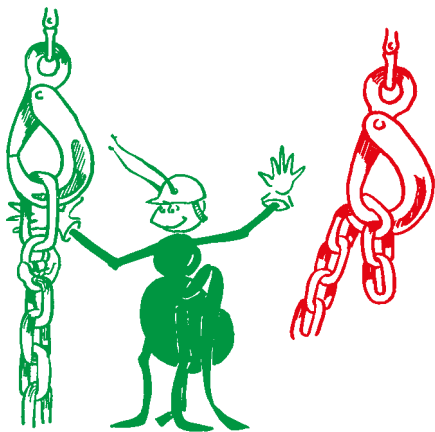
Edge load	$R > 2 \times \text{chain } \varnothing$	$R > \text{chain } \varnothing$	$R < \text{chain } \varnothing$
Reduction factor	1.0	0.7	0.5

Use shortening hooks when lifting asymmetric loads. Avoid lopsided lifting.



When Lifting

Do not connect directly to the chain by forcing a link on to the hook. Always use a master link.



Chain

Never lift with a twisted chain.

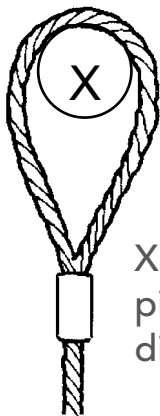
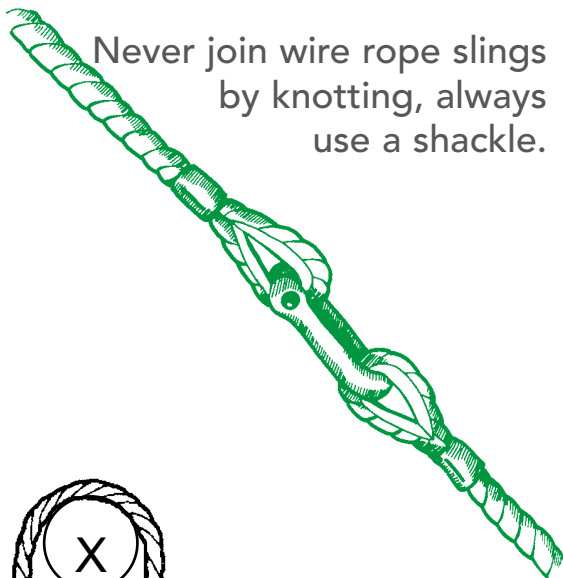
Severe environments
Chain and components in grade 8 and grade 10 must not be used in alkaline ($> \text{pH}10$) or acidic conditions ($< \text{pH}6$).

Comprehensive and regular examination must be carried out when used in severe or corrosive inducing environments, if using in an uncertain situation, contact the manufacturer. Remember - The user is responsible for incorrect handling or failure to comply with applicable regulations.



When Lifting Steel

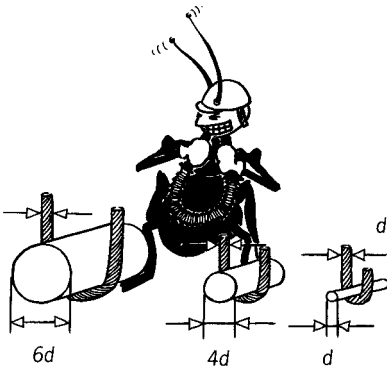
Never join wire rope slings by knotting, always use a shackle.



X = Recommended pin diameter 4-8 x wire diam. for best endurance.

Wire Rope

The strength of steel wire rope is reduced by bending.
The de-rating is related to the diameter of the bend as follows
(d = diameter of the steel rope):



$$6d = 100\%$$

$$5d = 85\%$$

$$4d = 80\%$$

$$3d = 70\%$$

$$2d = 65\%$$

$$1d = 50\%$$

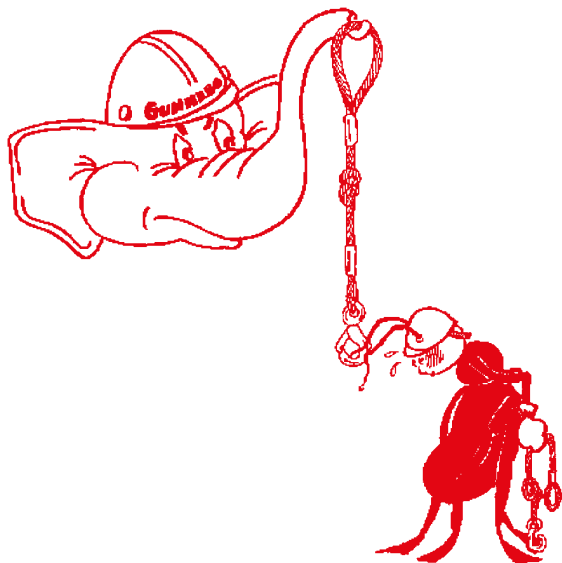
When Lifting Steel



Use protective gloves when handling steel wire rope.

Wire Rope

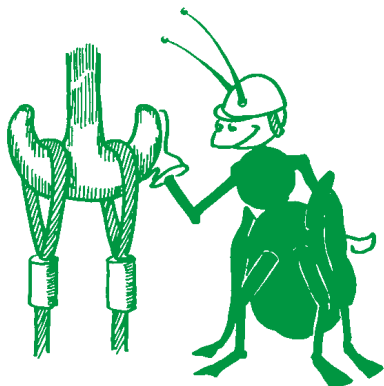
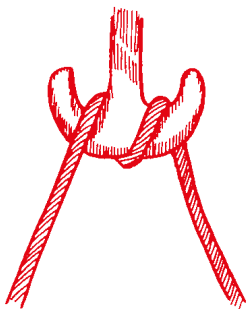
Never shorten steel rope
by knotting.



When Lifting Steel

Do not wind the rope around a ramshorn hook to prevent slipping.

The bending will be too sharp and cause damage to the rope.



Wire Rope



Use a suitable spacer to prevent the ropes from sliding. Avoid sharp bending of the rope. The load can slip if the lifting points slide. Sharp bending damages the rope.

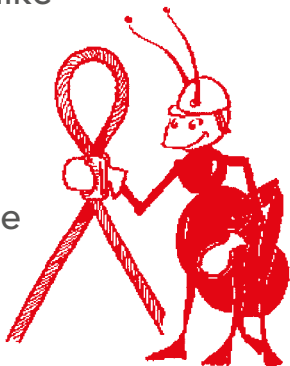
When Lifting Steel



Bending like this will immediately destroy the rope. Use lifting slings with hooks instead.

Wire Rope

A two-legged lifting sling with a single ferrule fitted like this can be lethal. The tearing force at the clamp grows with the lifting angle.



When Lifting Steel

Do not expose steel wire rope to excessive heat or cold.

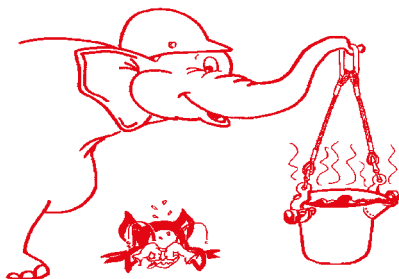
Steel wire rope with fibre core and aluminium ferrule, max 100°C.

Steel wire rope with steel core and aluminium ferrule, max 150°C.

Steel wire rope with steel core hand spliced, max 150°C = 100 % of WLL, max 200° = 90 % of WLL, max 400°C 60%, of WLL.

Do not use at temperatures below -40°C without consulting the manufacturer.

According to EN 13414-2



Wire Rope

Use edge protection to prevent sharp edges from damaging the lifting equipment.



When Lifting Soft

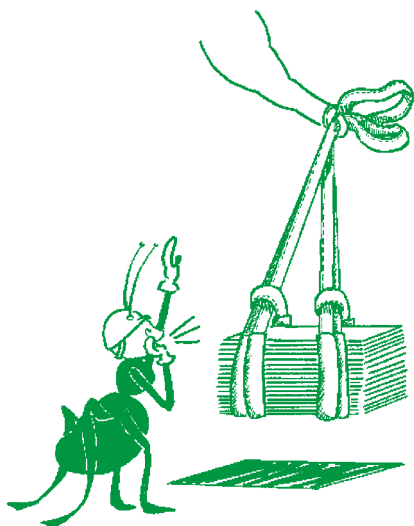
Use hooks with rounded edges and an inner radius not less than the webbing width.



Recommended contact areas
for Polyester roundsling 7:1

Tonnes	Min. pin diameter	Min. free contact width
1	23 mm	35 mm
2	32 mm	40 mm
3	35 mm	47 mm
4	38 mm	50 mm
5	42 mm	53 mm
6	46 mm	60 mm
8	50 mm	67 mm
10	56 mm	75 mm
12	58 mm	80 mm
15	70 mm	96 mm
20	78 mm	104 mm
25	84 mm	112 mm
30	90 mm	120 mm
35	96 mm	128 mm
40	102 mm	136 mm
50	120 mm	160 mm

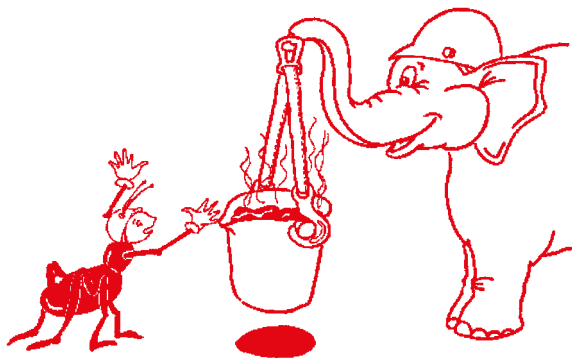
Note: If smaller dimensions are used it will affect the safety because the roundsling may become damaged. In practice, the WLL (maximum load) must be reduced.



Soft slings are very sensitive to cutting. Lift vertically and use protective sleeving and/or edge protection to keep the equipment from directly contacting sharp corners and edges.

When Lifting Soft

Polyester lifting strops and slings are made of synthetic fibre and must not be used with loads or ambient conditions exceeding 100°C. Hot materials require the use of steel wire rope or chain.

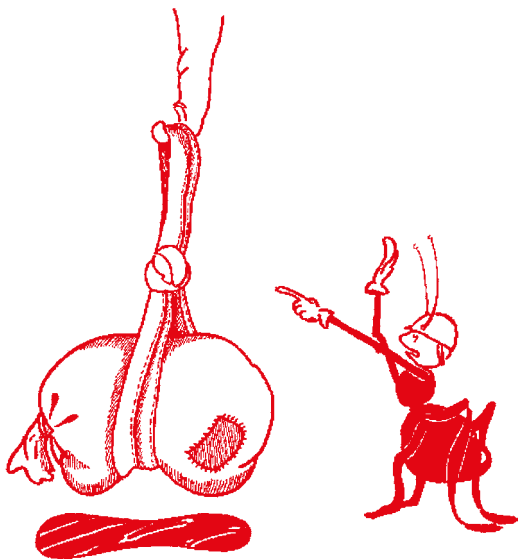




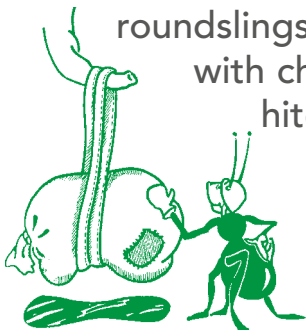
Keep soft lifting equipment away from alkalis such as caustic soda and ammonia. The colour fades and the slings disintegrate.

When Lifting Soft

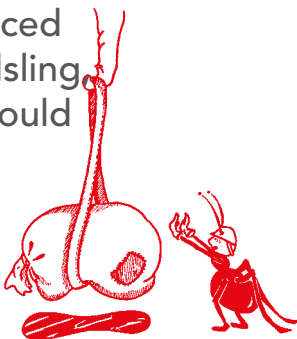
Do not shorten soft lifting slings by knotting. They quickly weaken. Avoid overloading.



Note that the maximum load of roundslings in connection with choke or basket hitching assumes vertical legs (see table on p. 48-49).



If the load is placed inside the roundslings, the max load should be calculated as straight lifting (see table on p. 48-49)



When Lifting Signal



Start



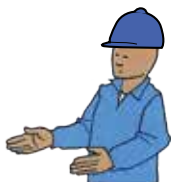
Stop



Raise slowly



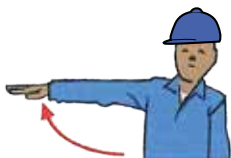
Raise



Vertical space



Horizontal space

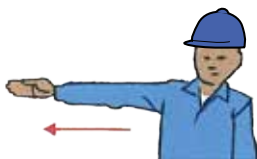


Stop

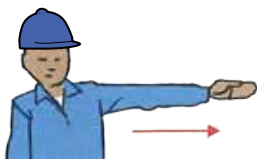


Emergency stop

Schedule



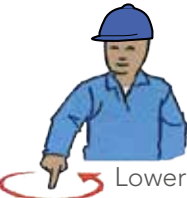
To the left



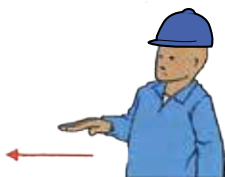
To the right



Lower slowly



Lower



Move to



I did not understand
the signal



Alternatively, stop and
emergency stop

Maintenance

Regular inspection

Lifting equipment must be checked on a continual basis and be inspected in accordance with standards and industrial safety legislation. The responsibility for carrying this out rests with the site management.

Regular inspection includes functional checks, as well as the adjustments and maintenance that may be required from time to time.

Inspections must be carried out by people possessing sufficient knowledge of design, use and maintenance of lifting equipment.

Damaged or worn equipment must be reported to the site management, who in turn, must arrange for the equipment to be taken out of use and then be repaired or replaced.

Lifting equipment having been stored for a period of time must be inspected before being taken back into use, according to local statutory requirements.

In addition to regular inspection, which must be thoroughly recorded, everyone working with lifting equipment must be on guard and inspect the equipment before every use.

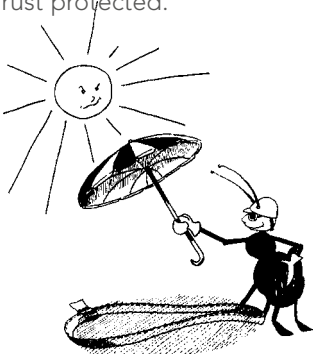
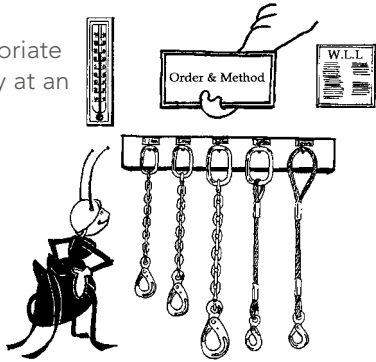
New equipment should be registered and controlled before use.

Storage

Dragging or dropping the equipment can cause damage and should be avoided.

Arrange for appropriate storage, preferably at an even temperature.

Good storage preserves the equipment and helps you find what you need faster. Chain and steel wire rope stored for long periods should be rust protected.



Soft slings and strops should not be exposed to bright sunlight for any long periods of time. Choose a storage location accordingly.

Maintenance

Inspection

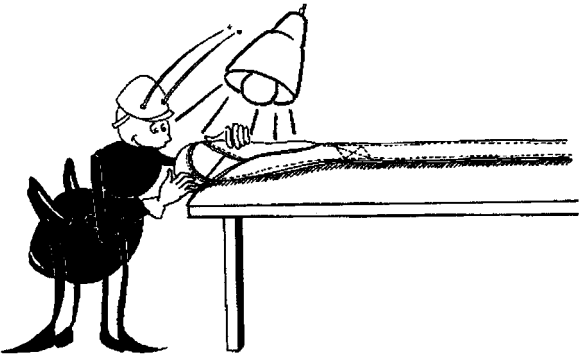
Lifting equipment must be inspected regularly. Good lighting without shadows is necessary during inspection.

Check

Check / inspect the equipment regularly.
Make sure that repairs are made when needed.



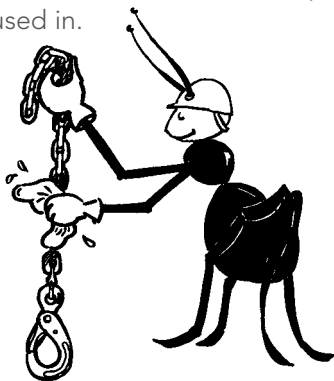
When inspecting soft lifting slings or strops: put the equipment, stretched to its full length, on a table. Turn eyes on the equipment inside out and inspect for wear or damage. Inspect webbing one side at a time. When inspecting endless slings it is recommended to run them around a revolving pin, or similar.



Maintenance

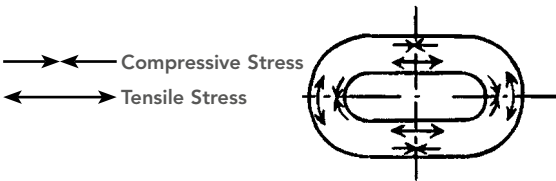
Before inspecting a chain it must be thoroughly cleaned of dirt and oil. All cleaning methods that do not damage the base material are acceptable. No methods that cause hydrogen embrittlement or overheating are allowed, nor methods that remove base material or move material in a way that might hide cracks or other visible damage.

In some countries, according to legislation, when a chain sling is older than 25 years it should be noted in the register. There is risk of fatigue, environmental impact etc. Consider reviewing the history and current use of the chain sling e.g. How often and how much you lift, the environment it has been, and is, currently used in.



Chain

The illustration below, showing the distribution of strain in a link, can be of guidance for decisions on chain wear and damage.



The stress distribution in the link is very favourable.

Tensile stresses are the most important to chain strength. They are concentrated to the most protected areas of the link: the outside of the short side and the inside of the long side.

The relatively harmless compressive stresses are distributed the opposite way around, i.e. where link wear is at its maximum. Here the link can wear down significantly without any major effect on chain strength.

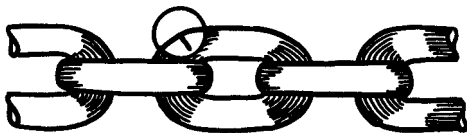
Keeping strain distribution in mind, we shall take a look at some examples of wear and damage on the following pages.

Maintenance

Cracks / Gouges

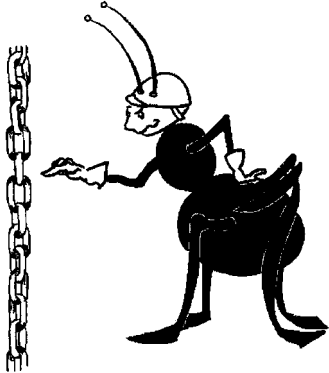


Chain showing cracks and gouges must be discarded. Transverse cracks are the most serious.



Deformation

When a twisted chain is overloaded the resultant twist becomes permanent. The chain must be replaced.



Chain containing bent links must be replaced.



If the corrosion runs deep, replacement is recommended.

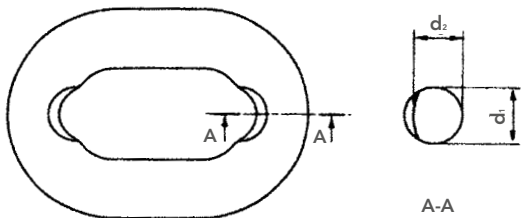
Maintenance

According to EN 818-6

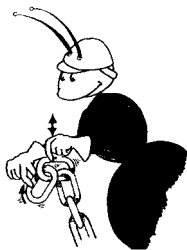
Chain

Inter-link wear, as measured by taking the diameter indicated (d_1) and one at right angles, (d_2) is acceptable until the mean of these diameters has been reduced to 90% of the nominal diameter (d_n) (see figure) provided.

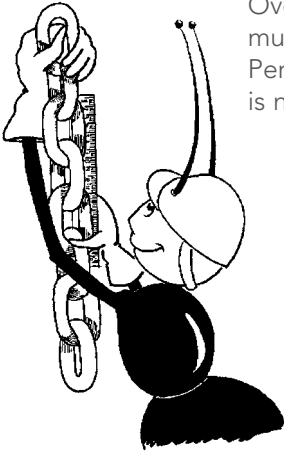
$$\frac{d_1+d_2}{2} > 0,9d_n$$



The chain must be slackened and the adjoining links pushed back to allow inspection of the contact surfaces of each link.

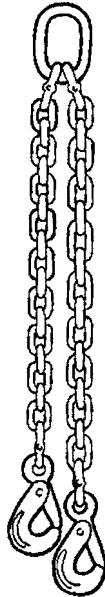


Elongation



Overloaded equipment must be discarded. Permanent elongation is not permitted.

If the lengths of the legs of a multi-legged chain sling are unequal, overload should be suspected. Use chain gauge or caliper square to check the links. If the links are elongated, discard the equipment.

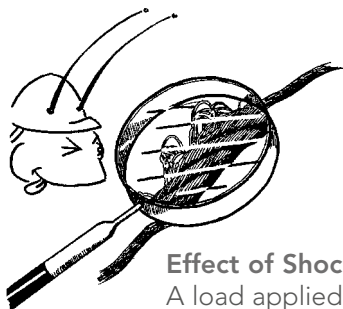


Maintenance

Steel Wire Rope

Rust

Remember that even galvanised steel wire rope may rust. Bend the rope to expose the inner strands and core to inspection.

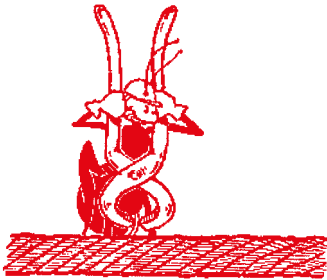


Effect of Shock Loading

A load applied or released quickly (shock) can damage a steel wire rope as the adjacent picture shows. Such a rope must be discarded.

Broken Wires

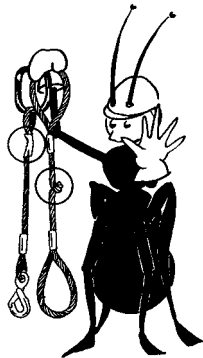
Broken wires weaken the rope and cause injury.



The correct way to remove a broken wire is to bend it back and forth until it breaks.

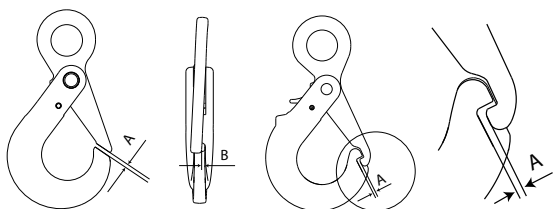
Do not use pliers.

Ropes with excessive wear, broken wires, kinks, crushing or damaged ferrules must be removed from service.



Maintenance

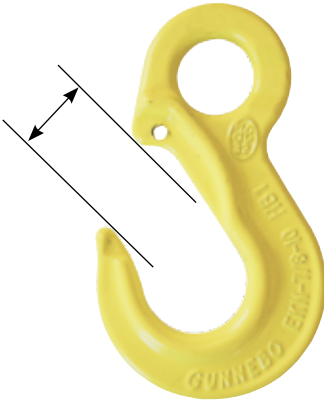
Components



This table indicates the maximum permissible clearance between hook and latch in horizontal and vertical direction.

Size	Maximum A, mm (clearance without load the spring)	Maximum B, mm (only BK-hook)
Grade 8 / 10	Service control	Service control
BK/OBK-6	2.2	3.5
BK/OBK-7/8	2.7	4.5
BK/OBK-10	3.0	6.0
BK/OBK-13	3.3	7.0
BK/OBK-16	4.0	9.0
BK/OBK-18/20	5.5	10.0
BK/OBK-22	6.0	11.0
BK-26	6.5	12.0
BK-28	7.0	13.0
BK-32	7.0	13.0

- Check the function of hook latches, locking pins/collars on coupling links etc.
- Check hooks thoroughly for widened apertures, which indicate abnormal loading.

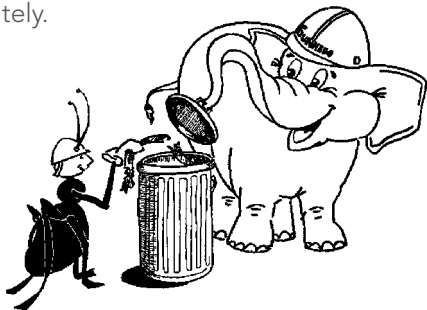


- The increase in hook aperture must not exceed 10%.
- No elongation is permitted for coupling components, such as G-links, master links and Berglok links.
- Wear must not exceed 10%.
- Examine all lifting components thoroughly for transversal cracks, wear and other damage.

Maintenance

Soft Lifting Equipment

Discard the equipment if a load bearing cord is broken. Repair protective sleeving when needed. Cut discarded slings and straps immediately.



Roundslings



The sleeving has been torn apart by being dragged along a rough surface. The load bearing cord is intact. Let the manufacturer attempt to repair the sling, or discard it.



A cut as a result of sharp edges combined with heavy loads in movement. A load bearing cord is broken. Discard the sling.

Webbing Slings and Straps



The warp is split as a result of lopsided loading. The strength is not affected unless the warp is broken. The equipment can be repaired by the manufacturer or be discarded.



A hardened, shiny surface is a sign of damage caused by severe friction. Webbing can easily slide, causing friction, when the lifting angle is wide. Folding the webbing at the damage makes it easier to see the extent of it.



If the damage is wider than 5% of the webbing width the equipment must be discarded.

Maintenance

Keeping a Register

Keeping a proper register is important to safe lifting. The register must describe the equipment and list its identity markings.

Intervals for inspection and testing should be determined and entered into the register.

The condition of the equipment and all test results must be recorded after every inspection.

The reason for, and a description of, every repair must also be recorded.

The register is intended as a continuous description, ensuring that the equipment is properly inspected, tested and maintained and that it is currently in a good condition for use.



Maintenance

Inspection Planning

Master Links

Material wear must not exceed 10%. Permanent elongation is not permitted. File away small, sharp cuts and burrs. Note: In case of heavy deformation the link must be discarded.

Coupling Links

Material wear must not exceed 10%. Permanent elongation is not permitted. File away small sharp cuts and burrs. Failure to pivot is a sign of previous overload. Make sure that the load pin is locked in position and that the locking pins (CLS / BL) securely lock the load pin.

Chain

Material wear must not exceed 10%. Wear is defined as the reduction in average diameter of the chain material, measured in two transversal directions. See page 110.

Permanent chain elongation is not permitted. File away small sharp cuts and burrs.

Hooks

Material wear must not exceed 10%. The maximum permissible increase in hook opening due to wear is 10%. File away small sharp cuts and burrs.

Steel Wire Rope Slings

Steel wire rope slings with kinks, excessive broken wires or damaged ferrules must be discarded. Concentrated wire breakage on one strand should not exceed 3 wires. Over a length of 6 x diameter, maximum 6 broken wires or over a length of 30 x diameter, maximum 14 randomly distributed broken wires. Note that steel wire rope should be opened up to expose the inner strands and core to inspection. Break off broken wires by repeated bending or tuck the wire back into the strand.

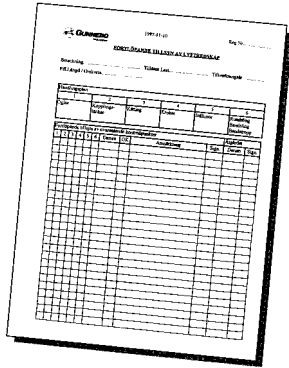
Roundslings / Webbing Slings and Straps

Roundslings: When holes in the protective sleeving expose the loadbearing fibres to contamination, the sling should be discarded. If there are holes in the sleeving and broken load-bearing cords, the sling must be discarded.

Roundslings must also be examined by hand for lumps, indicating fibre breakage. Webbing slings and straps:

If there is damage from friction, the equipment must be discarded. If eye sleeving is worn out: discard or repair.

If edge damage exceeds 5% of the webbing width, the equipment must be discarded. Check that the seams are intact.



The form is titled "ADRIKORANEN ILLASAVASTOIKUNNAN" and includes fields for "Seuranta" (Inspection), "Päivä" (Date), "Aika" (Time), and "Paikalla" (Location). It contains a table with columns for "Käyttö" (Use), "Käyttö" (Use), "Käyttö" (Use), "Käyttö" (Use), "Käyttö" (Use), and "Käyttö" (Use). Below this is a large grid for recording inspection results, with columns for "Käyttö" (Use), "Käyttö" (Use), "Käyttö" (Use), "Käyttö" (Use), "Käyttö" (Use), and "Käyttö" (Use).



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Tel: +46 21 83 82 00

E-mail: export@gunneboindustries.com

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Gunnebo Industries Pty Ltd, Australia

E-mail: general.info@gunneboindustries.com.au

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E-mail: info@gunnebolifting.co.za

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