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<p>Document title</p> <p>User Manual for steel rope equipment</p>
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User Manual for steel rope equipment
TRANSLATED FROM ORIGINAL DOCUMENT

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User Manual for steel rope equipment
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1 Introduction

This user guide is developed according to requirements set in the Machinery Regulation EU. The guide applies to lifting tools using steel wires with tensile strength 1770 or 1960 N/mm². With or without thimble, thimble eye, quad assembly, hooks or shackles.

This user guide only applies to steel wire tools manufactured by:

Kolos Lifting AS
Skvadronvegen 29
4050 Sola

Lifting equipment made of steel ropes contained in this user guide is meant for lifting various equipment, and is used between the crane hook and the load.

Steel ropes are manufactured with 1, 2, 3 and 4 parts, with or without single leg slings, including casing sling. The tools can be manufactured according to the Machinery Regulation EU, NORSOK R-003 and/or DNV-GL-ST-E271. The production standards will be identifiable on the compliance declaration, certificate and data label (see section 1.2 data plate).

The recommendations contained in this guide shall not be prioritized above the company's existing safety rules or safety regulations or OSHA regulations. If a rule in this guideline conflicts with a similar rule implemented by the company in question, the strictest rule should take precedence. Thorough insight into the information of this user guide should provide a better understanding of safe work routines and thus a greater safety margin for persons and equipment.

It is the responsibility of the owner/user to assemble, use, inspect and maintain the product according to all applicable standards and regulations. If the product is assembled as part of a lifting system, it is also the responsibility of the owner/user to meet applicable standards for other types of equipment being used.

Only authorized and qualified personnel who have read and demonstrated their understanding of this guide and its supporting documentation, and who are familiar with correct use of the product, should be allowed to operate this equipment.

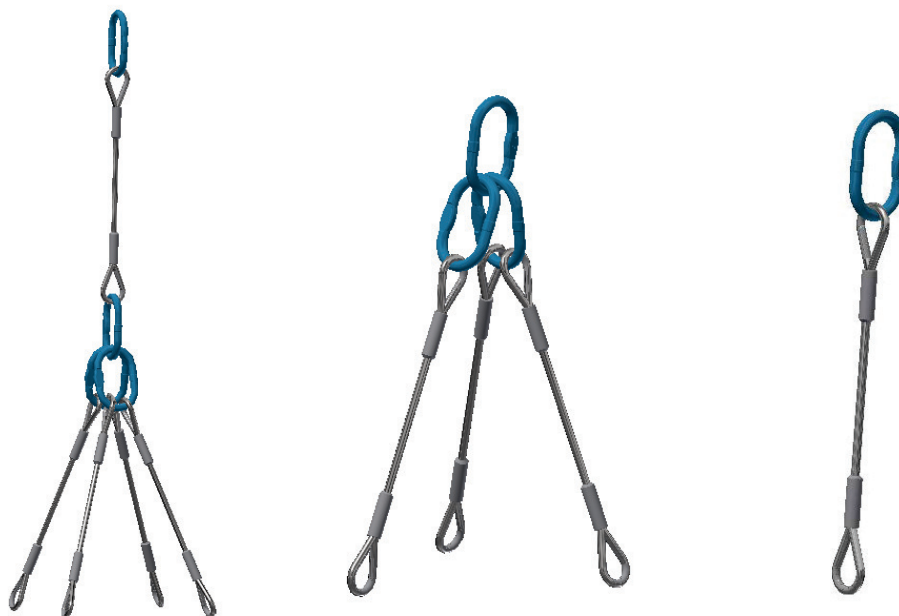


Figure 1: From the left: 4-part sling with fore-runner, 3-part sling and 1-part sling.

User Manual for steel rope equipment
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1.1 Abbreviations and definitions

- Work angle – the angle between the leg and the vertical line.
- d – the diameter of the steel rope.
- DNV-GL – Classing company.
- DNV-GL-ST-E271 – Standard for the certification of offshore containers.
- EWL – Effective Work Length.
- NORSOK R-002 – Standard for lifting equipment in the petroleum industry.
- WLL – Work Load Limit (The largest work load permitted)



Figure 4: Work length.

1.2 Identification tag

Steel rope equipment is delivered with one of three different types of labels or data plates.

Tools delivered according to the Machinery Regulation, which also defines the minimum requirements for all tools, will at least have the following labels:

- Label to identify the manufacturer, Kolos
- Serial number or batch number, to identify the documentation with equipment.
- The greatest work load permitted, WLL at the specified angle.
- Number of parts and the size of the forerunner sling and equipment.
- CE label.
- Production date.

Tools delivered according to NORSOK R-002 will contain the following additional labelling:

- Defining text: ONBOARD or OFFBOARD (OFFSHORE) according to the intended use

Tools delivered according to DNVGL-ST-E271 will contain the following additional labelling:

- Operative class R30, R45 or R60.
- Shackle ID
- DNVGL-ST-E271

Figure 3A and 3B shows the data plate for ordinary steel rope equipment, figure 4A and 4B shows the data plate for steel rope equipment delivered according to DNV-GL-ST-E271 and figure 5 shows how the lock of the steel rope is labelled, when using a tag the information of the tab is also labelled on the lock of a steel rope sling.

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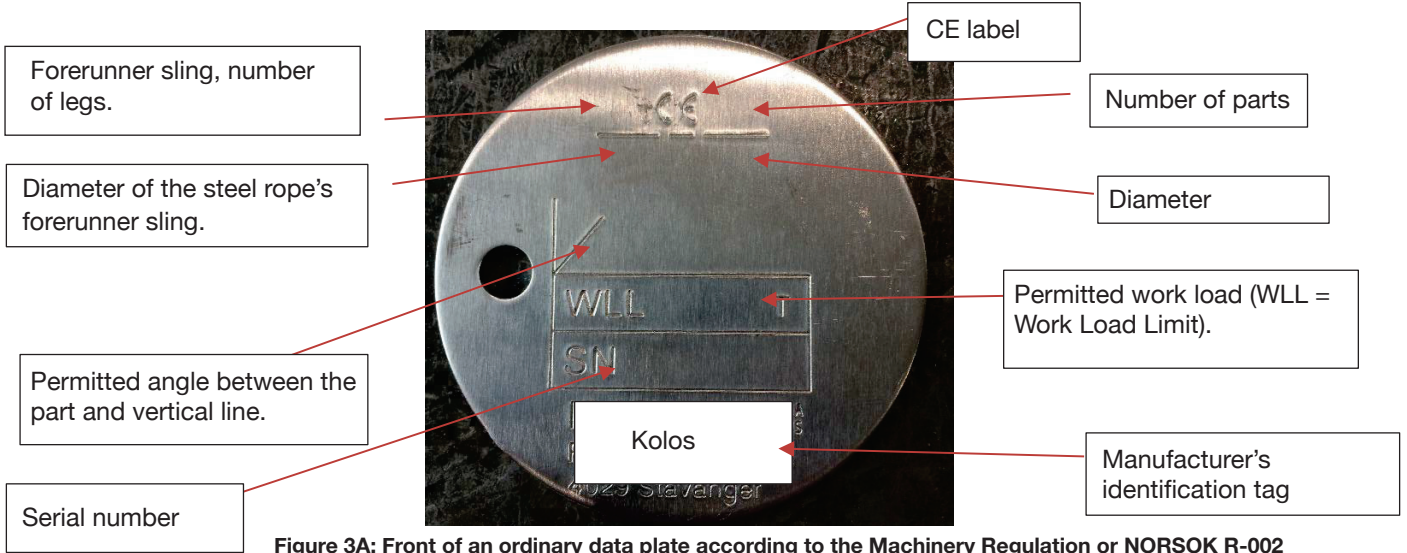


Figure 3A: Front of an ordinary data plate according to the Machinery Regulation or NORSOK R-002

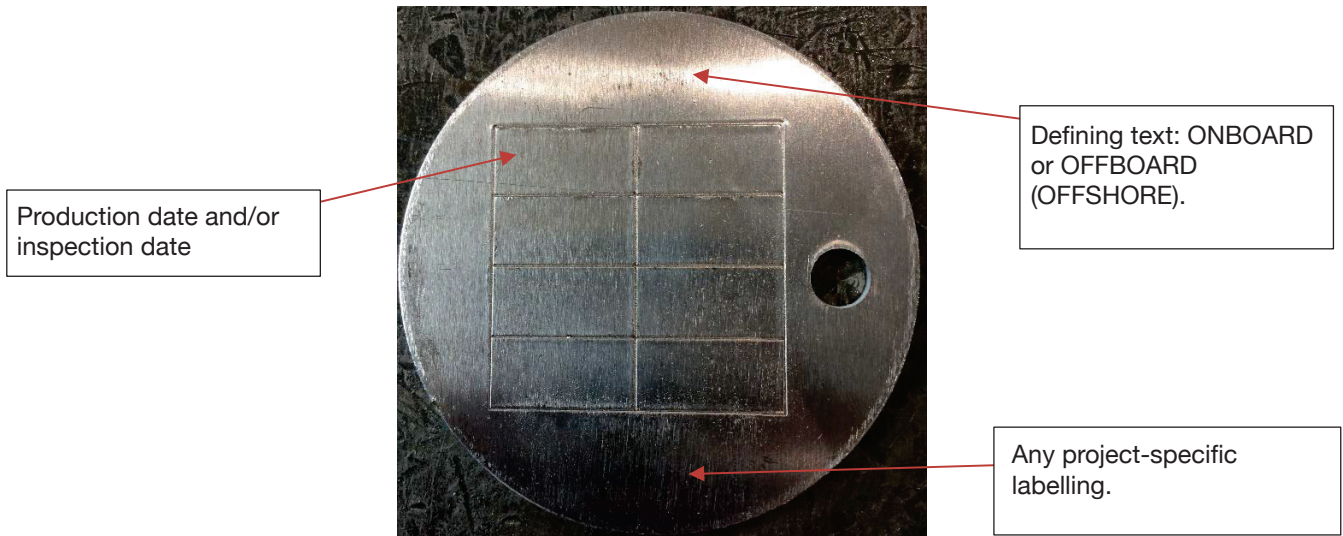


Figure 3B: The back of the data plate.

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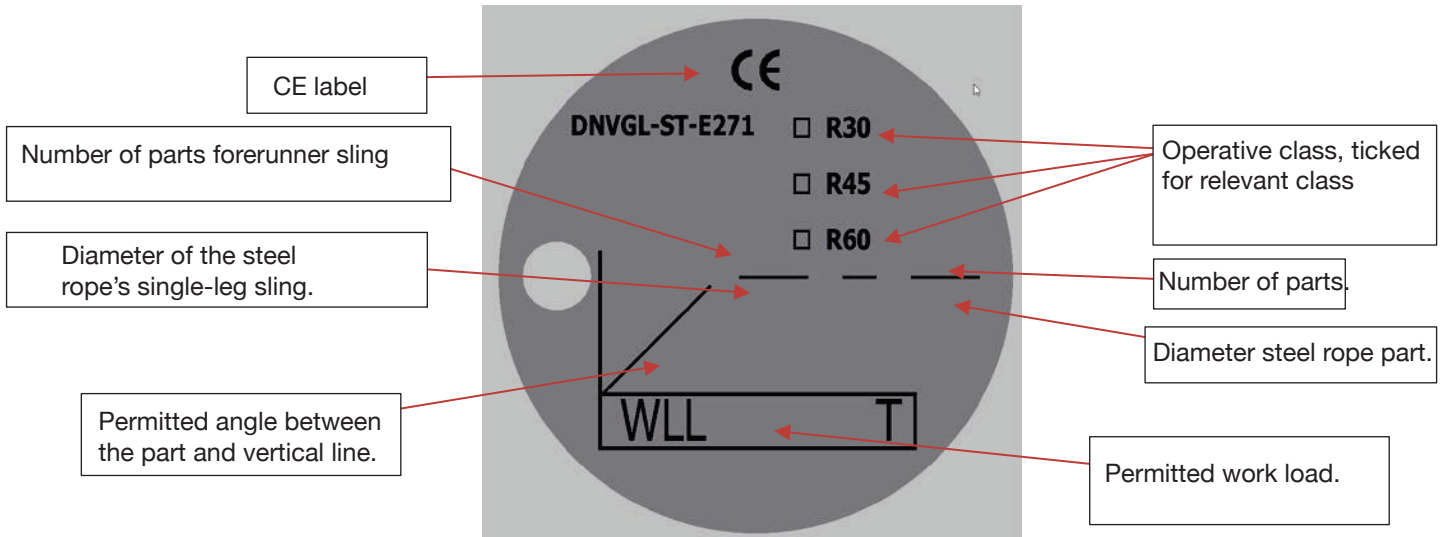


Figure 4A: Front of data plate acc. to DNV-GL-ST-E271

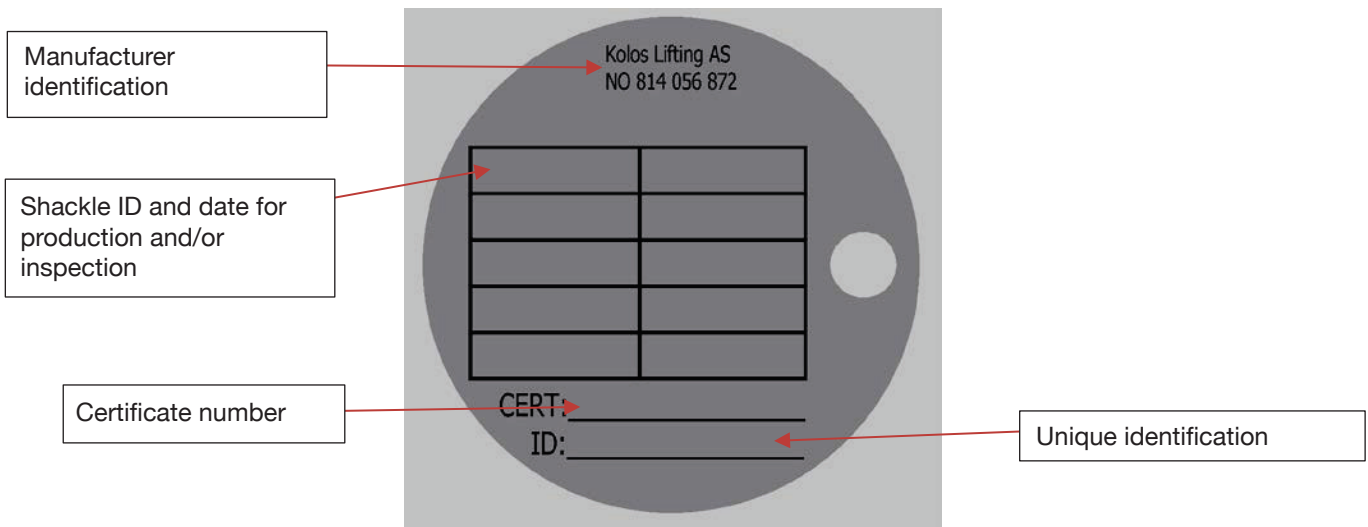


Figure 4B: Back of data plate

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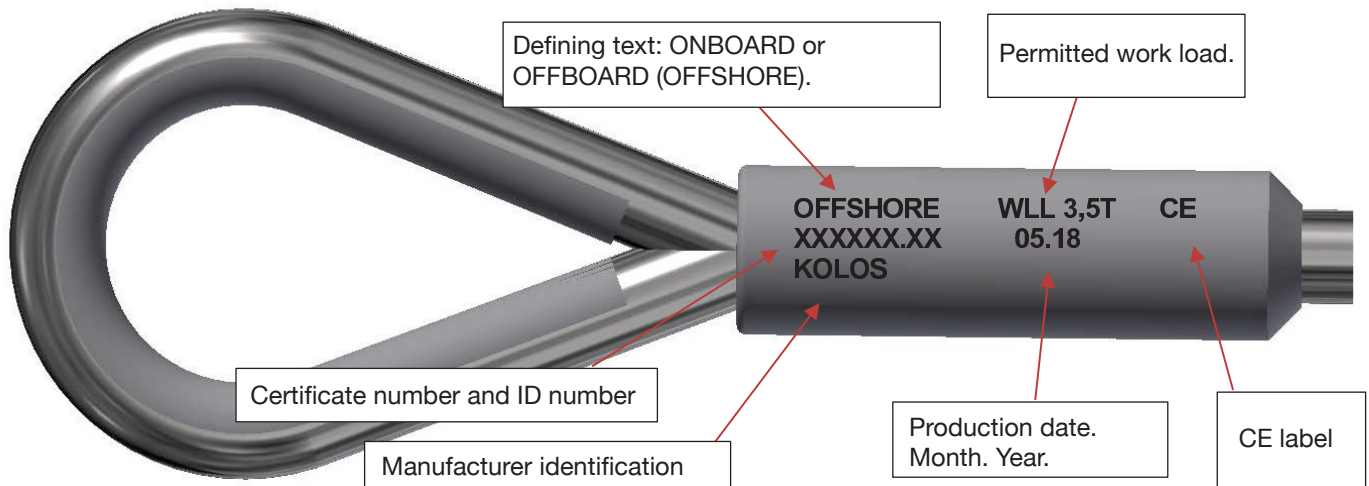


Figure 5: Lock labelling

1.3 Training

Personnel using lifting equipment shall receive knowledge through training within rigging methods according to local regulations, laws and rules. Experienced riggers shall ensure that the lifting equipment is connected according to recognized guidelines.

The personnel carrying out the operation shall be familiar with the Labour Inspection's rules and regulations.

In addition, the user must familiarize himself with these instructions before use.

2. Instructions for use

The capacity and design of the lifting equipment shall be selected to be proportionate to the load that will be handled, and to gripepunkter, løfteøye and the weather conditions, and the strapping and slinging method must also be considered.

The capacity, or WLL, is provided in the certificate for all steel rope equipment. The distributed tables, reproduced from standard EN 13414-1 provides the standard values for permitted work loads for steel rope equipment (See example in figure 6). If the equipment is manufactured according to or for offshore or maritime use (acc. to NORSOK R-002 or DNVGL-ST-E271), these tables do not apply. The capacity will always be stated in the certificate or the usage certificate.

Lifting tools are always supplied with the following documentation:

- User guide.
- Compliance declaration.
- Certificate or usage certificate.

If the lifting equipment is designed for a specific lifting operation, a drawing over the rigging arrangement may also be included. If the legs of the lifting tool must be connected to the load in a specific manner, such as when the load is asymmetrical, references to the drawing will be provided in the certificate and marked on the legs of the equipment.

Careful considerations must be made regarding the operational temperature area in which the tool is used. This is difficult in practice, but underestimating the maximum temperatures must be avoided.

User Manual for steel rope equipment
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LIFTING TABLE FOR STEEL ROPE STRAPS

Permitted work load (WLL) in tons according to EN 13414-1 Design: Soft eyes and ferrules

© Copyright



Lifting & Safety
International AS
Tel. 32 80 16 06
www.Lsi-bok.no

Ver: 11-2013-08

★ When snared / U-shape

The ratio between the steel rope's diameter (d) and the load's diameter (D) must be at least 6.
Ex. (d) 16mm x 6 = (D) 96 mm

★ When sharing, the work

load given for straight and angles is reduced by 20% (WLL x factor 0,8)

Steel rope type: 6x19, 6x36 and 8x36

Tensile strength: 1770 N/mm²

WLL type of core

FC: Fiber core IWRC: Steel core

Dia. in mm.	SINGLE STRAP				TWO STRAPS				THREE AND FOUR STRAPS															
	Straight	Snared	U-Shape	Angled U-Shape	0° < β ≤ 45°		45° < β ≤ 60°		0° < β ≤ 45°		45° < β ≤ 60°													
8	0,7	0,75	0,5	0,6	1,4	1,5	1,2	1,2	0,9	1,0	0,7	0,8	0,7	0,7	0,5	0,6	1,5	1,5	1,2	1,2	1,0	1,1	0,8	0,8
10	1,0	1,1	0,8	0,9	2,1	2,3	1,8	1,9	1,5	1,6	1,2	1,2	1,0	1,1	0,8	0,9	2,2	2,4	1,8	1,9	1,6	1,7	1,2	1,3
12	1,5	1,7	1,2	1,3	3,1	3,4	2,6	2,9	2,1	2,3	1,7	1,8	1,5	1,7	1,2	1,3	3,3	3,5	2,6	2,8	2,3	2,5	1,8	2,0
14	2,1	2,2	1,7	1,8	4,2	4,5	3,6	3,8	3,0	3,1	2,4	2,5	2,1	2,2	1,7	1,8	4,3	4,8	3,4	3,8	3,1	3,4	2,5	2,7
16	2,7	3,0	2,1	2,4	5,4	6,0	4,6	5,1	3,8	4,2	3,0	3,3	2,7	3,0	2,1	2,4	5,6	6,3	4,5	5,0	4,2	4,5	3,3	3,6
18	3,4	3,7	2,7	2,9	6,8	7,4	5,7	6,3	4,8	5,2	3,8	4,1	3,4	3,7	2,7	2,9	7,2	7,8	5,7	6,2	5,2	5,6	4,1	4,5
20	4,3	4,6	3,4	3,6	8,7	9,2	7,4	7,8	6,0	6,5	4,8	5,2	4,3	4,6	3,4	3,6	9,0	9,8	7,2	7,8	6,5	6,9	5,2	5,5
22	5,2	5,6	4,1	4,5	10,4	11,3	8,8	9,6	7,2	7,8	5,7	6,2	5,2	5,6	4,1	4,5	11,0	11,8	8,8	9,4	7,8	8,4	6,2	6,7
24	6,3	6,7	5,0	5,3	12,6	13,4	10,7	11,4	8,8	9,4	7,0	7,5	6,3	6,7	5,0	5,3	13,5	14,0	10,8	11,2	9,4	10,0	7,5	8,0
26	7,2	7,8	5,7	6,2	14,4	15,6	12,2	13,2	10,0	11,0	8,0	8,8	7,2	7,8	5,7	6,2	15,0	16,5	12,0	13,2	11,0	11,5	8,8	9,2
28	8,4	9,0	6,7	7,2	16,8	18,0	14,2	15,3	11,8	12,5	9,4	10,0	8,4	9,0	6,7	7,2	18,0	19,0	14,4	15,2	12,5	13,5	10,0	10,8
32	11,0	11,8	8,8	9,4	22,0	23,6	18,7	20,0	15,0	16,5	12,0	13,2	11,0	11,8	8,8	9,4	23,5	25,0	18,8	20,0	16,5	17,5	13,2	14,0
Fact.	1		0,8		2		1,7		1,4				1				2,1				1,5			
For asymmetric loads								See lifting capacity: ONE STRAP								See lifting capacity: TWO STRAPS								

PS! Always read the manufacturer's user guide on safe usage, maintenance and control.

WLL for straps with a fibre core applies to temperatures from -40°C to +100°C

Figure 6: Lifting table for steel rope straps. (Source: <https://lsi-bok.no/>)

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2.1 Limitations

2.1.1 Permitted operational temperature areas

100% WLL:

- Aluminium lock, fibre core: -40°C – 100°C
- Aluminium lock, steel core: -40°C – 150°C
- Ferrule, fibre core: -40°C – 100°C
- Ferrule, steel core: -40°C – 150°C

90% WLL:

- Ferrule, steel core: 150°C – 200°C

75% WLL:

- Ferrule, steel core: 200°C – 300°C

65% WLL:

- Ferrule, steel core: 300°C – 400°C

Do not use at temperatures above 400°C

Steel ropes must never be welded or used as grounding for welding electrodes.

When using steel rope equipment at temperatures below -40°C, the manufacturer should be consulted.

2.1.2 Permitted bend diameters, and their influence on WLL

When reducing the bend diameter, the WLL will be limited. If, for example, the steel rope is being bent around a pipe with the same diameter as the steel rope, the WLL will be reduced by 50%. See figure 7 for illustration and table 1 for extensive information on the minimum bend diameter.

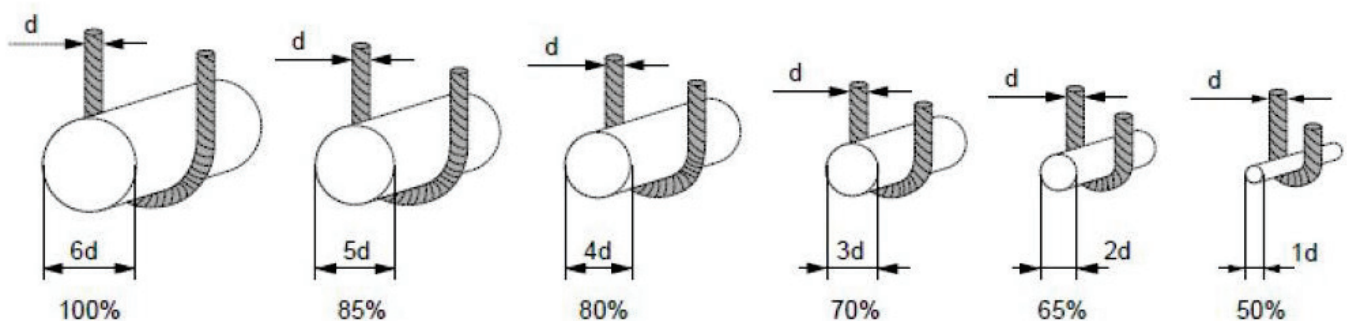


Figure 7: The bend diameter's impact on WLL.

Steel rope straps shall never be forced over a hook or bolt with a diameter greater than the natural width of the eye. The natural eye width is normally half of the eye-termination. Table 1 shows the minimum values for the bend diameter. These values will normally not cause the lifting capacity of the strap to be adjusted downwards. The splice or lock shall never be bent.

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Table 1: Minimum bend diameter

Type of steel rope strap	Normal use
1-part strap loaded in the eye: 1. Normal 6-laid steel rope: 2. Cable-laid steel rope:	3 x d 4 x d
1-part strap loaded outside the eye: 1. Normal 6-laid steel rope: 2. Cable-laid steel rope:	6 x d 6 x d
Grommet or endless strap: 1. Normal 6-laid steel rope: 2. Cable-laid steel rope:	7 x d 8 x d

2.1.3 Other conditions

PS: Other conditions, such as the environment, not described in this manual may also cause a reduction in WLL.

Steel rope tools should not be used in corrosive environments, or immersed in chemicals. When lifting in corrosive environments, dedicated lifting tools developed for this purpose shall be used.

Snaring steel ropes around the load entails a reduction factor of 0.8.

2.1.4 Conceivable misuse

The following paragraph provides a list over conceivable misuse. The list is not considered exhaustive.

- Hooks and legs should be mounted in a natural direction, avoid twisting single legs or crossing legs.
 - Steel ropes must never be welded or used as grounding for welding electrodes.
 - Steel rope tools must normally not be used at lower temperatures than -40°C .
 - Steel rope tools must normally not be used at temperatures above 400°C .
 - The minimum bend diameter must be respected.
 - Sharp edges cause a high point load and must be avoided.
 - Steel rope tools must not be used for lifting loads greater than the stated WLL.
 - Never walk below a hanging load.
 - Steel rope equipment are normally not made for lifting personnel.
 - Take care not to use a too small (below 15°) or too great (above 60° , or what the label states) work angle.
-
- Only lift a load that is known.
 - When lifting a load, position personnel in a secure zone.
 - Always carry out careful tightening and test loads, both to verify the rigging method, but also to verify the load distribution in the lifted object.
 - Ensure that the landing area has sufficient capacity for the load.
 - Always ensure that the hook is placed above the load's centre of gravity to avoid a swinging load.
 - Never mount a hook in a lifting eye that is too big for the eye. The load shall rest at the bottom of the hook.
 - Never force too large lifting heads or top rings into too small hooks. The load shall rest at the bottom of the hook.
 - Never side load hooks, rings, thimbles or locks.
 - Always connect steel rope tools in approved lifting points.
 - Use a steering rope when needed, to avoid a rotating load.
 - Always ensure that shackles have been correctly assembled according to the manufacturer's instructions.
 - Never rig the steel rope sling in the shackle or hook so that it is able to rotate (see figure 8).
 - Never use a knot to shorten a steel rope sling or steel rope tool.
 - Never twist a steel rope sling around a hook.
 - Be aware of the minimum bend diameter when snaring and in general.

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- Never use a steel rope clamp to make a 1-part steel rope sling into a 2-part steel rope equipment.



Figure 8: Wrong shackle rigging

2.2 Pre-use checks

A pre-use check shall always be carried out when using lifting equipment. This check is to ensure that the tool is OK for use, and has not been damaged or deteriorated since last use. Stored equipment may have been damaged due to the environment and other external influence. The equipment is checked for obvious signs of damage. If there is any doubt whatsoever regarding the condition of the equipment, it must be taken out of operation and a subject-matter expert must be contacted to carry out a more thorough inspection. If the label has fallen out, the tool must be taken out of operation. The unique ID labelling in the equipments locks enables the manufacturer to issue a new label. The steel rope equipment is inspected for the faults listed below. If any of the points are discovered, the tool must be taken out of operation, and experts must be contacted for a thorough inspection of the equipment.

- Lack of label or ID labelling connected to the certificate
- Wear, twisted cord parts, cracks in the end attachment or lock.
- Wear and damage in any hooks, top rings or quad assembly.
- Multiple thread breakages over a concentrated area.
- Severe breakage, the steel rope core comes out of the steel rope.
- Significant steel rope wear.
- Damage due to corrosion.
- Damage due to heat.

Lifting tools are subject to the government requirements for periodic inspections (at least once every 12 months, or shorter if local requirements dictate it) from an expert business. See paragraph 3.2 for periodic maintenance and inspection.

2.3 Installation and operation

When using 2, 3 and 4-part steel rope equipment, the load's connection point and the equipment configuration must be selected so that the rigging meets the permitted work angles for which the tool is certified. Work angles less than 15 degrees must, as far as possible, be avoided, as smaller angles represent a significantly greater risk for the load to be off balance. Such small angles also constitute a danger of fewer legs than intended reaching the full load. When loads are lifted in cases where a rigging with such small angles is necessary, this should be considered during dimensioning.

In the same way, it is important to ensure that the upper tolerance limit of the equipment is not breached either. The tensile force of the tool increases significantly at greater work angles. Steel rope equipment should not be used for work angles greater than 60°. Always ensure that the lifted load is able to withstand the horizontal forces that occur when lifting with tools at wide angles.

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The legs of the steel rope equipment must be assembled straight and without any torsion around its own leg or other legs. When assembling steel rope tools in the crane hook, the assembler must ensure that there is sufficient clearance to the steel rope and that it is not subject to compression damage. Never push, hammer or wedge a steel rope into place in the crane hook or the load. If there is not enough space in the crane hook for assembling the steel rope, use a shackle between the hook and the steel rope or use a steel rope tool that suits the size of the crane hook.

Wherever the steel rope is in direct contact with the load, it may be necessary to use protection to prevent chafing of the steel rope and the load. The steel rope was particularly vulnerable in cases where chafing occurs due to sharp edges. Edge protection should be used in such cases.

Before starting a lifting operation, it is important to ensure that the load is free to move, and is not bolted into the base or obstructed in any other way.

The connection point for the hook is assumed to be directly above the load's centre of gravity. It is important that the crane operator is aware of this, and positions the crane hook correctly before the load is lifted. Wrong hook placement above the load will result in the load shifting horizontally, which can lead to dangerous situations.

Calmly tighten the steel rope tool to verify that it has been correctly assembled and that no nykk is caused in neither the steel rope tool nor the load.

When using multi-part steel rope equipment with hooks, ensure that the ends of the hook are directed outwards. Steel ropes shall never be wrapped around a hook.

2.4 Storage

When lifting equipment are not used, these should be stored in a dedicated place. The equipment should not be left on the ground where they can be damaged. If the tools are being unused for a long period, they should be cleaned, dried and preserved. In order to protect against corrosion, the tools can be lightly oiled.

3 Instructions for maintenance and inspections

3.1 Daily maintenance and inspections

See also 2.2 Pre-use check.

Before and after use, the steel rope equipment should be inspected for the faults listed below. If any of the points are discovered, the equipment shall be taken out of operation, and an expert business should be contacted for thorough investigation of the tool.

- Lack of label or ID labelling connected to the certificate
- Wear, twisted cord parts, cracks in the end attachment or lock.
- Wear and damage in any hooks, top rings or quad assembly.
- Multiple thread breakages over a concentrated area.
- Severe breakage, the steel rope core comes out of the steel rope.
- Significant steel rope wear.
- Damage due to corrosion.
- Damage due to heat.

Lifting equipment is subject to the government requirements for periodic inspections (at least once every 12 months, or shorter if local requirements dictate it) from an expert business. See paragraph 3.2 for periodic maintenance and inspection.

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3.2 Periodic maintenance and inspections

The owner of the lifting equipment is obliged to keep available a certificate or usage certificate, declaration of conformity and user guide written in the native language of the user. This is verified during a periodic control. After completed inspection the owner shall keep the inspection reports issued for the equipment.

During the periodic inspection, the points listed under paragraph 3.1 be controlled in addition to the list below.

The following points forms the basis for repair/scrapping.

- Label is missing or information is unclear.
- Locks or terminals are worn, bent or cracked.
- Hooks, top rings, quad assembly or thimbles show signs of overload or other damage.
- Reduction in diameter, steel rope abrasion (7.5% of the nominal steel rope diameter).
- Exceeded the number of random thread breakages along the steel rope, see tables in ISO 4309.
- 3 concentrated thread breakages beside each other in the same cord.
- Kinks, compression damage, torsion, bird cage or lifted cords exposing the core.
- Damage due to corrosion.
- Damage due to heat.
- Individual leg length exceeds the greatest length of $2 \times d$ or 1% of the nominal length stated in the certificate.
- For symmetrical lifting tools: Mutual leg lengths in lifting tools exceeds the greatest length of $1.5 \times d$ or 0.5% of nominal length.
- The hook mechanisms do not work as intended.
- Steel rope equipment supplied with cone-type ferrules must be inspected through inspection holes. If the dead end is not visible in the inspection hole, the leg must be repaired/scrapped (see figure 9).



Figure 9: Inspection hole

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4 Declaration of conformity

Samsvarserklæring

DECLARATION OF CONFORMITY



I samsvar med Maskindirektivet 2006/42/EC, vedlegg II (A) og tillegg
According to the EC-Machinery Directive 2006/42/EC, annex II (A) and amendments

Produsent: Producer:	Kolos Lifting AS Skvadronveien 29 4050 Sola	Org no:	
Eier: Owner:		Prosjekt: Project:	Na
Prosjektnr.: Project no.:	Na	Produksjonsår: Production year:	2018

Vi/We

Kolos Lifting AS

Skvadronvegen 29, 4050 Sola

Erklærer som at følgende produkt er konstruert og bygget i henhold til: Forskrift om Maskiner FOR-2009-05-20-544
Declares that the product is constructed and built after: Directive 2006/42/EC on Machinery

Modell: Model:	2 stk Ståltau stropper	Serie nr.: Serial no.:	
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Harmoniserte standarder/ Harmonized standards:

Ståltau / Steel wire rope	NS-EN 12385-1.3.4
Dimensjonering / Design	NS-EN 13414-1
Endeavslutninger / End terminations	NS-EN 13411-1,3,4

Navn og adresse på den fysiske eller juridiske person i EØS-området som har fullmakt til å utferdige tekniske dokumentasjon:
Name and address of authorized person for the configuration of the declaration documents:

Firma/Company: **Kolos Lifting AS**

Date: 18.06.2018

Competent Person

Fullt navn og identifikasjon av person som er bemyndiget på vegne av importør / produsenten
Full name and identification of the person empowered to sign on behalf of the importer / manufacturer

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Samsvarserklæring

DECLARATION OF CONFORMITY



I samsvar med Maskindirektivet 2006/42/EC, vedlegg II (A) og tillegg
According to the EC-Machinery Directive 2006/42/EC, annex II (A) and amendments

Produsent: Producer:	Kolos Lifting AS Skvadronveien 29 4050 Sola	Org no:	
Eier: Owner:		Prosjekt: Project:	Na
Prosjektnr.: Project no.:	Na	Produksjonsår: Production year:	2018

Vi/We

Kolos Lifting AS

Skvadronvegen 29, 4050 Sola

Erklærer som at følgende produkt er konstruert og bygget i henhold til: Forskrift om Maskiner FOR-2009-05-20-544
Declares that the product is constructed and built after: Directive 2006/42/EC on Machinery

Modell: Model:	4 part Ståltau løfteredskap 4 leg Wire rope lifting slings	Serie nr.: Serial no.:	
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Harmoniserte standarder/ Harmonized standards:

Ståltau / Steel wire rope	NS-EN 12385-1.3.4
Dimensjonering / Design	NS-EN 13414-1 / EN 12079-2
Endeavslutninger / End terminations	NS-EN 13411-1,3,4
Toppløkker og løftehoder / Masterlink & Masterlink assembly	NS-EN 1677-4
Sjaker / Shackles*	NS-EN 13889

*Anses som del av redskaperen der disse er permanent låst fast/udemonterbare.
*Considered part of equipment when permanent secured.

Navn og adresse på den fysiske eller juridiske person / EØS-området som har fullmakt til å utferdige tekniske dokumentasjon:
Name and address of authorized person for the configuration of the declaration documents:

Firma/Company: **Kolos Lifting AS**

Date: 19.06.2018

Competent Person

Fullt navn og identifikasjon av person som er bemyndiget på vegne av importør / produsenten
Full name and identification of the person empowered to sign on behalf of the importer / manufacturer