

Cable-Laid Grommets and Cable-Laid Slings Steel Wire Ropes Slings, Steel Sleeve secured (Flemish eye) Steel Wire Ropes Slings, provided with resin poured end connections

In the following information, unless the context otherwise requires, the following words or expressions shall have the following meanings:

Abbreviations:

“Sling” or “Slings”	All products listed below.
“WLL” or “Working Load Limit”	Is the maximum mass a sling is authorized to sustain in general service.
“FSET”	Ferrule Secured End Termination

Definition:

For the purposes of this document the following term and definitions apply:

Steel wire rope sling for general lifting purposes:

- **Steel wire rope slings** are assemblies of components which includes one or more single part legs not designed for one specific lifting application ranging from 8 to 60 mm in diameter,
- Are produced in accordance with the EN 13414-1, using end connections as described in EN 13411-1 u/i -4
EN 13411-1 – Termination for steel wire ropes – Part 1: Thimbles for steel wire rope slings,
EN 13411-3 – Termination for steel wire ropes – Part 3: Ferrules and ferrule securing (Superloops)
EN 13411-4 – Termination for steel wire ropes – Part 4: Metal and resin socketing (Sockets)
- Slings > 60 mm in diameter will be produced technically in compliance with EN 13414-1, in combination with EN 13411-1 u/i -4, they are normally not intended for general service and are subject to special conditions relating to design, construction, frequency of use, service, and discard.

Cable-laid slings and grommets for general lifting purposes:

- **Cable-laid slings** are formed from a wire rope construction of six unit-ropes, laid as outers over one core rope with a termination at each end in the form of a spliced eye,
- Are produced in accordance with the EN 13414-3, using end connections as described in EN 13411-1 u/i -2
EN 13411-1 – Termination for steel wire ropes – Part 1: Thimbles for steel wire rope slings,
EN 13411-2 – Termination for steel wire ropes – Part 2: Splicing of eyes for steel wire rope slings,

Cable-laid slings and grommets for general lifting purposes:

- **Cable-laid grommets** are endless wire rope slings made of a continuous length of rope, formed to make a body composed of six ropes around a rope core,
(The rope ends are tucked into the body forming the core, with the tuck position diametrically opposite to the core butt position),
- Slings produced in accordance with the EN 13414-3 are covering cable-laid slings and cable-laid grommets ranging from 24 to 500 mm diameter (Slings smaller than 24 mm diameter are not covered by this standard).

These materials shall be used as a connection in between lifting points i.e., crane hook, trunnion, shackle, etc

Standard Service Conditions:

Before Slings are put into service, ensure that they are suitable for the lifting application related to WLL, length etc. The WLL and other data can be found on identification tags or sleeves fixed firmly to the slings and on the relevant certifications supplied with the slings.

The WLL for slings can also be found in tables contained in the relevant standards e.g., EN 13414-1, but these should only be considered as a guideline and not as a definite value. The ultimate and ruling WLL for a sling is defined in the relevant certificates supplied by the manufacturer associated with the sling.

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Please also note the following relevant guidelines and technical codes as well as your national guidelines:

- EN 13414-2 Steel Wire Rope Slings – Safety – Specification for information for use and maintenance.
- ISO 8792 Wire rope slings – Safety criteria and inspection procedures for use
- HSE Loler L113 Health and safety – The lifting operations and Lifting Equipment Regulations 1998
- NORSOK Safe use of lifting equipment (2017)
- SDU AI 17 ARBO Informatieblad Hijs en hefmiddelen

Instruction for use:

General

- Never use a sling over its rated load,
- Slings must be free from damage on ferrules, master-links, hooks or other parts associated with the slings,
- Slings must be free of wire breaks, kinks and/or loose strands of the sling body,
- Slings must be free of knots, irregularities, or other kind of deformations,
- Slings should not be positioned or pulled over sharp edges and/or a radius smaller than twice the sling diameter ($D/d \leq 2/1$),
- In case it is inevitable the sling is going over sharp edges, a form of protection must be used,
- By frequent use of the sling, it is important to ensure that the lifting points and bearing surfaces are correctly protected (e.g., the use of a thimbles or modification/increase of the bearing surface),
- Under no circumstances any alterations, modifications or changes be made to any part of the sling without consulting, clear guidance, and written permission of the manufacturer,
- Slings should be used in such a manner whereby the load is correctly secured,
- By using the "basket hitch"-configuration for lifting (e.g., lifting of tubes), it shall be sure that the load will be free from slippage,
- If a sling is twisted multiple times around a load (Double choke hitch), the windings should be laying parallel and shall not crossover (In that case $D/d = 1/1$).
- All fitted equipment be part of a sling such as master-links and/or hooks must be capable of free movement in its position,
- Fitted thimbles cannot detached from-, or moved in the eye of a sling, they may not be deformed (Signs of overload).

Steel Wire Rope Slings with Flemish Eye, Cable-Laid Slings:

- Ferrules and splices should not be placed over edges, connecting/bearing points, or crane hooks,
- Slings should not be shortened by winding or twisting the sling around a load or other points,
- Slings should not twist or rotated during installation,
- Load should not lower or rest onto slings to avoid damages by crushing or wear and tear,
- Under no circumstances slings should relate to an angle greater than 30° ($2 \times 15^\circ$) in the eye termination,
- Under no circumstances any tuck should be removed from a splice.



Cable-Laid Grommets:

- Under no circumstances cable-laid grommets should be connected, used, or bent over the tuck or the butt position, **RED marked areas**,
- Bending of the grommet will take place on the green marked area's (lifting points),
- Load should not lower or rest onto cable-laid grommets to avoid damages by crushing or wear and tear,
- There should be a minimum of two undistorted lays of rope in between of each bearing point and tuck or butt position.

Service Limits:

- The angle to the vertical shall in no case exceed 60°,
- In case slings used in a choker hitch, WLL must reduced to 80% of the rated load,
- In case steel wire rope slings used in a chemical environment, contact manufacturer for special advice,
- In no circumstances shock loads allowed,
- There are limitations on environmental working temperatures for steel wire rope slings.

Following table A1, taken from EN 13414-2, Annex A (adjusted by UOS), gives guidance for the WLL in case of various working temperatures. Operating Steel Wire Rope Slings within the allowed temperature range will have no negative long-term effect or reduction of the WLL providing the slings are returned slowly to normal temperature.

Temperatures up to - 40 °C will have no effect on the WLL.

Sling construction	Ferrule material	Rope core	Working Load Limit (WLL) in % of operating temperature T °C					
			-40°<T≤100°	100°<T≤150°	150°<T≤200°	200°<T≤300°	300°<T≤400°	
FSET Turnback loop	aluminium	Fibre	100%	-	-	-	-	Do not use
FSET Turnback loop	aluminium	Steel	100%	100%	-	-	-	Do not use
FSET Flemish eye	steel	Steel	100%	100%	90%	75%	65%	Do not use
Hand splice		Fibre	100%	-	-	-	-	Do not use
Hand splice		Steel	100%	100%	90%	75%	65%	Do not use
Endless Sling		Fibre	100%	-	-	-	-	Do not use
Endless Sling		Steel	100%	100%	90%	75%	65%	Do not use
Rope strand-grommets		Steel	100%	100%	90%	75%	65%	Do not use

xxxxxx Not an UOS product

Service Instructions:

General

- Slings should be thoroughly inspected at regular intervals by a competent person,
- These inspections should occur annually and depending on circumstances, this should often occur at shorter intervals,
- To make a thorough inspection, slings should be clean and free from obstructions,
- Damage should be recorded and registered,
- In doubts, slings should not be used, and the manufacturer should be contacted for further instructions.

Reasons for discard:

Before taking in to use and before every lift, slings should be visually inspected for damages.

In case one or more of the following points reported, the slings shall discard at once:

- Wear of the main body due to dragging or other friction applied,
- Kinks, $\geq \frac{1}{2}$ d of the rope diameter especially the midsection due to double use,
- Pinched rope - Flattened parts of the rope in free length,
- Birdcage or similar deformations,
- Protrusion or other damages of the IWRC (independent wire rope core) which causes deformation of the steel wire rope body,
- Individually broken wires by:
 - Steel Wire Ropes:** Six wires within 6 x d, but not more than 14 wires within 30 x d, One or more broken wires close to the end termination (e.g., socket, ferrule)
 - Cable-Laid Ropes:** 5% of the total number of wires in the unit rope in close groups,
- Three adjacent broken outer wires in one strand,
- Flattened parts or major deformations at the contact points having more than:
 - Steel Wire Ropes:** 4 broken wires,
 - Cable-Laid Ropes:** 10 broken wires of a cable-laid sling,
- Damage or major abrasive wear of the rope end fittings,
- Reduction of more than 5 % of the nominal rope diameter,
- Bended or abraded hooks or other fittings,
- Abrasive wear, deformation, cracks, and other kind of deformation of rope terminations,
- open tucks,
- Pop out core ends in the vicinity of the butt position or bearing point area,
- Thermal damage and electrical arcing,
- Heavy surface rust, pitted wires, and internal corrosion.

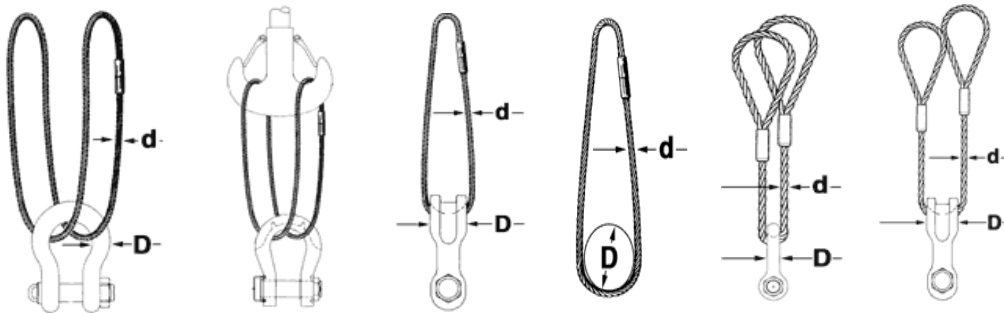
Storage of steel wire rope slings and grommets:

Slings must be stored in a suitable area protected from weather, aggregative substances, and heat.
For voluminous lifting gear following storage systems are recommended:

- Slings and grommets may be stored in open air,
- In case possible provide these materials with a cover (no contact with slings and free flowing air inside),
- Slings shall always be stored on wood (no contact with sand, mud, concrete, or stone surfaces),
- Slings must be provided with a heavy-duty corrosion protection,
- Slings must be inspected for corrosion every three months.

Calculation methods for WLL and bending losses:

To calculate the WLL for slings bended over an object bending losses are inevitable, especially for grommets or steel wire rope slings in doubled configuration.



Please be aware the EN-standard has no reduction factor for bending losses, these have been incorporated in the safety factor for general purposes SF 5:1

Please be aware EN 13414-3 grommet rating is as follows:

- Up to 60 mm Z_p is not less than 5
- Up to 150 mm Z_p is $6.33-0.022 * d$ (Which is SF 3 at 150 mm !!!!! no bending losses included)
- > 150 mm Z_p is not less than 3

We recommend using the bending loss formula as stated below for grommets and slings in doubled configuration. The E_B -formula is to calculate the necessary factor, which should be multiplied by the WLL, to achieve the effective WLL operating value.

These calculations must be made in case pin-, bearing point-, or surface contact-diameters are smaller than 4:1 down to 2:1, and can be calculated as follows:

$$E_B = 1 - \frac{0,5}{\sqrt{D/d}}$$

$D = \varnothing$ bearing point or hook, $d = \varnothing$ Slings

Example of calculation:

Slings 78 mm \varnothing – tensile grade 1960 N/mm² - WLL 112,6 to SF 4,614 (acc. EN 13414-3)
size of bearing points 200 mm \varnothing

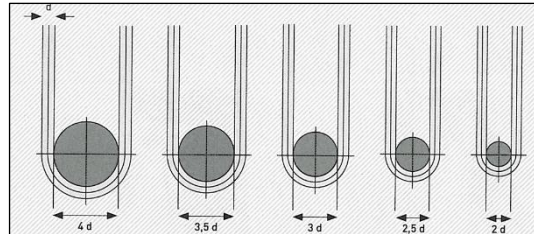
$$E_B = 1 - \frac{0,5}{\sqrt{200/78}} = 0,688$$

WLL 112,6 to x 0,688 = WLL 77,4 at SF 4,614

Note¹:

In case two varied sizes of bearing points are in service, the smallest one is the proper for E_B-calculation. To simplify the calculation following factors can be used:

D/d	E _B
2,0 : 1	0,65
2,5 : 1	0,69
3,0 : 1	0,71
3,5 : 1	0,73
< 4,0 : 1	0,75
≥ 4,0 : 1	1



Note²:

The results of a complex test series executed in 1987/88 and 1991/92 through our company demonstrated, that at D/d higher as 4:1 a WLL of 100% is achieved.

EC – Declaration of conformity

We hereby declare, under our sole responsibility that the materials have been constructed according to the Machine Safety Regulation Directive 2006/42/EC and the EC-standards and standardized documents. This declaration is considered invalid if the supplied product is modified / altered in any manner, used in an improper way, or is not provided with our identification. More precise information about the materials can be obtained from the relevant certificates which are supplied along with the materials.

Lloyd’s Register Quality Assurance approved our Quality Management System since 14 January 2000 to the standards ISO 9001: 1995 currently covered by following certificate:

ISO 9001: 2015 - ID No.: 10328800

Dit is het kwaliteitshandboek van:



De scope van dit kwaliteitssysteem is:
Het verkopen, produceren en leveren van kwalitatief hoogwaardige hijsmiddelen in het topsegment van de markt.



The muscle in heavy lifting

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ISO 9001: 2015



Current issue date: 1 February 2021
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Original approval: ISO 9001:14 January 2000

Certificate of Approval

This is to certify that the Management System of:
United Offshore Services C.V.
Appelweg 10, 4782 PX Moerdijk, The Netherlands

has been approved by Lloyd's Register to the following standards:
ISO 9001:2015
Approval number(s): ISO 0001 – 0025253

The scope of this approval is applicable to:
Manufacture, supply and storage of steel wire and synthetic ropes with various terminations, cable laid ropes, cable laid slings, cable laid grommets including inspection, refurbishing, testing and recertification of hoisting equipment i.e. shackles.

Paul Graaf
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Area Operations Manager North Europe
Issued by: Lloyd's Register Nederland B.V.



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