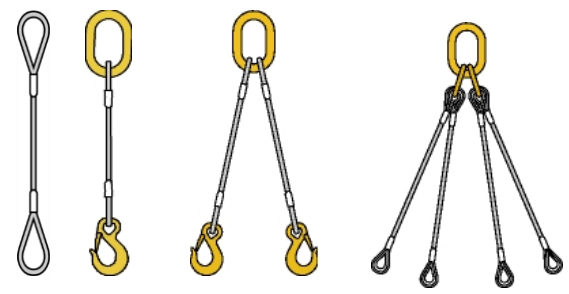
Lifting Products and Services



User Manual CBR 02-001

In accordance with the Machinery Directive 2006/42/EC.
If the customer makes any modifications, or if the customer combines the product with an incompatible product / component, CERTEX NORGE AS does not take responsibility for the safety of the product.

Norwegian regulations Performance of Work FOR-2011-12-06-1357 states that personnel in use of lifting gear must have the necessary training, practice and instruction in the safe use and in mastering the hazards the use poses.
Before operating the equipment this manual must be read through.
The information is intended as an aid to the user so that safe use can be achieved.
User manual contains important information about how the equipment works in a safe and proper manner. Equipment used in accordance with these instructions, will reduce hazards.
Anyone using the equipment must read and comply with the instructions.
In addition to manual we will also refer to HSE legislation and internal procedures at the work place.

User manual for steel wire slings, single leg and multiple legs

Innhold

1. Declaration of Conformity

Business name and full address of the manufacturer (1):	Certex Norge AS, Johan Follestads vei 6, 3474 Åros, Norway
Name and address of the person authorised to compile the technical file (2):	Only the manufacturer can make technical documentation.
Description of the machinery (3):	Steel wire rope grommets, steel wire rope pennants, single-leg and multi-legs steel wire rope slings
Declaration (4):	We declare that the above mentioned Products are in accordance with the Machinery Directive, 2006/42/EC
The name, address and identification number of the notified body which approved the full quality assurance system (6):	Bureau Veritas Norway AS, Stokkamyrveien 20, N-4313 Sandnes, Norway.
Standards and specifications used (7+8):	ISO 2408, NS-EN 12385-4, NS-EN 13411.1-7, NS-EN 1677.1-6, NS-EN 13889, NS-EN 13414.1-3, ISO 8792, NS-EN 12079.1-3, NORSOK R-002, NORSOK R-003
Place and date of the declaration (9):	Åros 14.02.2017
Identity and signature of the person empowered to draw up the declaration on behalf of the manufacturer	 Harald A. Hope, Managing Director

2. Introduction - General description

This manual includes all CE-marked steel wire rope grommets, steel wire rope pennants, single-leg steel wire rope slings and multi-legs steel wire rope slings manufactured by Certex Norge AS.
Steel wire rope slings manufactured at Certex Norge AS have been batch tested. Samples of slings are taken out of production and tested to 2xWLL and to break. Ref. BNV10 procedure for wire production and testing.

3. Intended use

Certex Norge AS steel wire rope grommets, steel wire rope pennants, single-leg steel wire rope slings and multi-legs steel wire rope slings are intended for use in controlled lifting operations, carried out and supervised by qualified and competent personnel. The steel wire rope slings described is intended for lifting equipment and is used between the hook and load. When using steel rope straps, consider the restrictions mentioned in the instructions for use.

4. Technical description

Steel wire ropes used for lifting gear shall have tensile strength of 1770N / mm² or 1960N / mm². The rope must minimum contain 114 wires.

5. Marking

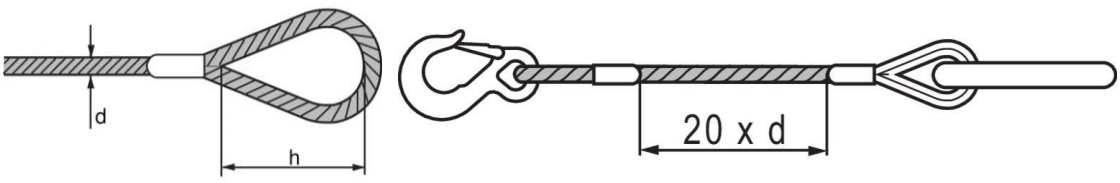
Marking is done on a marking tag or directly on the ferrule. The marking tag and its means of attachment to the sling assembly required by EN 13414-1, Clause 7, shall be made of corrosion resistant material. The total weight of the tag and its means of attachment to the sling assembly should have a mass of less than 70 g and should contain at least the following information:

- Name of manufacturer: Certex
- Production date
- Traceability labeling
- Lifting capacity in WLL or SWL and the angles applicable
- CE marking

6. Inspection before use

See that the certificate shall be available and that marking and identification matches the certificate.

- Weight and dimensions. Always check the weight of the load before lifting. Always check length, height and width on the load.
- Ensure that the lifting slings have the enough lifting capacity before rigging.
- Use the right connectors in the sling. Decide how to attach the sling to the hook and how to connect the sling to the load
- Choose the right type of slings. Check that you have enough capacity for the relevant bending ratio. Check that angle between the legs is acceptable for the slings lifting capacity. Avoid sharp edges when rigging.
- Lengths, the minimum length of a soft eye with a press lock (h) shall be 15 x the diameter of the steel rope. By hand splice min. 10 x steel rope diameter.

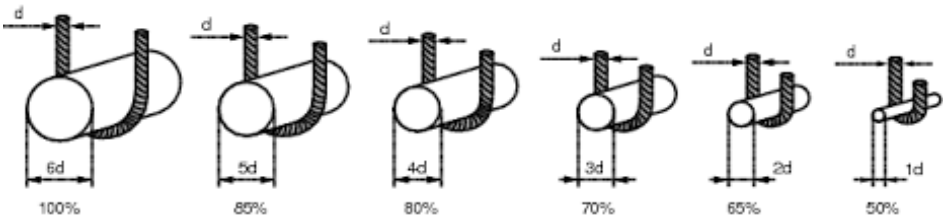


The minimum length of straight rope between the inside ends of ferrules terminating a sling eye shall be 20 times the nominal rope diameter.

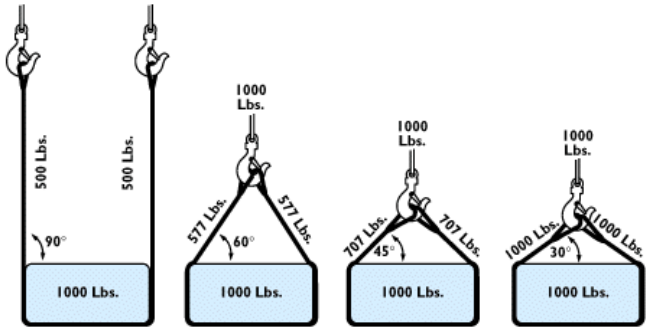
- Check that periodic inspection have been carried out (sling marked with this year's color) and this inspection before use is carried out.

7. Use and restrictions of use

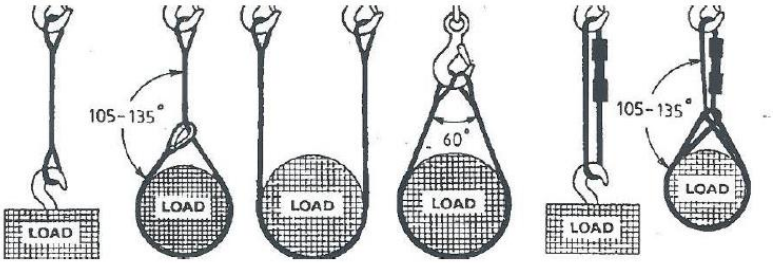
- Always rigg upwards, not down. Start by attaching the sling to the load before attaching the sling to the hook.
- Lifting capacity given on marking tag or ferrule must not be exceeded.
- A free hanging vertical steel wire rope sling is the simplest form of connection between lifting hook and load. Only steel wire rope slings with ferrule secured eyes may be used for free hanging loads. The splice of a steel wire rope sling made with hand spliced eyes can open and the parts can unravel during rotation.
- The legs of a mutiple leg sling should be connected in a top link. No more than two legs can be mounted in each link.
- Balance the load. Ensure a correct load distribution on all legs and that the load is secured against displacement.
- Test lift. Make a controlled trial lift before lifting in order to insures against the load shifting.
- Do not go under suspended loads. Restrict the area around the lift to prevents people going under suspended loads.
- Avoid shock load. Ensure that the load to be lifted is not snagging in order to avoid shock loads on the straps.
- Heat impact such as welding, use of high temperatures, etc. must be avoided.
- Choking the steel wire sling reduce the capacity by 20% of the total lift capacity. The bend that forms where the steel wire rope passes through the eye or the sliding choker hook effects the wires and strands of the steel wire rope and prevents a natural shift of the strands during tightening. A kink can destroy the steel wire rope at the choke point. The choke hitch must be tightened around the load before the load is lifted. The choke hitch is not to be forced by hammering it down, the rope should be allowed to assume its natural angle. It is dangerous to use a single-leg choke hitch if there is a possibility for the load to shift. A basket hitch distributes the load equally between the two legs. Because the two leg-ends are very rarely vertical, but rather form an angle between the legs the lifting capacity will not be the double of a straight leg capacity. The lifting capacity must be reduced due to the horizontal component of the force.
- The lifting capacity of a sling used in a basket hitch is influenced by the bending ratio of the steel wire rope around the load, D / d.
- Temperature limitations, steel wire rope with fiber core and aluminium ferrules -40°C to +100°C. Steel wire rope with steel core and aluminium ferrules -40°C to +150°C.
- **Reduction of sling capacity due to bending ratio.** We recommend that the load capacity of the sling is reduced as the bending diameter decreases. If a basket is created around a load having the same diameter as the steel wire rope itself, it decreases the load capacity to 50% of a straight leg. As a guide, the following can be used:



- **The lifting angle affects the capacity of the straps**



- **Choking factor**



1,0	0,8	2,0	1,8	1,6	1,5
	D/d-ratio minimum 20:1	D/d-ratio minimum 20:1	D/d-ratio minimum 20:1	D/d-ratio minimum 6:1	D/d-ratio minimum 6:1

8. Load chart

The tables for steel wire rope sling in this manual are for guidance only, due to different possible combinations of the upper end lower terminals. The lifting tables are from EN 13414-1, where one uses steel rope manufactured according to EN 12385-4. A termination factor of 0.9 is used for ferrule secured terminations. The safety factor is 5:1.

Safety factors according Norwegian Maritime Directorate's for steel wire rope slings/ forerunners:

Up to 10t	SF 6:1
10,1 - 25t	SF 5:1
25,1t - 60t	SF 4,5:1
60t - 100t	SF 4:1
Over 100t	Can sometimes use SF 3: 1

NORSOK R-002 Table F.6 – Enhancement factor

Lifted weight (tonnes)	Dynamic reduction factor R_{DAF}	Min required working load limit (WLL_{min})
0,5	-	4,0
1,0	-	4,0
1,5	-	4,0
2	2,08	4,16
4	1,68	6,74
6	1,51	9,06
8	1,41	11,24
10	1,33	13,34
12	1,28	15,37
14	1,24	17,36
16	1,21	19,32
18	1,18	21,24
20	1,16	23,14
22	1,14	25,01
24	1,12	26,87
26	1,10	28,71
28	1,09	30,54
30	1,08	32,36
32	1,07	34,16
34	1,06	35,95
36	1,05	37,74
38	1,04	39,51
40	1,03	41,27
42	1,02	43,03
44	1,02	44,78
46	1,01	46,53
48	1,01	48,27
50	1,00	50,00

9. Inspection after use

After using the lifting gear, check for damage and defects before storing it in an appropriate place to avoid damage during storage. If the lifting gear is damaged, it shall be withdrawn from service and subjected to a thorough examination or repair.
Pennant for offshore crane (group R7, NORSOK R-002) are intended both for onboard and offboard lifting and shall be subjected to thorough examination by a qualified user every 14th day.
See discard criteria under expert control.

10. Expert control/ storage

All lifting gear are to be thorough examined at least every 12 months by a certified enterprise of competence in Norway. On ships the examination can be carried out by personnel appointed by the Captain, chief mate or chief engineer, and who can document training in control of lifting gear of steel ropes. Records of the periodic expert examination shall be maintained. Deficiencies identified during the inspection shall be noted. If the lifting equipment is approved, it shall be marked with an oblate and/ or colour of the year in a suitable place. This year's colours apply to the calendar year the examination is conducted and lasts until next periodic examination.

Colour coding yearly. The 4 colours are used rolling:

2016	BLÅ	NS 4054 nr. 103
2017	RØD	NS 4054 nr. 102
2018	GUL	NS 4054 nr. 101
2019	GRØNN	NS 4054 nr. 104
2020	BLÅ	NS 4054 nr. 103

The owner shall keep the lifting equipment's documents during the lifetime of the equipment.
When the lifting equipment is used outside the company premises, the record from the last thorough examination be available at the site. This is to ensure information to the user and facilitate inspection by the Norwegian Labor Inspection Authority.

Control of steel wire rope and terminations:
Broken wires in a steel wire rope sling are detrimental because of the possibility of injury to the user's hands and the loss of strength in the rope.
Concentrated broken wires, no more than 3 adjacent broken outer wires in one strand are accepted.
Randomly distributed broken wires, no more than 6 randomly broken outer wires in a length of 6d but no more than 14 randomly distributed broken wires in a length of 30 d (d is the nominal rope diameter) are accepted.
Rope wear, no more than 10% reduction of the nominal rope diameter is accepted.
Damaged rope terminations, ferrules shall be examined for damage and wear. The ferrule shall be pressed together and round. No cracks or defects are allowed. If the wire sling is manufactured in accordance with NORSOK R-002, the ferrule must be tapered with inspection holes.

Upper terminals/ top link
The master link/ top link shall be examined for the following: marking, wear, corrosion, deformation, heat damage and cracks. The wear shall not exceed 10% of the thickness of the goods after making 2 measurements diagonally to each other and calculate the average of the measurement D1 + D2 / 2.
Discard criteria are Illegible sling marking, pitting, deformation, heat damage (welding splash), goods wear of more than 10% and cracks.
If the steel wire rope sling is manufactured in accordance with NORSOK R-002, the top link to be attached to the crane hook should have minimum internal dimensions 270 mm x 140 mm.

Lower terminals/ hooks
Hooks shall be examined for the following: Lack of marking, wear, deformation, weld splatter, rust, cracks, damage to the locking mechanism, lateral migration of the latch and the surface of the hook tip and opening in the locking mechanism.
Discard criteria are missing marking, pitting, deformation, heat damage (welding splash), cracks, good wear more than 10%, sidewalk on latch hook exceeds 50% of the surface of the hook tip and if the opening in the locking mechanism on the hook is more than 3-4mm.
If the steel wire rope sling is manufactured in accordance with. NORSOK R-002, hooks shall be of self-locking type in accordance with NS-EN 1677-3. If the hook is mounted in a pennant, it shall have a swivelling element, or a swivel of Grade 8 according to EN 1677-1 shall be permanently fitted between the hook and the steel wire rope eye. Swivels or swivelling elements of hooks shall incorporate a thrust bearing.

Lower terminals/ shackles
Shackles shall be examined for the following: marking, wear, deformation and heat damage.
Discarding criteria are, illegible marking, wear more than 10% of the goods, deformed bolt, deformation in threads, oval hole, heat damage (welding spatter) and cracks.

Storage
Steel wire ropes shall be stored in a dry and well-ventilated location. Cover with waterproof material for outside storage. Rotate the reel periodically during long periods of storage, particularly in warm environments. The ropes shall be examined regularly and lubricated if necessary. Contact Certex for advice.
WARNING! Incorrect storing can cause damage on the wire rope. Never store the rope in an environment with large temperature fluctuations.

11. References

NS-EN 12385-1 Steel wire ropes - Safety - Part 1: General requirements
NS-EN 12385-2 Steel wire ropes - Safety - Part 2: Definitions, designation and classification
NS-EN 12385-3 Steel wire ropes - Safety - Part 3: Information for use and maintenance
NS-EN 12385-4 Steel wire ropes - Safety - Part 4: Stranded ropes for general lifting applications
NS-EN 13411-1 Terminations for steel wire ropes - Safety - Part 1: Thimbles for steel wire rope slings
NS-EN 13411-3 Terminations for steel wire ropes - Safety - Part 3: Ferrules and ferrule-securing
NS-EN 13411-4 Terminations for steel wire ropes - Safety - Part 4: Metal and resin socketing
NS-EN 13414-1 Steel wire rope slings - Safety - Part 1: Slings for general lifting service
NS-EN 13414-2 Steel wire rope slings - Safety - Part 2: Specification for information for use and maintenance to be provided by the manufacturer
NS-EN 13414-3 Steel wire rope slings - Safety - Part 3: Grommets and cable-laid slings
NORSOK R-002 Lifting equipment
NORSOK R-003 Safe use of lifting equipment
ISO 2408 Steel wire ropes for general purposes — Minimum requirements

12. Reservations

CERTEX NORGE AS reserves the right to make changes to product designs, materials, specifications or instructions, without prior notice.