Instructions for use and maintenance, part 3

(Translation of the original instructions for use and maintenance (AWA), part 3)

all lifting accessories made of textile materials

CE

Machinery Directive 2006/42/EC
§ 1.d and .e, annex I, art. 1.7, 1.7.4, 1.7.4.2, 4

EASA CS-27./29.865 / ED Decision 2014/018/R, Amendment 9 to Part SPO, AMC1 SPO.SPEC.HESLO.100

as well as all lifting accessories, slings and their components, load securing devices and anchor points which are not in conformity with machinery directive 2006/42/EC or EASA CS-27./29.865 (used with/on Annex DI helicopters/MIL)

Part	0	1	2	3	4
	Index	Definitions	Maintenance: steel	Maintenance: textiles	Use of specific product

Revision D – what is new or has been modified?

D All «EG» or «EU» indications in front of «Machinery Directive“ have been removed

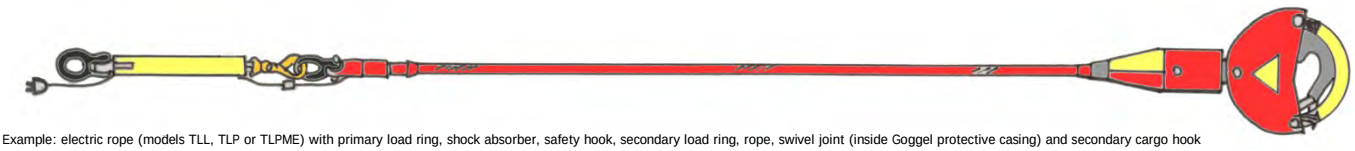
1. Maintenance, repair and overhaul (MRO) of textile components

1.1 Lifting accessories as well as slings and their components

Lifting accessory with manual cargo hook release (example)

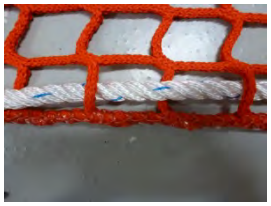
Example: manual rope (models TLDS, TLM or TLK) with primary load ring, shock absorber, safety hook, rope, safety hook, stabilisation weight/secondary cargo hook (load element, model SLE1)

Lifting accessory with electric cargo hook release (example)

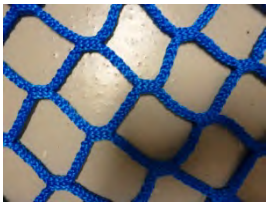


Example: electric rope (models TLL, TLP or TLPME) with primary load ring, shock absorber, safety hook, secondary load ring, rope, swivel joint (inside Goggel protective casing) and secondary cargo hook

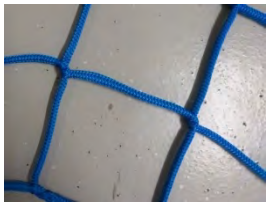
Shock absorber rope lanyard, PA 3-strand laid



Border rope, PES 3-strand laid



LN, knotless raschel PP netting



GVN2/KVN2, knotted PES netting

Round sling, 3 to, with belt protectors

Lifting strap with D-clamp

Whipping with label, resinated

PES sheathing, models TLDS/TLM/TLME and VGH

PES sheathing, model TLL

PA sheathing, model TLP

PES sheathing, models TLK and VGH

Sheathing made of TREVIRA NOVO

Splicing, PA/PES 3-strand laid

Fireproof protective sheathing

End holder of cargo net border rope

This list is not exhaustive. For more information, please contact us or check www-air-work.swiss

2. Introduction

2.1 The importance of regular equipment checks by qualified persons.

Based on EC directive 2009/104/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work, all working tools must be inspected regularly by a qualified person who is an expert in the field. A routine of at least once a year checks has been proven as best practice.

This EC directive on the safety of work equipment is implemented in the national laws of all members of the European Union and other contract-bound states (such as Switzerland).

ED Decision 2014/018/R on AMC1 SPO.SPEC.HESLO.100(c)(3) to Annex VIII (Part-SPO) states that "The operator should be responsible for maintaining the serviceability of this equipment".

Furthermore, correct maintenance, repair and overhaul (MRO) carried out by qualified persons guarantee constant functioning and enduring usability of a product and consequently also enduring safety.

After the general principles for use described in **part 1**, the following **part 2** (MRO of steel components), **part 3** (MRO of textile components) and **part 4,** containing the instructions for use of the specific product constitute the basis for correct use.

The 4 most frequent factors causing damage to lifting accessories are:

- Dropping of devices from considerable heights (> 3 m above the ground, partly up to 15 m)
- Dragging of devices over the ground
- Overstressing of ropes due to sudden, strong impacts (abrupt hoisting of slack rope, dropping of cargo attached to the rope, absence of shock absorber)
- Performing of applications for which the rope or slinging device is neither intended nor suitable.

The term "Correct use" comprises all applications the device has been designed, constructed and tested for.

Personnel performing equipment checks must previously be instructed by A&H Expert.

The life time of a textile component covers the time of use and storage and reaches a maximum of 10 years.
Product life time can only be established by the producer and is assessed according to the clients' operational demands.

For this reason, it can be dangerous to sell, loan or donate equipment to other companies/persons or to accept and employ equipment from third parties without previously contacting the producer.

3. Immediate measures

3.1 Equipment check after every assignment

Marshallers/task specialists always have "their" work material well in hand. Prior to every use, they automatically check its condition and, in the event of alterations or evident damage, they will remove the slinging equipment and/or lifting accessory in question and inform the crew.

Altered or damaged slinging equipment/lifting accessories must be handed over to the person in charge of MRO immediately after an assignment or at the end of the working day.

4. Visual inspection

4.1 What should special attention be paid to?

- Rope sheathings, straps, braids or laid ropes must be undamaged and free of foreign bodies (slight abrasion and fuzz are not considered damages);
- The whole length of kernmantel ropes or core ropes with protective sheathing must be of equal diameter and stiffness;
- Laid ropes and the legs of four-leg slings have non-circular diameters, but they must be evenly stiff and their strands must be intact (without gaps);
- Above all, ropes must not show any notch-like diminutions or knobby thickenings when manually stretched;
- Straps must not show any notches or perforations;
- Sheathings of ropes and round slings must not show any perforations or punctures;
- All whippings with/without labels and/or shrink tubes with/without labels must be undamaged;
- Lifting accessories/slings must not show any burnings, melting traces, indurations or glazing (damage caused by heat due to friction or contact with hot objects such as exhaust pipes, crankcases of fuel pumps, etc.);
- Labels must be legible at all times;
- Thimbles must be undamaged and firmly keep their position (i.e. they may move slightly, but the clearance must not exceed one to two millimetres);
- Laid/twisted ropes (border ropes of cargo nets (PES) or shock absorbers (PA)) must not show any protruding single or joined strands.

Annex A2 Lifting accessories/slinging equipment at their original condition (visual inspection)
Annex A3 Abrasion, wear or alterations belonging to category M (Maintenance)

5. Measuring – comparing – testing

The diameter of textile ropes is hard to establish, but the denser they are braided the more precisely it can be assessed. In the case of multi-layer or softly braided/laid rope constructions, however, the diameter cannot be determined exactly.

Used ropes may be of larger diameters following fibre mingling on the sheathing, swelling up due to humidity or pollution.

During inspection, special attention must be paid to the assessment of alterations to the rope construction (diminutions/taperings or thickenings). Furthermore, the rope's general condition must be checked.

Annex A1 Measuring – Comparing – Testing

6. Maintenance

6.1 Textile components must be periodically cleaned and checked

- Ropes with braided sheathings (all types and models): Regularly palpate the sheathing to detect foreign bodies (stones, splinters of wood). In the event of pollution, first let the dirt dry and then remove it with a soft brush.
- Whippings: Whippings are fixed with a 2 component resin (1 of the 2 whippings with product label attached). Hairline cracks and/or slight chipping is not problematic.
- Soft spots on the rope (all types and models): Soft spots can be caused by sharp bending (e.g. hoisting of rope or dragging of rope from flat lying coil). Such procedures break the surface tension of the coating on the bearing elements (core), the inner and/or outer protective sheathing. The carrying capacity, however, is not reduced.

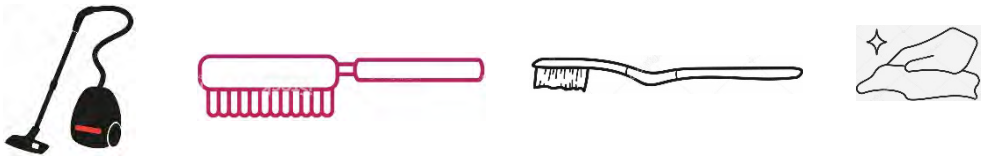
- Never cut or burn protruding strands or undamaged threads. Never bring the rope into direct contact with open fire (e.g. lighters, see annex A5).
- Penetrating objects (e.g. little stones) can be shaken out by compressing the braiding or removed by means of blunt tweezers.

- In the event of interventions in contaminated areas, e.g. rescue operations dealing with machine accidents (e.g. battery acid), or on surfaces treated with nitrates, the textile or synthetic components may become polluted by the corrosive substances and therefore become damaged.
- Any modification to the structure, e.g. following embossing or replacements with not certified parts, will result in the producer immediately disclaiming all responsibility.
- Avoid contact with any abrasive, sharp or pointed object.
- Avoid contact with power lines or power stations.

D⌦6.2 Correct care and storage

- All structural components must be checked visually to make sure they are clean and that there is no damage.
- Dirty metal components (slinging rings, double-stud fittings and carabiners) can be cleaned with a damp cloth, mechanical components are then lubricated with WD40.
- If straps, ropes, nets, etc. become dirty, let them dry before cleaning.
- In the event of strong pollution with soil, after drying remove the dirt from straps, ropes, nets, etc. with a soft brush and let them dry once again.
- Remove the remaining dirt with a vacuum cleaner.
- Check all components, straps, ropes, nets, etc. for damages or alterations, especially around the seams.

Better than chemicals: vacuum cleaner and soft brush; for small parts: toothbrush and cloth



Also check AWA instructions, part 2, MRO maintenance steel.

The following tools and/or substances must NOT be used for cleaning:

- **Heat > 20°C (hairdryer, lighter, Bunsen burner, radiator, tumble dryer, radiant heater, etc.)**
- **Chemical cleaners such as detergents, curd soap**
- **Caustic or corrosive substances such as stain removers**
- **Volatile substances/hydrocarbons such as ethyl alcohol, fuel, gun oil (only exception: WD40 for the lubrication of mechanical components, where necessary)**
- **Tools such as screw drivers, files, knives, etc.**
- **Compressed air or water pressure as occurring when using nozzles, high pressure cleaners, etc.**

The manufacturer must be notified of all damages. Also see “Appeal” at point 15 of these AWA instructions.⌫

If you have any doubts or questions, please contact the producer or the supplier.

Annex A2 Lifting accessories/slinging equipment at their original condition (visual inspection)
Annex A3 Abrasion, wear or alterations belonging to category M (Maintenance)

7. Repair

Textile components must only be repaired by the producer. For exceptions from this rule, see annex 5. In the event of repairs that can be carried out by the users, a qualified person must undergo appropriate instruction by **A&H Service**.

7.1 Spare parts

Spare parts can be ordered by specifying both their serial number (S/N, if any) and their part number (P/N).

Ropes or rope legs can only be replaced as a whole item.

After consultation with the producer, the electric conductor can be substituted or reused with a new rope (assembly and disassembly to be carried out by the producer).

The use of self-made parts or wrong assembly leads to immediate warranty exclusion and the disclaiming of any responsibility.

7.2 Repairs that can be carried out by the users (only after consultation with and following training by the producer)

As a principle, users are not allowed to carry out repairs, since they do not possess the expert knowledge, experience and tools necessary. Moreover, incorrect repairs could result in faulty or unreliable operation and thus constitute a high risk for the users themselves.

A&H Service distinguishes 3 damage levels:

1. Superficial alterations of the sheathing, damaged points on the 1st sheathing (when there is more than one) and broken meshes of cargo nets. Damage of this type can be provisorily fixed or permanently repaired by the users.
2. Damage of the sheathing divesting the bearing core of covering, extensive damage on rope sheathings or cargo nets, as well as damaged single parts like border ropes, loops/hangers, replacement of single components (border ropes, shock absorber lanyards, safety catches, etc.). These types of damage can be repaired by **A&H Service** after thorough inspection, testing (possibly through tensile loading) and final assessment.
3. Damage to bearing structures cannot be repaired.

7.3 Special repair procedures

Annex A3 Abrasion, wear or alterations belonging to category M (Maintenance)
Annex A5 Repair procedures, category R (Repair)

8. Overhaul

An overhaul of textile components is possible only in rare cases and must be carried out exclusively by the producer.

As a general rule, a rope construction can only be repaired as a whole (i.e. replacement of a thimble, new socketing of rope ends/end holders, replacement of labels, replacement or repair of sheathings), while bearing fibres or auxiliary material incorporated in the core cannot be repaired.

D⌦ The repair of or need to replace rope sheathings must be assessed on a case by case basis.⌫

Textile components can NOT be overhauled. FLUX or ultrasound testing is INEFFECTIVE.

9. Modifications to the original condition upon delivery

It is compulsory that any modification of a lifting accessory's or slinging equipment's original condition upon delivery must be carried out by the producer or a qualified person after appropriate instruction by **A&H SERVICE**.

Several examples of modifications to a product's condition upon delivery:

- Replacement of 1 (of the 2) lifting straps of the LAM-LT slinging device (particular rope configurations must be observed).
- Application of shrink hoses (also see "Absolutely forbidden!").
- Removal of labels.
- Replacement of fittings/accessories with products other than those intended or delivered by the producer.
- Application of adhesive tapes on the spliced ends of shock absorber ropes (3-strand twisted polyamide ropes).
- Cutting off the spliced ends of shock absorber ropes.

10. Situations in which the product has to be removed from service

10.1 Life span (EXP.) and prolongation of life span

If not worn out or damaged in other ways, products can be used in accordance with the indications shown on the producer's label. However, wear or other damage could nullify the products' functionality even from their first use. Life = storage time + operating time.

- The production date is shown at "PROD:" on the producer's label.
- The expiry date is shown at "Exp." on the producer's label.

- The expiry date is shown at „Exp." on the producer's label.
- Authorisation to prolong the expiry date, because the product has only been stored and never used, can only be obtained from the producer.
- Damages of structural components due to overloading cannot be repaired (plastic deformation).
- Textile components must be replaced even before their expiry date when the constriction exceeds 10% of their minimum diameter.

Damaged components should be made available to the producer for evaluation. Any further use of damaged components will result in the producer immediately disclaiming all responsibility.

10.2 Aging times of textile materials (normal weathering)

- Polypropylene PP/PPM, on average, ages approximately 30% per year
- Polyamide PA ages approximately 8 - 10% per year
- Polyester PES and high module polyethylene HMPE age approximately 3% per year.

10.3 Criteria for the removal from service

- Life time has expired
- Prolongation of life time has expired
- Any event described in AWA part 1, Basic principles, chapter PROHIBITIONS/FORBIDDEN
- Any product condition described in AWA part 3, MRO steel, annex A4
- Any product condition described in AWA part 3, MRO textiles, annex A4

Annex A4, category S (Scrap), Annex A6

11. Pay attention to special risks

- Extremities of textile ropes: Repeated dropping of ropes at > 2 m from the ground can cause damage to thimbles and rope sheathings.
- Textile ropes in general: Strong impacts (shock loads) cause fatigue on the rope structure. Such damage is not visible.
- Slinging equipment, lifting straps: Rigging of straps that are twisted or overturned can severely damage the fabrics.
- Slinging equipment, all types: Careless rigging of slinging devices onto narrow components with excessively small radii, in combination with friction and increasing pressure, can severely damage the fabrics.

- Also in the case of equal diameters, the ropes' load bearing capacity may vary considerably. At the same diameter, ropes made of high modulus polyethylene (HMPE = Dyneema) have an approximately 350% greater bearing capacity than ropes made of polyamide (PA).
- In principle, even if there is the slightest doubt regarding safety, products must be immediately removed from service and checked.

12. Absolutely forbidden!

- The application of shrink hoses on damaged parts by the user is strictly forbidden. When incorrectly applied, shrink hoses can lead to extreme heat accumulation which damages the textile fibres. Temperatures of > 250° C can easily be reached;
- D⌦ Leaving textile lifting accessories unattended for a long time on tarmac, freight vehicle loading ramps, etc. in the sun;⌫
- The application of rope clamps, cable straps, whippings, stitched seams and/or other constricting devices on the free rope length (impairment of rope structure), as well as any fastening together with staple guns.
- Knots;

See AWA part 1, Limit states / limits of definition

13. Special properties

13.1 Resistance to chemical substances

In the event of contact with acids, alkaline solutions, nitrates, fuels etc., ropes made of PES, PA, PP or PPM must be removed from service.

If components made of HMPE, HMPES, HMPA are exposed to the above substances, please consult the producer's specifications. Generally, these materials are highly resistant to UV rays, acids, alkaline solutions, nitrates, fuels etc.. In case of any doubts, please contact the producer.

13.2 Temperatures

Temperature tolerances vary considerably according to materials. Any material treatment, such as the application of shrink hoses, must only be carried out by the producer.

Jerky shifting of slinging equipment, ropes gliding along obstacles (power lines) or the formation of knots lead to excessive heat with extreme temperatures which may cause rope glazing. The appearance of glazed or glossy areas is a criterion for immediate removal.

D⌦ Sun on concreted or asphalted tarmac surfaces, on steel or aluminium freight vehicle loading ramps, on steel IBC (kerosene containers), etc. generates extremely high temperatures which may cause indiscernible but significant damage to textile materials. ⌫

14. Regulations

AWA part 1 = Legal assumptions

Annex 6 D⌦Misuse,⌫ non-compliances and critical conditions

Your service partner

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ISO 9001:2015, SQS n° 32488

EASA Part 21 G POA, CH.21.G.0022

NATO NCAGE SAC17

Question to the persons responsible for training and work materials:

Have you read, understood and given instructions on parts 1 to 4?

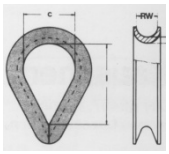
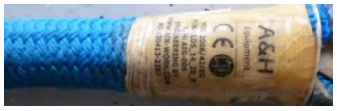
A&H Service offers an extensive inspection and testing service for all its in-house products.

15. Appeal

If you have questions, if a component is damaged, seems to have changed or might be damaged, whenever you have any observations or suggestions to make, please take a photograph and send it to us via email, MMS or SMS (no messages via WhatsApp, Facebook or similar).

In 90% of all cases we can answer immediately, thus saving you time and postal charges. Having an image will help us greatly and, together with your short description of the problem, it can usually be identified very quickly.

Annex A1 Measuring – Comparing – Testing

Maximum dimensional changes allowed for textile components				Figure
Component	**Dimension, unit**	**Change**	**Note**	
Kernmantel rope (TLK)	d L	+/- 5% + 1%	d: to be measured at 4 points of rope length and crosswise at each point. L: stretched ropes, with payload.	**Whenever the whipping starts to disintegrate, the thimble dangles considerably or the sheathing begins to shift, the rope must be immediately removed from service. Inform the producer!**
Core rope with sheathing (TLDS)	d L	+/- 5% + 1%		
Laid rope constructions (TLL, TLP, TLM, TLME)	d L	+/- 5% + 1%		
Twisted ropes (VM-DP, cargo net border rope)	d e e	none + 5% + 10%	At 4 points of rope length, crosswise at each point. PA 8 – 12 % with payload attached PES 1 – 2 % with payload attached	
Thimbles (Example: groove width (RW) 16 mm = TLDS_14)	c = 37.5 RW = 16 L = length	- 10 %, ~ 4 mm +/- 1 mm - 1 mm bending + 3 mm extension	A&H steel thimbles (V4A NIRO) are particularly strong and welded at the joint. If needed, an addtional reinforcement can be welded in. Significant changes of the geometrical shape or breaking of the welded joint indicate considerable overloading.	
Whippings	miscellaneous	Hairline cracks and crevices on the epoxy laminating resin and haze on shrink tubes is normal.	Whenever the whipping starts to disintegrate, the thimble dangles considerably or the sheathing begins to shift, the rope must be immediately removed from service. Inform the producer!	
Splice of kernmantel rope	L = rope ∅ x 50	+/- 10%	The passage from the splice end to the intermediate staple fibre cover can be slightly thinner. For more information, see next paragraph.	
Splice of twisted ropes	n/a	n/a	Protruding extremities of strands (fig. above) or flatly chopped strand extremities (fig. below) must not retract into the splice.	 

Assessment of kernmantel ropes with intermediate staple fibre cover, models TLK

1) This rope model is no longer produced and marketed (status 2018). Remainder of stock is operational at most up to 2024.

Rope with sheathing and intermediate cover

Rope with sheathing but without intermediate cover

Splice end: the rope becomes “thicker” towards the thimble.

Characteristics exemplified by rope model TLK_14_x, diameter 16 mm $^{+/-1}$:

- The rope ∅ is > 16 mm at 2 crosswise measurements.
- The splice length from the splice end to the throat of the thimble is 75 to 80 cm (rope ∅ x 50).
- At times, 5 to 30 cm of the intermediate cover can be missing between the splice end and the rope (the intermediate cover must be removed to do the splicing). See “2” mark. However, the rope ∅ still amounts to at least 15 mm.
- The core’s minimum diameter is ∅ 11.5 mm.
- As of 2007, the thimbles have an inner width of 37.5 mm and are welded at the joint.

Measuring procedure:

- Palpate the splice end of the rope and mark it.
- Rig the rope to a hook and preload it with approximately 50 kg.
- With a calliper, measure the rope 2 times crosswise for diameter and 1 time the thimble’s inner width. Compare the results with the target values given in the chart “Measuring – Comparing – Testing”.

Measuring points: 1. on free rope length; 2. at 5 cm from splice end; 3. inner width of thimble

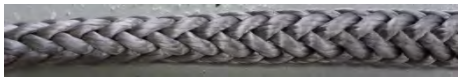
Parameters:	**❶ Rope**	**❷ Rope**	**❸ Thimble**	**Rope sheathing**
	≥ 16 mm ✓	**≥ 15 mm**	**≥ 30 mm**	**fuzzy, rough, a little dirty, knobby (thickenings)**
	< 16 mm ✖	**< 15 mm ✖**	**< 30 mm ✖**	**damaged sheathing, core visible, shrink hoses applied**

PS: When heated or inappropriately handled, shrink hoses can become extremely hot and thus damage the core!

In case of doubts, the producer can perform tensile tests to reliably assess if a rope is damaged or not.

Annex A2 Load lifting devices/slinging equipment at their original condition (visual check)

For care and repair instructions, information on damages and corresponding illustrations of standard products such as round slings (EN 1492-2), lifting straps (EN 1492- 1), lashing straps (EN 12'195-2), FIBC (EN 21'898), etc., please turn to their original producer.

	TLK (VGH)		Rope sheathing, PA white/yellow (W/Y), white/red (W/R), white/blue (W/B), white/green (W/G) or vice versa (yellow/ white (Y/W), etc.).
	TLM (VGH)		Rope sheathing, PES, yellow (Y), red (R), green (G), blue (B), gray (GR) or black (BK), braided.
	TLL		Rope sheathing, multifilament PES, red /white (R/W), braided.
	TLP		Rope sheathing, monofilament PA, red (R), braided.
	VM-DP		Rope, PA 3-strand laid, twisted (green tracer thread inside).
	Cargo net border rope		Border rope, PES (recognizable by blue tracer thread.)
	Dumping net border rope		Border rope, PES Gemini X (bearing core-cover).
☑	TLD		Rope core without protective sheathing. **NB.: Due to the high risk of wear, A&H does not deliver ropes without protective sheathing!**
	TLDS		Rope sheathing, PES, yellow (Y), red (R), green (G), blue (B), gray (GR) or black (BK), braided.
	SM TrNo		Protective sheathing with velcro fastening, TREVIRA NOVO 600 hr/m2, orange, provides additional abrasion protection.
	Net mesh		Net mesh, knotless raschel, red (R), green (G), blue (B), yellow (Y), black (BK) Mesh widths 45 mm, 60 mm and 100 mm, cord size always 5 mm.
	Thimble		Strong thimble V4A (NIRO), welded and tightly embedded in the whipping.
	Whipping/ label		2 mm PP tackle yarn, cotton label fixed with epoxy laminating resin.
	Label, laminated		Laminated label, additionally fixed with shrink hose.

These are only examples. Many of the illustrations also apply to other types of constructions.

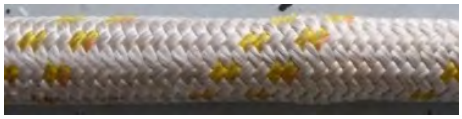
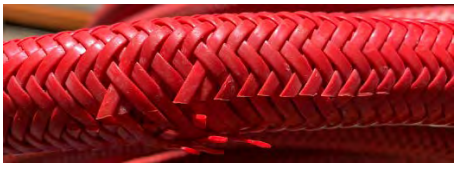
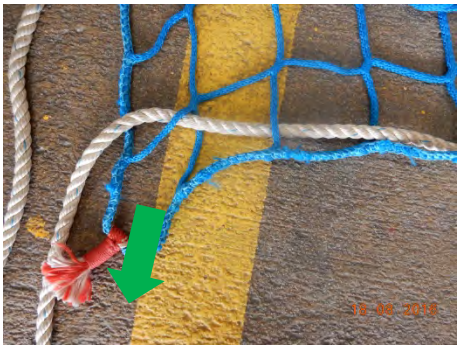
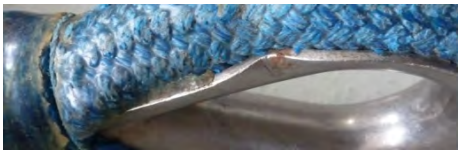
This list is not exhaustive. For more information, please contact us or check www-air-work.swiss

Annex A3 Load lifting devices/slinging equipment, categories M & R (Maintenance & Repair)

Abrasion, wear or alterations: discuss damage with producer. Usually there are no restrictions and repair is possible (after consultation)

If marked with (x) under category "R" see Annex 5 "Repair procedures", if marked under category "O" please contact A&H Service.

M = Maintenance, can be used without restrictions; R = Repair, can be repaired; O = can be repaired by the producer; S = Scrap/ to be removed from service, repair not possible;

Cat.	Type	Illustration of damage	Note	M	R	O	S
	TLK		Knob on rope (thickening). Possible causes are: dropping of rope (compression), rope under-designed, type of rope construction.	x			
	TLL		1st sheathing damaged, but rope still sufficiently stiff.		x	x	
	TLP		1st sheathing damaged, but rope still sufficiently stiff.		X	X	
	Dumping net border rope		One strand slightly detached.	x			
	TLD		Abrasion, fibre mingling on braid.	x			
⚠	TLDS		Rope sheathing slightly felted.	x			
			Fibre tuft torn out of sheathing.	x			
	Net mesh		Abrasion on net meshes.	x			
	Border rope exit		Retrieve the wrongly positioned border rope extremity and pass it through the spot marked with a green ←.	x			
	Thimble		Thimble notched. Bearing rope and sheathing are not damaged.	x			

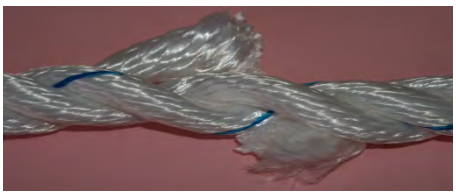
Cat.	Type	Illustration of damage	Note	M	R	O	S
	Whipping/ label		Hairline cracks and crevices on epoxy laminating resin are normal signs of wear.	x			
			Label damaged, open whipping (this damage is typical of ropes which are continuously dragged along the ground).			x	
	Lifting strap		Light abrasion, but warp and weft are intact (only single filaments severed).		x		
	LAM-LT		LAM-LT consisting of lifting strap (green), lashing strap (light yellow) and protective sheathing (dark yellow). 1 out of a total of 5 loops (black) is broken (center). Right side is intact. Please note: the left side is in correct condition since the lifting strap does not pass through the two outermost loops.		x	x	
	Lashing strap with protective tape		Loop torn off.		x	x	

Annex A4 Load lifting devices / slinging equipment, category S (Scrap)

Abrasion, wear or alteration: must be withdrawn from service! Repair may be possible, but only by producer = if marked at MRO

M = Maintenance, can be used without restrictions; R = Repair, can be repaired; O = can be repaired by the producer; S = Scrap/ to be removed from service, repair not possible;

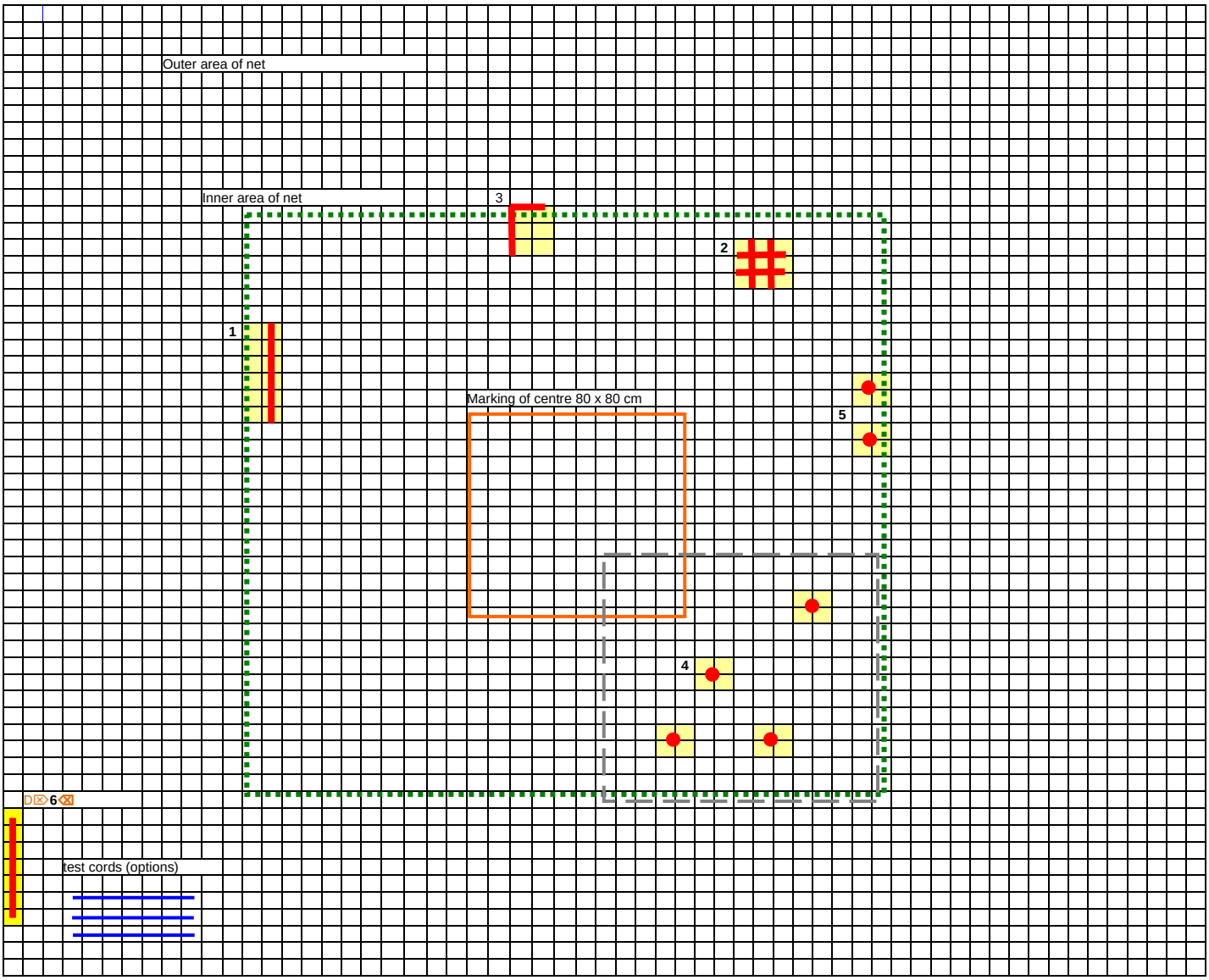
Cat.	Type	Illustration of damage	Note	M	R	O	S
	TLK		Rope core has breached the sheathing (caused by contact with rotor blade).				x
	Dyneema rope without protective sheathing		Barely visible damage which can be detected only by touching: perforation and induration (melting) of rope.				x
		 	Thickenings caused by the abrupt hoisting of ropes which have not been previously uncoiled or in which bends or loops have formed. (see AWA part 1, Application-technical definitions).				x
			Extreme damage to the rope structure due to unilateral straining (result of the thickenings above, when loaded)				x
							x

Cat.	Type	Illustration of damage	Note	M	R	O	S
	Round sling		Palpable knob formation inside round sling, probably caused by a jamming point in direction of tension. The sheathing was then cut for examination.				x
	TLL		Due to cable contact and friction, both outer covers and inner protective sheathings have been severed. Light abrasion of the bearing core but no rope failure thanks to the specific rope construction.				x
	TLP		Knobs due to overloading. TLP rope under-designed for the application it was used for. Check type of operation.				x
			Due to cable contact and friction, both outer covers and inner protective sheathings have been severed. Light abrasion of the bearing core but no rope failure thanks to the specific rope construction.				x
	VM-DP		Protruding strands and yarns: though almost new, this 3-strand laid PA rope was under-designed (fabrication defect).				x
			Protruding braids/strands and abrasion.				x
			Traces of extreme abrasion due to high stress (PA has melted and is hard at some points).				x
	Cargo net border rope		Rope is cut through.				x
			Rope core is broken.				x
	Dumping net border rope		Sheathing and core are partially cut.				x
			Bearing sheathing has melted.				x
	TLD		Several strands are damaged. Rope can possibly be cut and newly spliced (depending on location of damage and remaining life time). Will pass technical inspection only as a shorter rope with a new label (REV).			x	x

Cat.	Type	Illustration of damage	Note	M	R	O	S
			Heat damage caused by incorrect application of shrink hose.				x
	TLDS		Damaged rope sheathing, 1 strand distorted. If load test (core) is passed, rope can possibly be repaired by shortening it (see TLD).			x	x
			Rope sheathing (and core) damaged due to heat and/or friction (during an accident). The illustration applies to all types of ropes.				x
			Broken rope core. The illustration applies to all types of ropes.				x
	Thimble		Welded joint broken, sheathing damaged on curve and plucked out at the whipping. Overstressing due to dropping from significant heights and repeated overloading of rope (notches on thimble, indentation left by lifting hook). Such “traces” on ropes usually indicate that the breaking load is significantly reduced.				x
			Welded joint broken, sheathing damaged on curve. Overstressing due to dropping from significant heights and repeated overloading of rope (notch on thimble left by accessory/fitting). Such “traces” on ropes usually indicate that the breaking load is significantly reduced.				x
	Lifting strap		Damage of weft thread (completely severed), warp thread can be retrieved.				x
	Lifting strap (picture by SBV)		Strong abrasion at the edge.				x
	Round sling (picture by SBV)		Severed sheathing and protrusion of one strand of the bearing core.				x
	Splice		The spliced end has been cropped, then covered with adhesive tape for medical use. By doing so, a) the product’s condition upon delivery was changed b) the splice’s modification was masked (instead of being reported)				x

Cat.	Type	Illustration of damage	Note	M	R	O	S
	Cargo net	See graph below	The entire net must be withdrawn from service and sent to the repair service (OVE), when 1. 6 mesh squares in a row are disjointed (gap = ~ 40 cm) 2. 9 mesh squares forming a square are disjointed (gap = ~ 20 x 20 cm) 3. half of the border of 2 adjoining rows of 3 mesh squares is disjointed (gap = ~ 13 x 20 cm) 4. in the central part of the net, in an area of 1 m² (1.5 m from the centre), more than 4 knots or mesh intersects* (4 mesh squares = 1 knot or mesh intersect in the centre) are disjointed (gap = 4 x (13 x 13) cm) 5. there is only 1 faultless mesh square between 2 broken knots or mesh intersects. D⌦6. slipping of the border rope has caused 4 or more mesh squares to be disjointed (like in point 1) ⌫ The LN net has mesh squares sized 5 x 60 x 60 mm, so on a side length of 5 m the net has approximately 77 mesh squares (side length in mm divided by 65 mm = number of mesh squares)			x	x

Example: Net with 60 meshes of 60 mm, cord size 5 mm = ~ 4 m side length



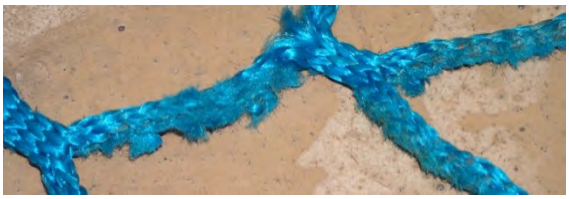
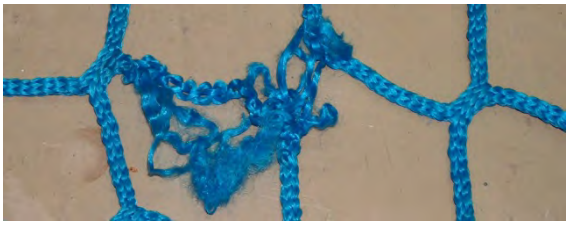
D⌦Caption

1. 6 mesh squares in a row are disjointed (gap = ~ 40 cm)
2. 9 mesh squares forming a square are disjointed (gap = ~ 20 x 20 cm)
3. half of the border of 2 adjoining rows of 3 mesh squares is disjointed (gap = ~ 13 x 20 cm)
4. in the central part of the net, in an area of 1 m² (1.5 m from the centre), more than 4 knots or mesh intersects* (4 mesh squares = 1 knot or mesh intersect in the centre) are disjointed (gap = 4 x (13 x 13) cm)
5. there is only 1 faultless mesh square between 2 broken knots or mesh intersects.
6. slipping of the border rope has caused 4 or more mesh squares to be disjointed (like in point 1) ⌫

Annex 5 Repair procedures, category R (Repair)

Repairs that can be carried out by the users (only after consultation with and following training by the producer)

Several examples of damage belonging to level 1 and how to repair them:

Cat.	Type	Illustration of damage	Note
General advice	**Never cut protruding strands or undamaged threads.**		
	Penetrating objects (e.g. little stones) can be shaken out by compressing the braiding or removed by means of blunt tweezers.		
	TLL		 If only the 1st sheathing (outer sheathing) and maybe a 2nd sheathing (out of 4) are damaged: remove all dirt from the damaged area and wrap it in adhesive tape.
	TLP		D⌦ If only the 1st sheathing (outer sheathing) and maybe a 2nd sheathing (out of 4) are damaged: remove all dirt from the damaged area and wrap it in adhesive tape. ⌫
	TLK TLM TLME TLDS	 	 Rub the protruding strand back into the surface by using your fingernail or a ball pen shaft. While doing so, knead and roll the rope.  Melt protruding fibres off with a lighter and flatten by rubbing. If necessary, fix the rope with a bit of adhesive strap (as described for rope models TLL/TLP). NB: the 2 rope models TLK and TLDS D⌦[...]⌫ have only one sheathing. As soon as the core becomes visible, the rope must be withdrawn (see A5).
	Net mesh	 	 D⌦ For repair procedures, see next chapter.⌫
	Danger	**Always place the flame of the lighter laterally, never under the rope!** **A flame put directly under the rope can damage its bearing core.**	 **Heat damage**  **Lateral melting**

Special repair procedures

Repair of damaged nettings

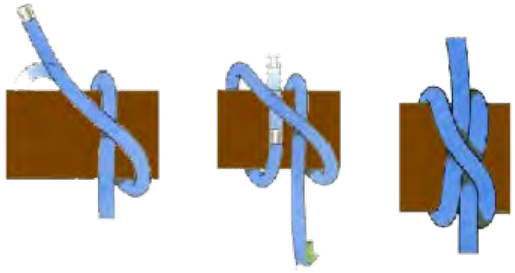
Damage	Repair method
1 cord damaged	Replace the defective bar of the mesh with a piece of cord; replacement length = length of damage plus 1 knot or mesh intersect (in the case of knotless meshes)
D⌦2 or more cords damaged	Replace net meshes and mesh bars following the instructions below⌫
Net cord defective or strongly worn	Cords which are only damaged can be left within the net, disjointed cords must be cut out and secured (by melting them off).

D⌦Persons repairing damages must have undergone training by A&H Service and be able to demonstrate the necessary competency.

Only net meshes can be repaired by trained experts. Border ropes, edges of nets, slide rings, tags, etc. cannot be repaired.

Netting repair procedure

Step 1: Repair of a single bar of the mesh. The adjacent net sections must be intact, the replaced bar of the mesh must not be longer than the original. Knot: simple clove hitch



Schematic illustration of a clove hitch:

Fig. 1

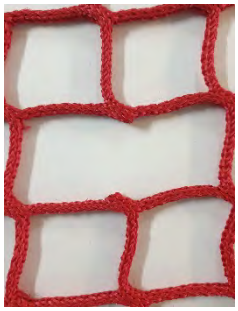


Fig. 2

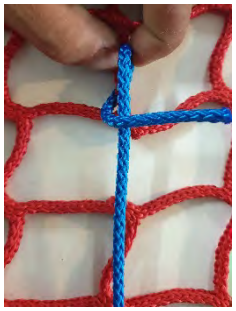


Fig. 3

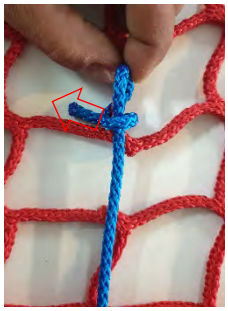


Fig. 4

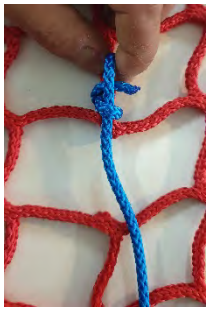


Fig. 5

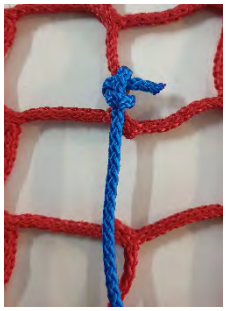


Fig. 6

1. damaged bar – 2. remove the damaged bar with a heat cutter – 3. form a bight in the repair cord parallel to the bar, then pass the cord from the right under the bar and from the left over the cord to the right– 4. pass the cord from the right back under the bar to the left– 5. pass the cord end from below through the loop held by thumb and index finger. – 6. tighten

For better visibility, the repair cord is shown in blue.

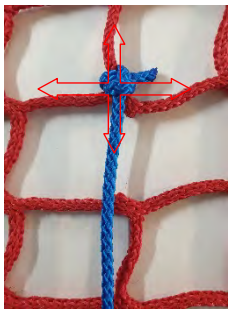


Fig. 7

Fig. 8

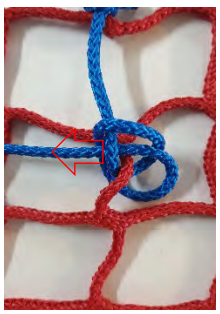


Fig. 9

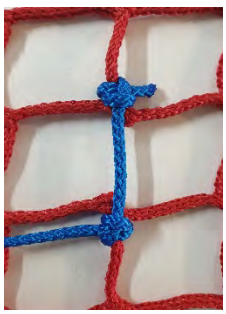


Fig. 10

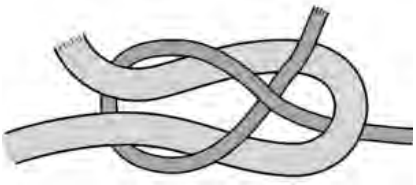
Fig. 11

Fig. 12

7. pull the hitch down, then pull in all 4 directions to fasten – 8. pass the cord from the left under the bar – 9. pass the cord from the right twice over the bar but the second time pass the cord end through the loop – 10. tighten hitch as in point 7. – 11. cut the cord ends to a length of 5 mm and heat them– 12. press the hot ends immediately with a metal stamp. Fasten both hitches once again by pulling in all directions.

Step 2: 2 adjacent damages, displaced by 1 mesh square. The adjacent net sections must be intact, the replaced bar of the mesh must not be longer than the original. Knot: simple clove hitch (see figures above) and reef knot.

Schematic illustration of a reef knot:



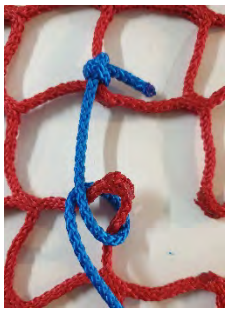


Fig. 13

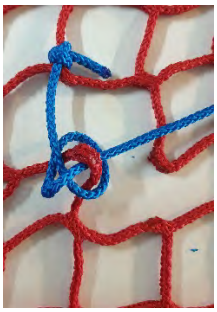


Fig. 14

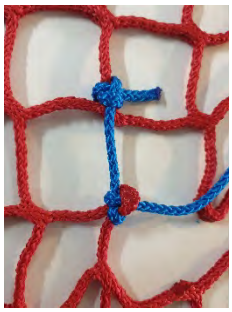


Fig. 15

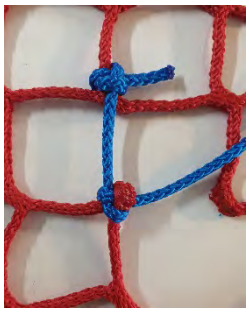


Fig. 16

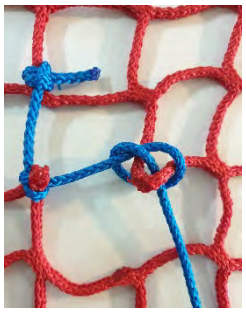


Fig. 17

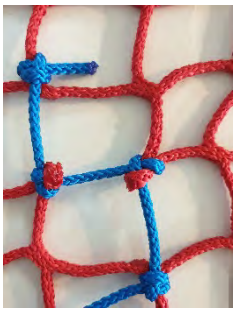


Fig. 18

13. clove hitch as explained above, then start forming a reef knot on the adjacent mesh corner – 14. pass the cord end through the red loop – 15. fasten – 16. pass the cord to the corner of the adjacent mesh and align the netting in all 4 directions. – 17. lay a 2nd reef knot on the corner of the mesh – 18. pass the cord down and fix it to the mesh corner below with a clove hitch. Finish the cord ends as described in fig. 11 and 12.

Step 3: several adjacent damaged bars, displaced. The adjacent net sections must be intact, the replaced bars of the mesh must not be longer than the originals. Knot: simple clove hitch (see figures above) and reef knot.

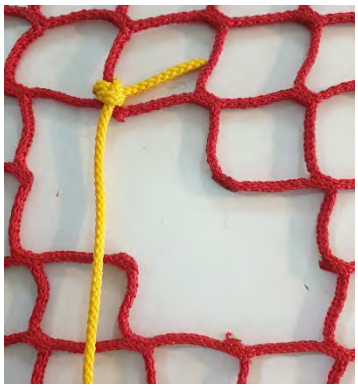


Fig. 19

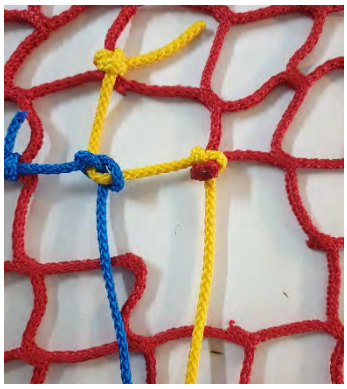


Fig. 20

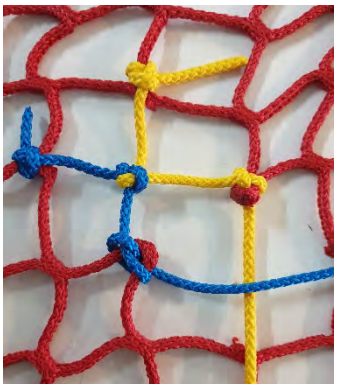


Fig. 21

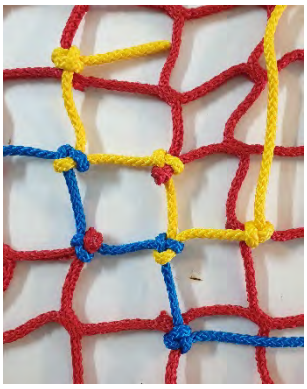


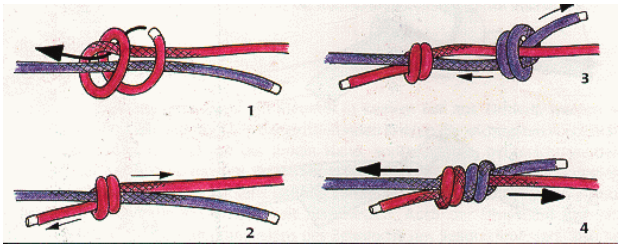
Fig. 22

19. – 22. See description in figures 13 – 18. In the event of greater damages, the method can be applied in the same way.

Replacement of the marking of centre

At the net's centre, pass the cord through every mesh to form a square of 80 x 80 cm. Join the cord ends with a double fisherman's knot.

Schematic illustration:



Annex 6 D⌦Misuse,⌫ non-compliances and critical conditions

Several examples of D⌦misuse,⌫ non-conformities and critical conditions entailing the immediate withdrawal from service (it is forbidden to use devices of the kind depicted below)

D⌦ **Comment by A&H Expert**

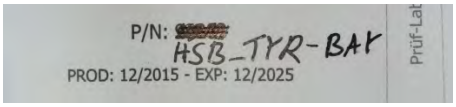
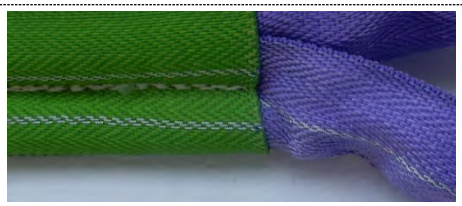
Disposable lifting straps DIN 60005 are simple, extremely cheap slinging equipment destined for single use only. Such straps are made of cheap, unprotected one-layer fabric, frequently of the worst quality. This is why A&H Expert considers disposable lifting straps unsuitable for slinging purposes.

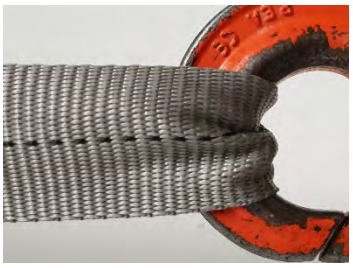
Notwithstanding the CE-marking, disposable lifting straps are contrary to any acknowledged rule of technology. Their limited safety characteristics (safety factor 5, no protection, simple and cheap) are diametrically opposed to the policy of helicopter transport requiring enhanced safety.

Even on common building sites, the use of disposable straps for lifting simple cargo crosses the threshold of unacceptability. Their employment for lifting loads by helicopter must be considered wantonly negligent.

Practical experience clearly shows that these lifting straps frequently are not only used more than once, but are also often employed in an incorrect and abusive way. Usually, helicopter companies encounter such straps when reaching job sites, as they are often already slung to the cargo by the client's workers. The moment helicopter companies accept disposable lifting straps as slinging points, all risks and liability devolves upon them.

A&H Expert strongly discourages the use of disposable lifting straps. For possible risks, misuse and prohibitions, see points 1.12, 1.13, 5.6 as well as AWA part 3, A6. ⌫

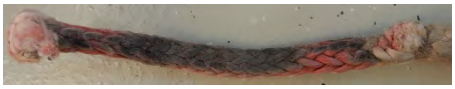
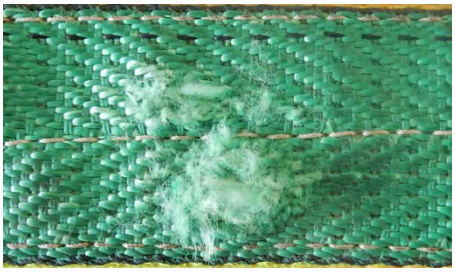
Type	Illustration of damage	Note	M	R	O	S
Label		Hand-written modifications on labels are not allowed.			x	x
All LA/SL		It is forbidden to cover labels or paste other tags over them.			x	x
All LA/SL		It is forbidden to use lifting accessories or slinging devices not provided with labels. Round sling without standard marking (colour, black bands symbolizing the quantity of tons allowed, imprint of WLL in kg, label with instructions).			x	x
Round sling		Whenever EN 1492-2 (round sling) is mentioned, the requirements of the standard must be rigorously met, e.g. the wear sleeves of round slings must consist of a single, continuously sewn together piece of webbing. The payload marking must be imprinted on the bearing sling only and not on the additional wear sleeve. So what is this device about? Is it a 1000 kg round sling with protective sleeve or actually a 2000 kg round sling?				x
Spliced end of shock absorber		The spliced end has been cropped, then covered with adhesive tape for medical use. By doing so, a) the product's condition upon delivery was changed b) the splice's modification was masked (instead of being reported).				x
D⌦Disposable lifting strap		Perpendicularly slung disposable lifting strap. At diagonal pull, the bearing cross section is reduced while the force increases (30% AI = load x 15%, 45° AI = load x 40%). Increased loading due to shearing, perhaps also combined with torsion.				x

Type	Illustration of damage	Note	M	R	O	S
Disposable lifting strap		When fixing straps with planks or by nailing them onto planks, the force flow is interrupted and the straps can be permanently damaged due to unequal tensile stress in the fabric. Diagonal pull further aggravates the problem (see above).				x
Disposable lifting strap		Formation of folds caused by inappropriate slinging technique or unsuitable slinging equipment. Loss of carrying capacity: > 30%				x
Disposable lifting strap		As always, knots are forbidden! Loss of carrying capacity: > 50%				x
PSA rope employed as lifting accessory		Ropes EN 1891 A «Kernmantel ropes with low elongation» are unsuitable as lifting accessories. The carrying capacity of a PSA rope is only a third or less of that of a LongLine.				x
PSA rope employed as lifting accessory		Ropes EN 1891 A «Kernmantel ropes with low elongation» are unsuitable as lifting accessories. Insufficient labelling.				x
FIBC		A quick glance at the label would have been enough to ascertain that this slinging technique is forbidden!				x

If you use A&H products, we can discuss the possibility of label replacement, since we are able to retrace the manufacturing data of your product.

In the following, a couple of examples showing why A&H Equipment does not deliver ropes without protective sheathing and why sufficient dimensioning (safety margins) is of vital importance.

The pictures below do NOT depict products by A&H Equipment.

Type	Illustration of damage	Note	M	R	O	S
Dyneema without protective sheathing		MISUSE: knots at the rope end, rope failure at 17.5 kN due to knot breakage.				x
		Strong abrasion and entry of dirt (same rope as above)				x
		Strong abrasion and dirt in the thimble (splice was cut for inspection). Friction produces heat.				x
PES rope		Extreme thickenings as a result of lack of safety and too much elongation.				x
Lifting strap		Lifting straps must always be provided with edge protection, since even the slightest damage will immediately have an influence on the bearing parts.				x
Round sling rigged onto cargo hook		The round sling can slip under the safety catch and get jammed or even entirely slip out of the cargo hook. NOT SAFE!				x

Whenever lifting accessories and slings are not provided with protective sheathing, the bearing parts are directly loaded and can suffer damage. Damage of this type cannot be repaired.

A&H Service also offers training courses in accordance with DGUV 312-906 (formerly BGG 906) (2 days, 16 lessons).
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