Teufelberger

RIGGING SEILE
RIGGING ROPES

Herstellerinformation und Gebrauchsanleitung/
Manufacturer's information and instructions for use

Art.-Nr.: 6800504 / Ausgabe 02/2016

Together in Motion

INHALT / CONTENT

INHALT / CONTENT

⚠ WARNING

The use of our products can be dangerous. Our products may only be used for their intended purpose. They must particularly not be used for personal protective equipment as specified in EU directive 89/686/EWG. The customer is responsible that the user has been trained in the safe use of the product and in accompanying safety precautions. Be aware of the fact that the product can cause damage if wrongly used, stored, cleaned or overloaded. Check national safety regulations, industry recommendations and standards for local requirements. TEUFELBERGER® and 拖飞宝® are internationally registered trademarks of the TEUFELBERGER Group.

GENERAL

This manufacturer's information is valid for the following (ready-made) ropes in all available lengths individually and in combination:

		Nominal diameter		Actual diameter	
Application	**Rope type**	**DM [mm]**	**DM [inch]**	**DM [mm]**	**DM [inch]**
Generalist rigging ropes (Bullrope)	Sirius	**12**	0,47	12,0	0,47
	Sirius	**14**	0,55	14,3	0,56
	Sirius	**16**	0,63	16,0	0,63
	Sirius	**18**	0,71	18,0	0,71
	Sirius	**20**	0,79	20,0	0,79
	Sta Set	12,7	**1/2**	12,3	0,48
	Sta Set	14,3	**9/16**	13,7	0,54
	Sta Set	15,9	**5/8**	14,6	0,58
	Sta Set	19,1	**3/4**	18,5	0,73
	Sta Set	22,2	**7/8**	21,7	0,85
	Sta Set	25,4	**1**	25,3	1,00
	tREX	9,5	**3/8**	9,8	0,39
	tREX	11,1	**7/16**	11,8	0,47
	tREX	12,7	**1/2**	13,9	0,55
	tREX	15,9	**5/8**	14,6	0,58
	tREX	19,1	**3/4**	19,3	0,76
	tREX	22,2	**7/8**	24,0	0,95
Energy dissipating rigging ropes (Bullropes)	Poly Nylon	12,7	**1/2**	13,1	0,52
	Poly Nylon	14,3	**9/16**	14,6	0,57
	Poly Nylon	15,9	**5/8**	15,9	0,63
	Poly Nylon	19,1	**3/4**	19,9	0,78
	Poly Nylon	22,2	**7/8**	21,9	0,86
	Poly Nylon	25,4	**1**	27,6	1,09
Static Winch ropes	arborWINCH line	**12**	0,47	12,6	0,50
Loopie sling	tREX	9,5	**3/8**	9,8	0,39
	tREX	11,1	**7/16**	11,8	0,47
	tREX	12,7	**1/2**	13,9	0,55
	tREX	15,9	**5/8**	14,6	0,58
	tREX	19,1	**3/4**	19,3	0,76
	tREX	22,2	**7/8**	24,0	0,95
Ploopie sling (Loopie sling + PINTO Rig pulley)	tREX	11,1	**7/16**	11,8	0,47
	tREX	12,7	**1/2**	13,9	0,55

Application	Rope type	Nominal diameter DM [mm]	Nominal diameter DM [inch]	Actual diameter DM [mm]	Actual diameter DM [inch]
Soft Eye sling (single eye)	tREX	9,5	**3/8**	9,8	0,39
	tREX	11,1	**7/16**	11,8	0,47
	tREX	12,7	**1/2**	13,9	0,55
	tREX	15,9	**5/8**	14,6	0,58
	tREX	19,1	**3/4**	19,3	0,76
	tREX	22,2	**7/8**	24,0	0,95

GENERIC WARNINGS

Prior to using this product, read this document thoroughly, make sure you understand the instructions for use. Follow all recommendations, consider under which circumstances and conditions the product will be used and whether the product meets the resulting requirements. Keep this manufacturer's information readily accessible for future reference. Contact the manufacturer TEUFELBERGER Fiber Rope GmbH (contact details on the back of this set of user instructions) if you have any questions.

This product may be utilized only by persons trained in its safe use and having the relevant knowledge, experience and skills i.e. competence. Rigging is a higher risk activity than most arborist activities. Therefore, relevant training and knowledge is required prior to carrying out rigging operations. We recommend that the user has attended and completed a relevant and recognized arborist's training program, e.g. ETT (Certified European Tree Technician), ETW (Certified Europea Tree Worker), relevant training courses put on by the AA (Arboricultural Association).

Before carrying out rigging work check whether an official permission is needed. Restrict access to the work site and demarcate the site clearly so that no one can enter the site inadvertently. Recognize and detect the potential risks like electric cables.

⚠ **Failure to follow manufacturer's instructions especially all warnings and safety instructions may lead to accidents, property damage, serious injury and possibly death! Rigging carries a high risk of personal injury and damage to property. Any use deviating from and any disregard of these instructions will be considered as outside the defined scope of use and therefore not for the defined purpose(s).**

Be aware of the need for appropriate or obligatory personal protective equipment (PPE).
⚠ **Check all relevant legislation regarding rigging and personal protective equipment (PPE) for local requirements.**

We regard this manufacturer's information as "work in progress". We have simulated dynamic loads on site and will go on working on measurement of dynamic data. The available results are published on our homepage www.teufelberger.com.

INTENDED USE / PRODUCT LABELLING

INTENDED USE

Rigging means the step-by-step dismantling of a tree aided by a rated lifting system, consisting of textile ropes, pulleys and (normally) a tree trunk as a natural structure that is capable of withstanding the forces generated by the deceleration created when falling tree sections, often of considerable mass, are arrested.

The (ready-made) rope accompanied by these user instructions may be used only for the defined purpose(s) as part of a rigging system. It is the user's responsibility to ensure compatibility of each product component with its neighbouring components.

⚠ **Note:** "The individual components of the system interact in a way that has neither been fully investigated nor understood. Rigging exposes the climber, the equipment and the tree itself to high loads that are difficult to calculate."[1] It is the user's responsibility to assess and minimize all risks associated with this work.

TEUFELBERGER is not responsible for any direct, indirect, or incidental consequences/damage occurring during or after the use of the product and resulting from any improper use including alteration of the ropes (preparation of an eye etc.) nor caused by poor compatibility with other equipment or poor configuration.

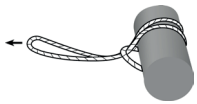
Rigging products must not be used as personal fall protection equipment (PPE).

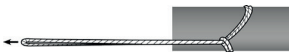
It is important to mark rigging equipment in such a way that it cannot be confused with, nor used as, PPE. Store climbing and rigging equipment separately.

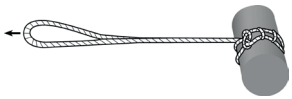
EXPLANATIONS REGARDING PRODUCT LABELLING

	manufacturer; TEUFELBERGER Fiber Rope GmbH, Vogelweiderstrasse 50, A-4600 Wels
Type	application(cf. table 1)
Sirius etc.	rope name
1 eye splice etc.	information about the termination (e.g. 1 eye splice)
Polyester etc.	fiber material
DM: xx mm	nominal diameter in [mm]
L_ yy m	length in [m]
xxxxxxx	Art. no.
2016-xxx	Serial no.
2016	Year of manufacture
03	Month of manufacture
	Symbol indicating that the instructions for use must be read and understood
Rated load	the loads printed next to the following icons give an indication of rated load in a defined configuration.

[1] Andreas Detter, „Rigging-Techniken beim Abtragen von Bäumen. Teil 1: Kinematische Analysen", AFZ-Der Wald 24/2008, S.1322ff.t

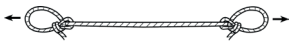

Loopie sling 0°


Loopie sling 90°

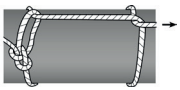

Soft eye sling 0°


Soft eye sling 90°

Straight pull


Knotted eye - straight pull


Spliced Eye - straight pull


Tree stem configuration

TECHNICAL DATA – GENERIC PRELIMINARY REMARKS

All given data are valid for **new dry ropes tested under laboratory conditions.** All breaking loads are tested under static conditons.

The rope properties change during the use of the rope: The ability to elongate decreases, the breaking load decreases.
The surrounding conditions (weather etc.) during use must be considered:
As a rule, humidity reduces breaking load and increases elongation under load.
Especially wet ropes may shrink. High or low temperature (in summer or winter) may negatively influence breaking load. The same holds true for dirt, influence of sunlight etc. Always take a reduction of breaking load into consideration.
Note that ropes become stiff when they freeze and will therefore behave differently. Tree secretions (e.g. resin, slimy exudates etc). may create conditions comparable to those caused by adhesives or lubricants and rope behavior on pulleys, in knots etc. may be significantly altered.

TECHNICAL DATA

Our ropes are regularly tested in laboratory conditions during production for MBL[2] in their "free length" when new and dry.

The additional data quoted below were determined as described in the following chapters on technical data. They are not part of our regular quality control. The values of "spliced MBL[2]" are only valid for the eye splice made by TEUFELBERGER. Only one rope end carried a splice. Depending on the make of the splice the loss in MBL as compared to the „free length" may vary considerably. Use these values only **as indicative** as they are **not based on a statistically relevant sample size.**

⚠ **Note:** The loads involved in rigging are not easy to quantify and can vary dramatically, depending on mass of the section, rigging set-up, tree species and condition and the nature of the structure being used as an anchor. Impact loads may occur unintentionally if e.g. a rope brake is blocked. They can lead to failure of the rigging equipment and/or (parts of) the tree.

The following considerations (rough guideline; no responsibility is taken for the correctness of this information) are solely based on literature[3]:

- The force factor on an anchor sling may be 9-20 times as high as the mass of the log[4]. See Rigging Research Report for details
- The load in the rigging rope is often approximately half the load on the anchor sling. (Note the strong influence of the chosen configuration!)
- Accordingly, to ensure that cordage components do not fail when subjected to impact loads, the breaking load of the anchor sling in the chosen configuration must be **more than** 9-20 times the mass of the log and the breaking load of the rigging rope in the chosen configuration must be **more than** half the breaking load of the anchor sling. Choose a sufficient safety factor on top!

Dynamic tests carried out under realistic but simulated conditions in a master thesis sponsored by Teufelberger and treemagineers give another indication (rough guideline! One defined set of conditions only!):

- Static and dynamic configured breaking strength values are rather close so that static strength data give a good lead to define a reasonable Working Load Limit.

[2] MBL = minimum breaking load

[3] Andreas Detter, Chris Cowell et al., „Evaluation of current rigging and dismantling practices used in arboriculture", Health and Safety Executive Research Report 668, 2008 (http://www.hse.gov.uk/research/rrpdf/rr668.pdf)

[4] Instead of the mass of the log its weight ought to be used to be physically correct. The weight results from the mass [kg]]*9,81m/s² and is given as a force in [N]. Simplified a mass of 1kg may be taken for 10 N = 1 daN = 0,01 kN.

TECHNICAL DATA – GENERALIST AND ENERGY DISSIPATING RIGGING ROPES

Mind the generic preliminary remarks on technical data, especially on statistical relevance!

The values of „knotted MBL“ are valid for the following configuration: An eye was knotted (doubled bowline) at each rope end:

Pic. 1

„MBL on stem“ was determined as described in the following pictures:

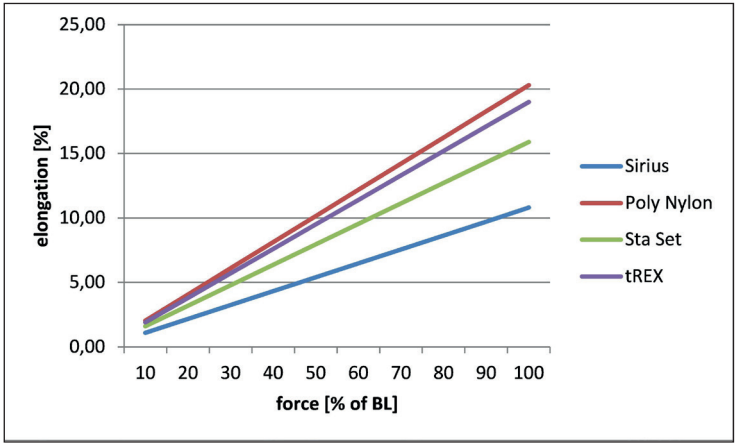
Pic. 2

Pic. 3

Information on rope make:

	Sirius	Sta Set	tREX	Poly Nylon
Core	Braided polyester	Braided polyester	Hollow-braided polyester with waxed coating	Braided polyamide PA6
Cover	Braided polyester	Braided polyester with polyurethane coating		Braided polyester

Typical load-elongation behaviour of the rope along its „free length“:



TECHNICAL DATA

Rope Data (all data: new, dry rope, lab conditions)

Rope type	Nominal diameter [mm] [inch]	Actual diameter [mm]	Nominal weight [g/m]	MBL free length min. [kN]	MBL spliced [kN]	MBL knotted [kN]	MBL stem [kN]
					max.: 85% of free length	max.: 50% of free length	max.: 59% of free length
Sirius	12	12,0	103	35	30	18	21
Sirius	14	14,3	151	52	44	26	31
Sirius	16	16,0	185	63	53	32	37
Sirius	18	18,0	227	77	65	39	45
Sirius	20	20,0	285	88	75	44	52
					max.: 85% of free length	max.: 45% of free length	max.: 55% of free length
Sta Set	1/2	12,3	116	37	32	16	20
Sta Set	9/16	13,7	150	55	47	24	30
Sta Set	5/8	14,6	177	65	55	29	36
Sta Set	3/4	18,5	253	87	74	39	48
Sta Set	7/8	21,7	353	143	122	64	79
Sta Set	1	25,3	482	168	143	75	92
					max.: 90% of free length	max.: 50 % of free length	max.: 55 % of free lenght
tREX	3/8	9,8	71	26	23	13	14
tREX	7/16	11,8	100	34	30	17	18
tREX	1/2	13,6	131	44	39	22	24
tREX	5/8	17,4	209	66	59	33	36
tREX	3/4	20,0	271	91	81	45	50
tREX	7/8	23,3	377	128	115	64	70

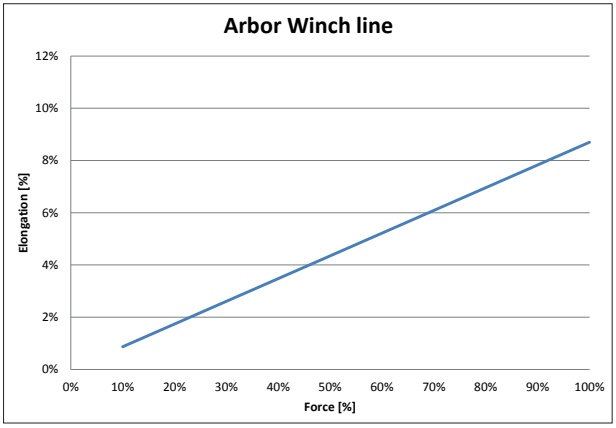
Rope type	Nominal diameter [inch]	Actual diameter [mm]	Nominal weight [g/m]	MBL free length min. [kN]	MBL spliced [kN]	MBL knotted [kN]	MBL stem [kN]
					Max: 90% of free length	max.: 50% of free length	max.: 55 % of free lenght
Poly Nylon	1/2	13,1	116	42	37	21	23
Poly Nylon	9/16	14,6	140	52	46	26	28
Poly Nylon	5/8	15,9	165	60	54	30	33
Poly Nylon	3/4	19,9	237	85	76	42	46
Poly Nylon	7/8	21,9	336	124	111	62	68
Poly Nylon	1	27,6	454	168	151	84	92

TECHNICAL DATA – WINCH ROPE

arborWINCH line
core: braided HMPE (high modulus polyethylene)
cover and intermediate cover: braided polyester

Nominal diameter [mm]	Actual diameter [mm]	Nominal weight [g/m]	MBL free length [kN]	MBL spliced [kN]	WLL[5] [kN] (saftey factor 7 acc. to machinery directive)
12,0	12,6	98	70	57	10

Typical load-elongation behaviour of the rope along its "free length"



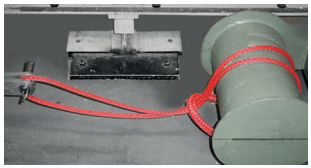
[5] WLL = Work load limit; maximum permissible work load

TECHNICAL DATA – LOOPIE, PLOOPIE, SOFT EYE SLINGS

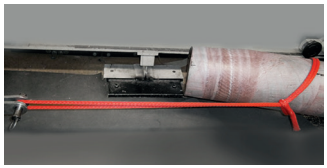
Mind the generic preliminary remarks on technical data, especially on statistical relevance!

All further data were determined as follows. They are not part of our regular quality controle. Use these values only as indicative as they are not based on a statistically relevant sample size.

The Loopies were tested in two configurations that differ in direction of applied load. They are designated as "loaded 0°" (pic. 4) and "loaded 90°" (pic. 5).



Pic. 4



Pic. 5

Soft Eye Slings were tested in two configurations that differ in direction of applied load. They are designated as “loaded 90°” (pic. 6) and “loaded 0°” (pic. 7).

Pic. 6

Pic. 7

tREX

Hollow-braided Polyester rope with waxed coating

Nominal diameter [inch]	**MBL free length min. [kN]**	**Loopie Sling** loaded 90° [kN]	**Loopie Sling** loaded 0° [kN]	**Soft Eye Sling** loaded 90° [kN]	**Soft Eye Sling** loaded 0° [kN]
		max. 110 % of free length	max. 130 % of free length	max.: 55% of free length	max.: 65% of free length
3/8	26	28	33	14	16
7/16	34	37	44	18	22
1/2	44	48	57	24	28
5/8	66	72	85	36	42
3/4	91	100	118	50	59
7/8	128	140	166	70	83

The pulley on the ploopies consists mainly from aluminum ASTM 7075 and stainless steel 174PH. The technical data of the loopies ARE NOT valid for the ploopies and adding any pulley to a loopie may change the breaking strength values considerably: For larger diameter ploopies the strength limiting part is the pulley – so take care of the pulley's breaking strength. And the loopie's breaking strength is likely to be reduced by the pulley that damages the textile during strong pull. We have experienced reductions of approx. 15%.

Nominal diameter [inch]	**MBL free length min. [kN]**	**Ploopie Sling** loaded 90° [kN]	**Ploopie Sling** loaded 0° [kN]
		max. 90 % of free length	max. 110 % of free length
7/16	34	30	37
1/2	44	39	48

MATERIAL PROPERTIES OF YARNS

The following data are taken from literature and relate to yarns, i.e. the raw material used for making the ropes.
Sources: "Faserstoff-Tabellen nach P.-A. Koch": Polyester fibers, 1993 and Polyamide fibers, 1997. Fact Sheets by DSM: CIS YA100 and CIS YA102 of 01-01-2008;

Material		**Polyester** (polyethylen-terephthalate)	**Polyamide** (Polyamide 6)	**HMPE** (high modulus Polyethylene)
Electrical properties:				
Specific electrical resistivity	Ωcm	10^{11}-10^{14}	10^{9}-10^{12}	
Electrical resistivity	Ω			>10^{14}
Moisture take-up (standard climate)	%	0,2-0,5	3,5-4,5	0
Chemical resistance				
Resistance against acids		Good against diluted mineral acids and organic acids at room temperature	More susceptible to diluted acids thean Polyester	excellent
Resistance against alkali		Sufficient. Concentrated or hot diluted alkali affect the fibre.	Very good resistance against alkali at room temperature. Fiber damaged by high concentration or temperature.	excellent Careful with strongly oxidizing media.

MATERIAL PROPERTIES

Material		Polyester (polyethylen-terephthalate)	Polyamide (Polyamide 6)	HMPE (high modulus Polyethylene)
Avoid contact with chemicals!				
Thermal properties:				
Thermal conductivity	W/mK	0,25	0,24	20 axial 0,2 transveral
Melting point	°C	250-260	215-220	144-152
Permanent heat resistance	°C	120	90	70
Characteristics in cold		Minor increase in tenacity, strong decrease in elongation	Very good resistance against cold. Minor increase in tenacity, strong decrease in elongation	At -60°C 110% of tenacityand 90% of elongation as compared to +23°C
Weathering		After 1 year weathering 40-47% (double) bending cycles until breakage.	Medium stability against light.	Under real conditions (9 months outdoors) residual tenacity comparable to Polyester (46%): 47%.
Burning behaviour		Does not continue burning, tendency to flamng droplets	Like Polyester. Burns considerably if coloured or impregnated	Does not continue burning
Disposal		Domestic waste	Domestic waste	Domestic waste

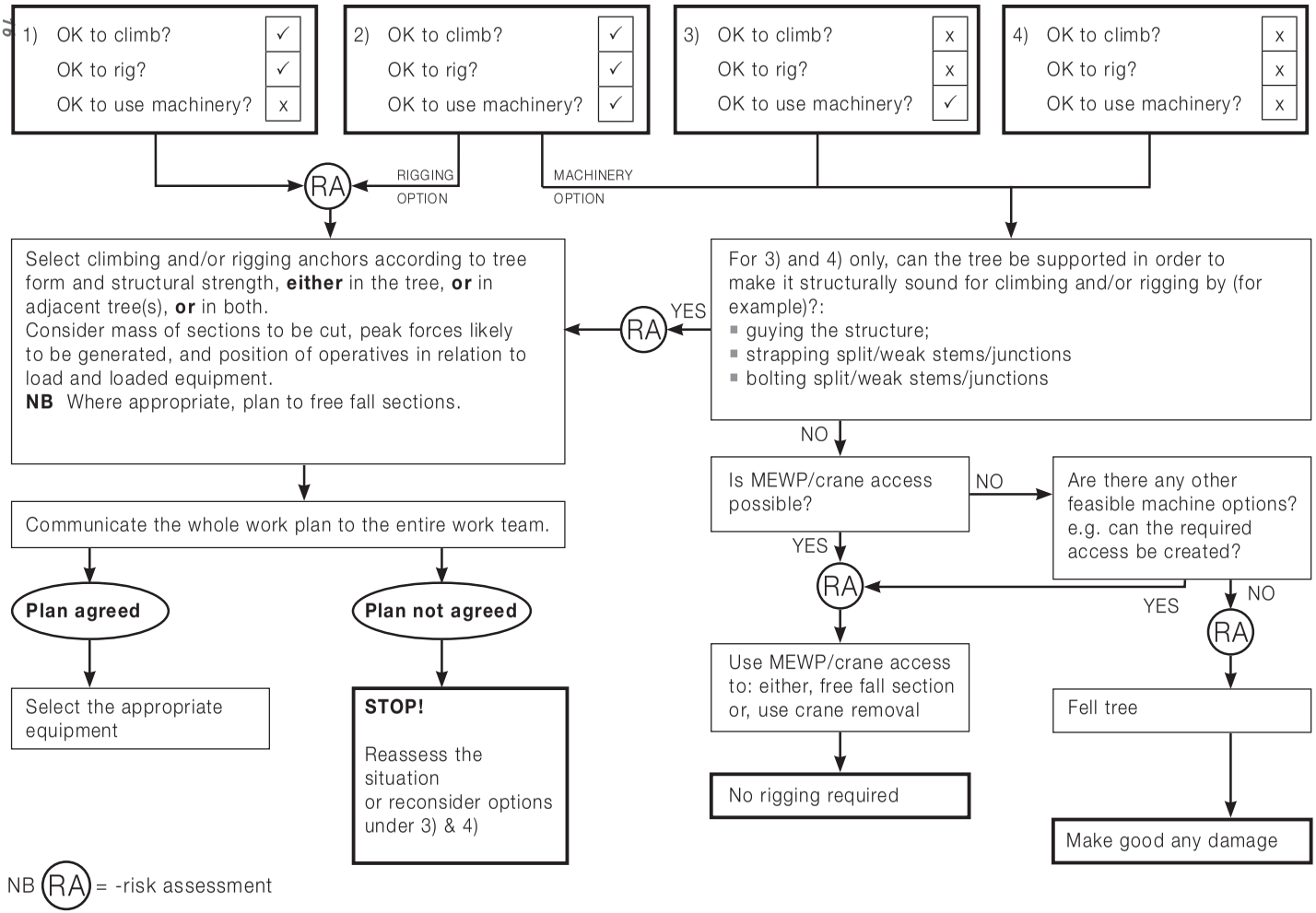
MATERIAL PROPERTIES OF METAL PARTS

For information on the metal parts also consult the corresponding user instructions accompanying the product.
Some values in the below table are taken from material datasheets and have not been measured on the actual product. Certain factors may affect these values (e.g. an anodising layer will drastically reduce electrical conductivity).

Material		Stainless steel 174 PH	Aluminium ASTM 7075
Electrical properties			
Specific electrical resistivity	Ωcm	$8*10^6$	$5.15*10^6$ (Anodizing layer reduces conductivity)
Electrical resistivity	Ω		
Moisture take-up	%	0	0
Chemical resistance			
Resistance against acids Resistance against alkali		Strong acids and alkalis may have a corrosive effect. If contamination occurs, clean and inspect in accordance with user instructions of pulley	Strong acids and alkalis may have a corrosive effect. If contamination occurs, clean and inspect in accordance with user instructions of pulley.
		Avoid contact with chemicals!	
Behaviour if soiled		Certain contaminants may have a corrosive effect. Contaminants may impede the correct function of mechanisms. Regularly clean, maintain and inspect in acc. with user instructions of pulley.	Certain contaminants may have a corrosive effect. Contaminants may impede the correct function of mechanisms. Regularly clean, maintain and inspect in acc. with user instructions of pulley.
Thermal properties			
Thermal conductivity	W/mk	178.4	130
Operating temperatures of pulley		Suitable for normal climatic temps (-40 to +50 °C)	Suitable for normal climatic temps (-40 to +50 °C)
Ice		No effect if > -40°C	No effect if > -40°C
Weathering		Certain environmental conditions may have a corrosive effect. Regularly clean, maintain and inspect in acc. with user instructions of pulley.	Certain environmental conditions may have a corrosive effect. Regularly clean, maintain and inspect in acc. with user instructions of pulley.
UV stability		No effect in normal climatic conditions	Anodized layer may fade
Burning behaviour		Does not burn	Does not burn
Disposal		Widely recycled	Widely recycled

USE AND LIMITATIONS OF USE

Before using rigging ropes make considerations whether rigging is the most suitable method. Question whether the tree is safe to climb and whether the tree is safe to use as a structure for rigging. Only if the answer to both questions is “yes”, rigging shall be used.
Also consider whether it is safer to use machinery (crane, work platform) than to rig the tree.



Andreas Detter, Chris Cowell et al., „Evaluation of current rigging and dismantling practices used in arboriculture", Health and Safety Executive Research Report 668, 2008

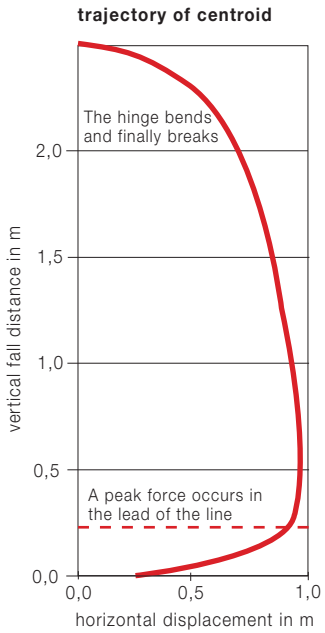
TO BE OBSERVED PRIOR TO USE

Before rigging operations:

- Carry out a thorough risk assessment. It is the responsibility of the user to ensure that a relevant and 'live' Risk Assessment is in place during the work being carried out which includes emergency contingencies.
  Notably, a thorough visual tree inspection must be undertaken.
- Plan and organize all steps. Note that different sections of the same tree show different behavior. Individual measures and techniques may therefore be necessary.
- Safe rigging requires team work. Take care that each team member is aware of their scope of responsibility. Establish and maintain clear communication between all people involved by introducing unambiguous language, hand signals and by using communication headsets if appropriate.
- It is strictly forbidden to stay underneath suspended loads. Note that wind can alter the direction of fall of a tree section, rotate it when suspended, or cause the lowering zone to be altered. The work site must be clearly demarcated, with access restricted, so that no one can enter the site inadvertently especially members of the public.
- Minimize all risks and take measures to prevent accidents. A plan of rescue measures that covers all foreseeable emergencies needs to be in place before this product can be used. Prior to and during use, rescue measures that can be executed safely and effectively must be considered. The situation of each team member must be analyzed.
- Set appropriate safety factors.
- Choose a safe rigging technique for your specific application.
- Choose the appropriate rigging equipment in the appropriate configuration.
- Take all measures for the safety of the climber! Use the necessary personal protective equipment against fall (PPE)!
  The climber, and his fall protection PPE, shall be positioned outside the anticipated trajectory of the rigged section and any rigging equipment. Be aware that in case of rope failure heavy recoil may occur with hardware moving upwards in the tree.
- A particularly critical situation occurs when the log impacts and the tree starts to vibrate. When 'snatching' tree sections, the team shall carefully consider the effects of the forces generated on the anchor structure, how the aerial operatives might be negatively affected and what remedial measures would minimize risk to acceptable levels?
- The climber shall have to establish a means of safe egress from the tree prior to undertaking each cutting and rigging operation.
- The climber shall carry a handsaw.
- Be aware of the entire responsibility for the planned operations. Be aware that there is a responsibility for a Competent Person to plan all rigging operations.

⚠ **Note:** The loads involved in rigging are not easy to quantify and may vary dramatically depending on the mass of the section, rigging set-up, tree species, tree condition and the form of the anchor structure itself. Shock loads may occur unintentionally, e.g. when a brake is blocked. They can lead to failure of the rigging equipment and / or failure of (parts of) the tree.

Literature[6] gives model trajectories. Note! Deviations are to be expected in reality.



CHOICE OF EQUIPMENT

Before establishing a rigging system carry out a risk assessment covering the work site and the planned work. Decide how to assemble the individual components. Select all rigging components carefully, ensuring correct neighbour component capability. Use loading capacities for the chosen configuration. Configure all components correctly.
Visual inspection of the tree is a fundamental step. Assess loads in a worst-case scenario and take invisible tree damage into consideration.

The ropes' capabilities when dry, new and under laboratory conditions are given in the chapters on technical data. Make sure that they are sufficient for your application.

Take into consideration that

- dynamic loads imply significantly higher forces than static loads
- the rope end connection has a lower breaking strength than the rope in its "free length". (Knots reduce the breaking strength dramatically – reduction of more than 50% is possible. A correctly assembled splice may be assumed to be 10-20% lower in breaking strength than the rope.)
- the configuration of ropes and slings may influence the effective load considerably

[6] Andreas Detter, Chris Cowell et al., „Evaluation of current rigging and dismantling practices used in arboriculture", Health and Safety Executive Research Report 668, 2008

- all plans and actions should be based on a worst-case scenario and take unforeseen events into account.

Dynamic loading occurs when a falling/swinging load is dropped into rigging. The more rapidly or suddenly the load is arrested, the greater the dynamic load generated. In such cases the dynamic load may easily be equivalent to many times the static load.
Operations must be planned in a way to minimize and/or effectively manage dynamic loads. Carefully consider the load capacity of the anchor slings as the exerted forces can be more than double the forces on the rigging rope.

A Competent Person who is trained in calculating / estimating rigging forces, and must know the relationship between section mass, fall distance, rope type, rope length and further relevant factors, must be present on site and manage rigging operations.

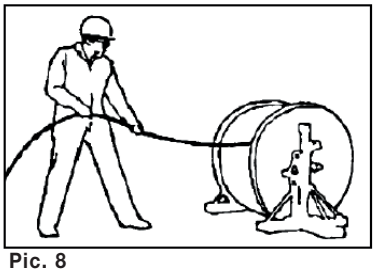
Studies[7] show that the forces at the anchor sling are about 9-20 times as high as the section mass. Warning! This is just a rough indication.

Make sure that the performance of the rope is suitable and adequate for the intended use!

Chose a relevant safety factor. Consult the "International Guidelines on the Safer Use of Fiber Rope" (CI 1401) of the Cordage Institute for recommendations on safety factors. To be downloaded free of charge at www.ropecord.com.
The machinery directive 2006/42/EC indicates use of a minimum safety factor (ratio of MBL of new rope in its free length to static work load) of 7 for hoisting. Literature ***suggests*** multiplying any estimated load by a factor of 1.5[8].

⚠ **Note:** The system is only as strong as the weakest component involved.

INSTALLATION AND USE



Pic. 8

Unrolling a spool:
When the rope is taken off a spool, the spool must be free to rotate. Place a pole through the middle of the spool and pull the rope off the spool so that it rotates. Never take rope off a spool lying sideways, as the rope will become badly twisted.

[7] Brian Kane et al., „Forces and Stresses Generated During Rigging Operations", Arboriculture & Forestry 2009, 35(2), 68-74.
[8] Andreas Detter, Chris Cowell et al., „Evaluation of current rigging and dismantling practices used in arboriculture", Health and Safety Executive Research Report 668, 2008

INSTALLATION AND USE

Uncoiling:
When removing a rope from a coil, one should start with the end from the inside. The rope should run out counter-clockwise. If the rope is pulled out clockwise, kinks will occur. If that happens, re-place the length of rope back into the coil, turn the coil over and pull from the center again. Now the rope should run out counter-clockwise and thus kink-free.

Knots:
⚠ **Knots reduce breaking loads considerably.** In the reported tests a doubled bowline was used.

Instructions for doubled bowline:


Pic. 9


Pic. 10


Pic. 11


Pic. 12


Pic. 13

Splice:
⚠ **Any splice reduces the breaking load.** Only splice a rope when properly trained!
Splicing instructions for Sirius, Poly Nylon, Sta Set, arborWINCH line and tRex may be downloaded from our homepage: www.teufelberger.com.
We take no responsibility for splices or other adjustment of ropes that have not been made by TEUFELBERGER.

Loopie Sling / Ploopie:
Loopie: Install the pulley on the Loopie Sling and carefully smooth out the splice.


Pic. 14


Pic. 15

Pic. 16

Put the Loopie Sling/Ploopie around the tree and put the pulley through. The length of the Sling can be adjusted: Pull the sling tight and make sure that sling and pulley fit tightly.

Pic. 17

Pic. 18

Soft Eye Sling:

Put the eye with the pulley around the tree as shown in the pictures. The stiff rope end helps in mounting.

Pic. 19

Pic. 20

Pic. 21

Pic. 22

Pic. 23

Pic. 24

Put the lose end between sling and tree.

Pic. 25

Now set up the rigging rope with a doubled bowline as described in the section on technical data.

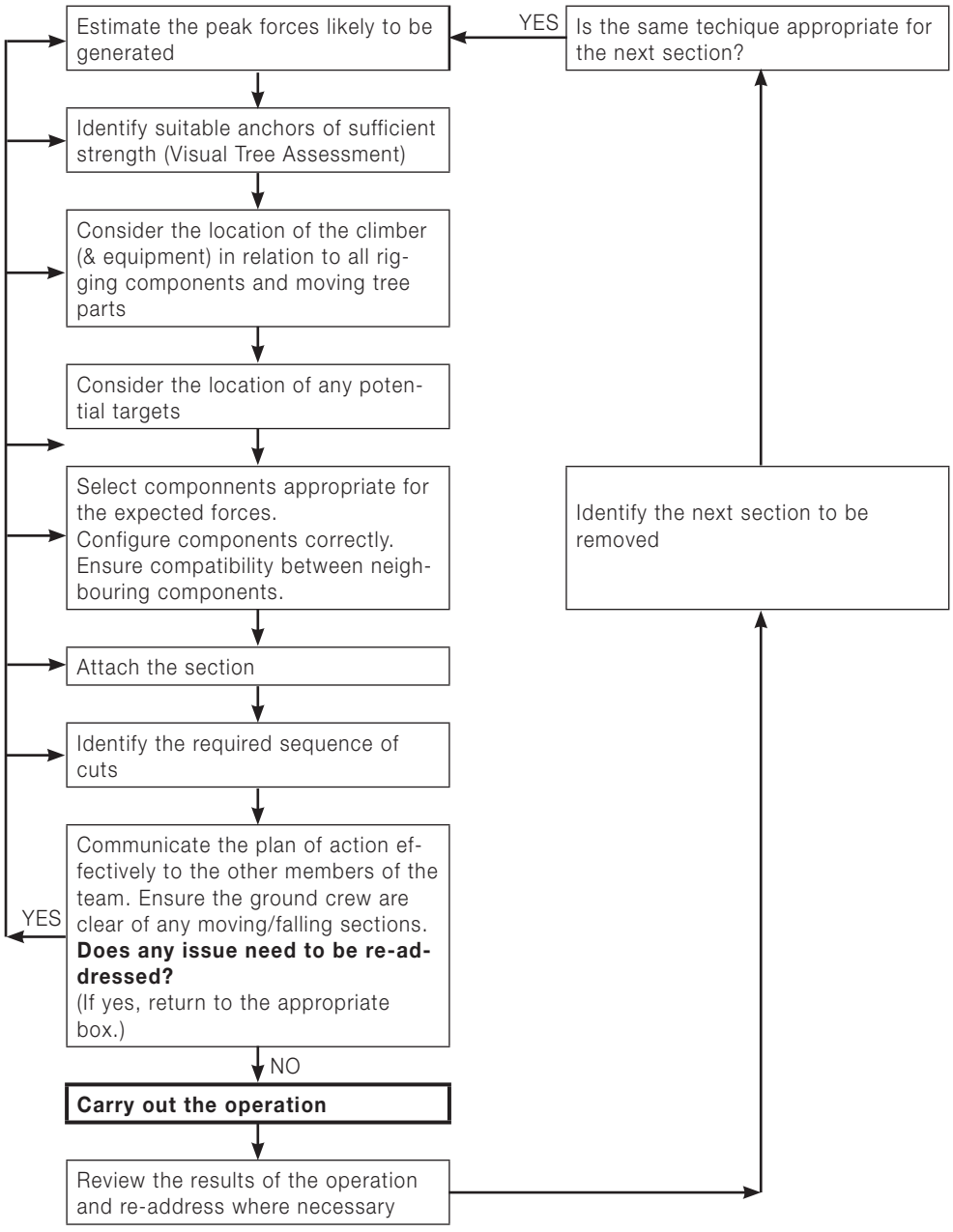
Pic. 26

Pic. 27

Pic. 28

Pic. 29

Carefully check the system after installation! Keep sharp and abrasive objects/surfaces away from rope! The following figure should assist you in carrying out rigging operations safely.



Source: Rigging Research Report

Options to minimize the effective forces in rigging

- reduce the log mass
- reduce the log length
- install the anchor block as close as practicable to the notch
- establish an anchor above the section to be rigged (in the same tree or in neighbouring trees/structures)
- avoid slack in the rigging ropes.

⚠ **NOTE:** These are basic recommendations. There may be reasons not to use these strategies in your special application.

Reduce pendulum swing where possible!

Rotation of the rope along its axis reduces service life! The cover pattern of Sirius ropes helps identify twist.

Ropes of higher elongation can take up more energy. All ropes increase in length – a longer rope does so more than a short one. The higher the applied load the more elongation of the rope.
Bear in mind that elongation implies risk! An elongated rope can move the load in an unforeseeable or dangerous way. An elongated rope can recoil and cause serious injury.
Never wind a rope around your hand or body. Be sure not to stand on rigging ropes during rigging operations. Keep branches, tools and other items clear of fast moving rigging ropes.
Fall distance is increased due to elongation of the rope. Control of rigged sections may be more difficult with ropes of higher elongation.

Note when using winch rope:
Never stand in line with rope under tension. Under high tension enormous energy is stored in the rope due to the elasticity of the synthetic material. High danger is involved when persons stand in line with the rope under excessive tension. If the rope fails, it can recoil with considerable force potentially causing serious or fatal injury.
Inform all site staff of this hazard. Ensure all site staff and the public are kept clear of the danger area(s).
If a rope is frequently twisted in one direction, as e.g. in the use on a winch, it should be used in the opposite direction at times.

Use with further equipment:
It must be ensured that the recommendations for **use with other components** are complied with.
Ensure that all components are compatible. Particularly,

- the ratio D/d of pulley diameter D to rope diameter d must be as large as possible
- the diameter of the pulley groove must be adequate for the rope diameter.
- ensure that all components are configured correctly.

Failure to do so increases risk serious injury or fatality.

REGULAR CHECKS

WARNING – SAFETY INDICATION

Generally speaking:
If there is the slightest **doubt** about the suitability of the product to perform its required task, the product must to be retired or quarantined and then subjected to testing by a competent person. It must only be returned to service if a competent person has approved its further use in writing after testing.

After a shock load it may be necessary to retire the rope.
The rope's ability to dissipate dynamic loads is reduced by use under normal and shock loading.
A used rope is not as elastic as a new one and therefore cannot dissipate as much energy. The peak forces in rigging operations therefore increases. The breaking load of the rope decreases at the same time.

Prior and after each use, this product must be subject to inspection as described below:
Prior and after each use, the product must be subject to visual and tactile inspection to verify its integrity, readiness for use and proper functioning.

Inspect the rope visually from all sides and along its entire length. Feel along the rope (tactile check) in order to detect any hidden core damage that might have been caused by excessive bending or local overloading.
Note rope sections that have been thermally damaged (glassy rope surface). This may have been caused by high friction in the system. Pay particular attention to the rope section used in the half-hitch on the log. This part of the rope is usually the most damaged one. It may be necessary to cut off this part of the rope and make a new splice or use the other rope end. If in doubt, withdraw from service!

Avoid using a rope that shows signs of aging and wear. Only use ropes in acceptable condition that are free from cuts, knots or worn strands. Avoid rope abrasion on rough surfaces. Try to ensure the rope wears evenly along its' entire length. Never join a broken rope - retire it from service!

We recommend keeping record of use (date, duration, conditions) and inspections (date, examiner, distinctive features). Consult all relevant regulations for inspection intervals if applicable.

Always check the entire rope including terminations and hardware!

If there is the slightest doubt, the product must be withdrawn from service or inspected by an expert.

REGULAR CHECKS / MAINTENANCE / SERVICE LIFE

Checklist: This inspection must comprise:

- Inspection of the general condition: age, completeness, dirt, correct composition.
- Inspection of the labels: Present? Is all information legible? Is year of production identifiable?
- Inspection of the individual parts for mechanical damage such as cuts, cracks, notches, abrasion, deformation, ribbing, twisting, flattening, thick places.
- Inspection of all individual parts for damage caused by heat or chemicals such as fusion, hardening, stiffness, discoloration.
- Inspection of the metal parts for corrosion and deformation.
- Inspection of the completeness of the end connections, seams (e.g. no abrasion of sewing thread), splices (e.g. no slippage), knots present.

The equipment must be inspected regularly: your safety depends on the effectiveness and durability of the equipment.

Additional information can be found in document CI 2001 — Fiber Rope Inspection and Retirement Criteria – of the Cordage Institute. To be downloaded free of charge at www.ropecord.com.

MAINTENANCE

Only the manufacturer is permitted to carry out repairs.

SERVICE LIFE

Actual useful life depends solely on the condition of the product which is influenced by various factors (see below). The lifespan could be as short as first use under extreme conditions, or even less if damaged (e.g. in transit) prior to first use.
Only if the rope is rarely used (one week a year) and stored correctly (see the section on transport, storage and cleaning) can its useful life be up to 5 years from date of manufacture. The year of manufacture can be depicted from the product label. If it is not possible to clearly state the age of the rope, it must be retired.

Mechanical wear or other influences such as the effects of sunlight seriously reduce useful life. Bleached or abraded fibres, discolouring and hardening are a clear sign that the product should be withdrawn from use. Consult the chapter “Regular Checks”.

TEUFELBERGER expressly refrains from making any general statements about the useful life of the product, since it depends on a variety of factors such as UV light, the type and frequency of use, treatment, the effects of weathering such as ice or snow, the environment such as salt, sand, battery acid, thermal strain (exceeding normal climatic conditions), mechanical deformation and many more factors.

Always check the entire rope including terminations and hardware!
If there is the slightest doubt, the product must be withdrawn from service or inspected by an expert.

TRANSPORT, STORAGE AND CLEANING

The rope should always be protected against light and dirt and placed in appropriate packaging (moisture resistant, light impermeable material) during **transport.**

Storage conditions:

- protected against the UV radiation (light, welding equipment, ...),
- dry and clean
- at room temperature (15-25 °C)
- not in the proximity of chemicals (acids, lyes, liquids, vapours, gases,...) and other aggressive environments
- protected against sharp-edged objects

Therefore, store rope products in a dry and ventilated environment away from light. Avoid twisting of the rope!
Keep the product clean! Dirt can damage the rope. Damp dirty ropes may rot.

For **cleaning**, use lukewarm water and – if available – a rope detergent in accordance with the cleaning instructions provided thereon. Do not use a textile detergent. Following cleaning, rinse the product with plenty of clear water. Alternatively, you can use benzine for cleaning. Be sure to observe the applicable safety rules for the use of benzine. In any event, prior to storage or use, allow the product to dry completely in a natural way and not in direct sunlight, or near fires or other heat sources.

For **disinfection**, use only such substances that do not have an impact on the synthetic materials used. Do not disinfect the product more often than is absolutely necessary! We recommend the use of isopropyl alcohol 70%. Apply the disinfectant to the surface for about 3 minutes and allow the product to dry naturally. Be sure to observe the safety instructions for the use of the disinfectant.

If you fail to observe these provisions, you may be putting yourself and others in danger!

DECLARATION OF CONFORMITY

DECLARATION OF CONFORMITY FOR THE ROPE MASTER LENGTH

The company: **TEUFELBERGER Fiber Rope GmbH**
Vogelweiderstr. 50
A-4600 Wels
hereby declares that the machinery described below:

Generic denomination	a) Sirius 12 / 14 / 16 / 18 / 20mm b) arborWINCH line 12mm
Function	Rope for lifting purposes to be use in rigging operations
Model	See generic denomination
Type	a) braided cover-core rope made of PES/PES b) braided cover-core rope made of HMPE/PES with an intermediate PES cover
Serial number	See label of the rope master length
Commercial name	See generic denomination

fulfils all the relevant provisions of the Machinery Directive 2006/42/EC as amended.

Wels, January 20th, 2016

Person authorised to compile the technical file:

DI. Rudolf Kirth
Technical Director Fiberrope
TEUFELBERGER Fiber Rope GmbH
Vogelweiderstraße 50
A-4600 Wels

Wels, January 20th, 2016

Person empowered to draw up the declaration on behalf of the manufacturer:
Rainer Morawa, MBA
President Fiberrope
TEUFELBERGER Fiber Rope GmbH
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NOTES

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Treecare Catalogue

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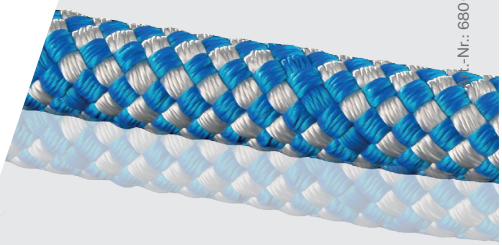

Art.-Nr.: 6800504 / Ausgabe 02/2016 / Hersteller: TEUFELBERGER Fiber Rope GmbH, Vogelweiderstraße 50, 4600 Wels, Austria