PFEIFER —
Your specialist for ropes for mobile and crawler cranes

PFEIFER
SEIL- UND HEBETECHNIK
GMBH

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Innovative wire rope systems for mobile and crawler cranes

Moving means to set things in motion, to unfold dynamics, to create things. For us in the PFEIFER group, to move is very specific: it means that with our products from Wire Rope Technology, Rope and Lifting and Building Systems elevators, heavy loads on cranes, sheet metal coils, workpieces and precast concrete elements move. Our cable structure buildings are known all over the world, and so is our extensive knowledge on the dynamics of wire rope in all applications.

Moving also means for us that we don’t sit still, we study, we learn, we apply and we invest. There is a reason why the PFEIFER group is one of Europe’s leading companies in Structures, Wire Rope Technology, Rope and Lifting and Building Systems.

We get things going – special requests by customers, efficient and practical solutions, technical expertise, quality and dependable service – these are the benefits for you as a partner.

Gerhard Pfeifer,  
President of the PFEIFER group

The PFEIFER group is one of Europe’s leading companies in Structures, Wire Rope Technology, Rope and Lifting and Building Systems. The headquarters are located in Memmingen, Germany. Numerous service centres and subsidiaries worldwide are responsible for sales and distribution.
Ropes ready to use for cranes and construction machinery are our strength for years. We are the original equipment manufacturer of well-known construction machinery manufacturers, e.g. Liebherr, and have the comprehensive know-how in production and application of crane and construction machinery ropes.

The choice of a specific rope construction of our very extensive portfolio of ropes for your machine requires the special application- and rope-know-how of our consultants, because of the dependence on crane system, operation conditions and abrasion behaviour of the ropes.

Our complete documentation guarantees you traceability for all operations.

We guarantee rapid availability with our fully automatic high rack storage in Memmingen with a capacity of more than 4000 tons and further storages worldwide. Professional logistic partners ensure quick delivery.

Reduce every risk and trust in our longtime experience of correct rope selection!

Further information can be found under Products & Services at the PFEIFER web portal: www.pfeifer.info/building-construction

Please let us advise you!

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General information

Requirements in wire ropes of mobile and crawler cranes

Hoisting ropes
High rope speeds, small winch dimensions, as well as large hoisting heights are complex challenges, which require wire ropes with special properties. The resistance in multi-layer spooling plays a decisive role. The choice of the right end-termination is of high importance. We will be pleased to advise you!

Luffing ropes
Large rope tension and multiple reeving require special ropes. Therefore characteristic of our luffing ropes is for example the excellent performance during the boom set up.

Pendant ropes
Only by production with high dimensional accuracy and by the use of special wire ropes with high breaking forces the specific demands on pendant ropes in mobile and crawler cranes can be reached. We set ourselves this challenge everyday.

PFEIFER added value advantage

- Complete documentation and traceability
- High availability
- Attractive price
- Own material test centre
- Comprehensive stock

PFEIFER analyses all properties of wire ropes and applied materials with extensive tests to choose the right wire rope for your application and to optimize the lifetime in your equipment.

Reduce every risk and trust in our longtime experience in choosing the right ropes!

Please let us advise you!
Ropes for mobile cranes
### Liebherr

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### Further manufacturers

- Kobelco
- Link Belt
- Manitex
- Palfinger
- XCMG
- Sany
- Zoomlion
- and further manufacturers

Detailed handling constructions you will find in our operating manual for stranded ropes in the PFEIFER download centre at: [www.pfeifer.info/manual-strand-ropes](http://www.pfeifer.info/manual-strand-ropes)
### Liebherr

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### Further manufacturers

- Kobelco
- Link Belt
- Manitex
- Palfinger
- XCMG
- Sany
- Zoomlion
- and further manufacturers

Detailed handling constructions you will find in our operating manual for stranded ropes in the PFEIFER download centre at:

Pendant ropes

Different manufacturers

Extract from our in stock rope range

Detailed handling constructions you will find in our operating manual for stranded ropes in the PFEIFER download centre at:

→ www.pfeifer.info/manual-strand-ropes

Trust in our experience and let us advice you!
Rope end terminations

Pouch Socket PSH
22A

Technical data
- Material bolt: Quenched and tempered steel
- Surface bolt: Plasma nitrided
- Material housing: Cast steel (cold resistant to -40 °C)
- Surface housing: Hot-dip galvanised or painted
- Surface hinged safety pin: Zinc-plated

Application area
- Round strand ropes

Combination products
- Swivel PSH 42A
- Swivel 96A
- Swaged sleeve rotary locked PSH 12A
- Resin Socket PSH 13A
- Resin Socket rotary locked PSH 14A
- Swaged Sleeve PSH 11A

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Please note that these are castings with tolerances. Detailed measurements on request!

Dimensions correspond to nominal sizes without tolerance and without coating. Please contact us for exact measurements!

Don’t use non-rotation resistant and rotation resistant ropes with a turnable fixed point (e. g. swivel). The end termination has to be fixed against rotation as well. If this is not observed considerable damage, serious injury or death will occur.
Rope end terminations

Swaged Sleeve PSH
11A

Technical data
Material  Stainless steel (rustproof, cold resistant to -45 °C)
Surface  Plain
Nominal tensile strength  ≤ 2160 N/mm²
Loss factor  0,9
Fill factor range
Fill factor f  0,64…0,78
Application area
High performance rotation-resistant ropes

Combination products
Pouch Socket PSH 22A

Reference no.  NG  ds  A1  A2  da  da Tol  d  L  L Tol  t2  Weight
mm  mm  mm  mm  mm  mm  mm  mm  mm  mm  kg
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214372 16 15 10 24 36 +0,4 12 116 +2 24 0,6
214286 16 16 10 24 36 +0,4 12 116 +2 24 0,3
214374 19 17 10 24 44 +0,4 12 135 +2 24 1,2
214377 19 18 10 24 44 +0,4 12 135 +2 24 1,1
214386 19 19 10 24 44 +0,4 12 135 +2 24 1
214388 22 21 10 24 48 +0,4 12 154 +3 26 1,6
214400 22 22 10 24 48 +0,4 12 154 +3 26 1,5
214409 26 23 10 24 56 +0,6 12 181 +4 26 1,4
214408 26 24 10 24 56 +0,6 12 181 +4 26 2,6
214405 26 25 10 24 56 +0,6 12 181 +4 26 2,6
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229695 40 38 16 40 86 +0,8 20 280 +5 40 9
229696 40 39 16 40 86 +0,8 20 280 +5 40 8,7
229697 40 40 16 40 86 +0,8 20 280 +5 40 8,4

Dimensions correspond to nominal sizes without tolerance and without coating. Please contact us for exact measurements!
Rope end terminations

Open wedge socket PSH
95A

Technical data

Material bolt: Quenched and tempered steel
Material housing: Cast steel (cold resistant to -40°C)
Surface housing: Hot-dip galvanised
Material wedge: Cast steel (cold resistant to -40°C)
Surface wedge: Hot-dip galvanised
Loss factor: 0.8

Application area

Round strand ropes
Combination products
Pouch Socket LH 570/85A
Swivel Pouch Socket LH 571/86A

Don’t use non-rotation resistant and rotation resistant ropes with a turnable fixed point (e.g. swivel). The end termination has to be fixed against rotation as well. If this is not observed considerable damage, serious injury or death will occur.

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Additional sizes on enquiry.
Dimensions correspond to nominal sizes without tolerance and without coating. Please contact us for exact measurements!

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Your specialist for ropes for mobile and crawler cranes 03/2018
Rope end terminations

Solid thimble PSH
519

Technical data
Material  Cast steel (cold resistant to -40°C)
Surface    painted

Application area
Round strand rope pressed acc. to EN 13411-3

Combination products
Pin 518 P
Swaged fork thimble PSH 518
Ferrule acc. to EN 13411-3 510
Safety spring 518 S

Don't use non-rotation resistant and rotation resistant ropes with a
turnable fixed point (e.g. swivel). The end termination has to be fixed
against rotation as well. If this is not observed considerable damage,
serious injury or death will occur.

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WLL = maximum payload
Safety factor = 3,0
Dimensions correspond to nominal sizes without tolerance and without coating. Please contact us for exact measurements!
Rope end terminations

Swaged fork thimble PSH
518

Technical data

Material: Cast steel (cold resistant to -40°C)
Surface: Painted or galvanised

Application area
Round strand rope pressed acc. to EN 13411-3

Combination products
Solid thimble PSH 519
Pin 518 P
Ferrule acc. to EN 13411-3 510
Safety spring 518 S

Don’t use non-rotation resistant and rotation resistant ropes with a turnable fixed point (e.g., swivel). The end termination has to be fixed against rotation as well. If this is not observed considerable damage, serious injury or death will occur.

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WLL = maximum payload
Safety factor = 3.0
NG 14 to 36: Form A, NG 37-68: Form B
Dimensions correspond to nominal sizes without tolerance and without coating. Please contact us for exact measurements!
Innovative packaging solutions

PFEIFER-reels and PFEIFER-stands for reels – the perfect combination for your ropes:

- Optimized packaging sizes
- Simplified transport – to be taken by forklift
- Stands for reels are gently for reels and ropes
- Prevention of transport mistakes and resulting damages
- Heat treatment according to ISPM 15

Further possibilities of packaging of ropes on reels:

- Planked reels
- Seaworthy packing

Depending on your needs we can pack your ropes in wooden boxes according to ISPM 15.

Of course we follow your special requirements as well.

All our shipments are insured to provide maximum customer service.
Further products and services

Rope accessories

**Connecting links**
For fast and simple connection and fastening options of steel wire ropes
Available in various versions

**Swivels**
To avoid the rope torque being transmitted to the load and thus causing great damage

**Bolts**
For fast and stable securing in the most diverse areas of application

**Manual strand ropes**
Detailed manual for the proper use of your strand ropes with useful tips to extend the rope lifetime
Further languages on request
Included in each Rope Service Starter Kit and the measurement equipment cases 75/150 or available as PDF in the PFEIFER download centre at:

Rope service and rope handling

**Rope lubrication**

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Maintain your wire ropes with the proper re-lubricant and extend the lifetime. Save costs for new ropes and rope changes by extended lifetime.

We can offer re-lubricating large rope lengths using a special re-lubrication device. Our service team comes to you worldwide and saves you cost intensive trips with your crane.

**Rope measurement**

- Groove gauges
- Caliper gauges
- Sets

Use our special measurement devices from the rope specialist to reduce costs by extending the lifetime.

Based on our long-term practical experience of rope drive inspection, we created a measurement devices program. These measurement devices are used by our rope experts for each inspection and thereby approved for general use.

**Tools for working on ropes**

- Crimping pliers
- Wire rope cutter

So that you can also easily carry out minor work on ropes, PFEIFER offers you a selection of different tools for working on ropes.

**Rope assembly aids**

- Winding blocks
- Rope tensioning clamps
- Cable grips

PFEIFER rope assembly aids assist you reliably in the attachment and replacement of your steel ropes.

**Innovative packaging solutions**

- Reels
- Stand for reels

PFEIFER-reels and PFEIFER-stands for reels – the perfect combination for your ropes:

- Optimized packaging sizes
- Simplified transport – to be taken by forklift
- Stands for reels are gently for reels and ropes
- Prevention of transport mistakes and resulting damages
- Heat treatment according to ISPM 15
Rope services

**Rope assembly**
PFEIFER is expert in all kinds of rope assembly — from the high-precision manufacturing of the finest ropes for medical technology to the precise cutting to length of crane hoisting ropes and the casting of ropes with the largest of diameters.

**End connection design**
Standard or tailor-made — through our own development and production every rope receives the optimal connection.

**Rope stocking**
PFEIFER guarantees fast availability in one of the industry’s largest stock assortments and a capacity of well over 4000 tonnes in a fully automatic rope warehouse in Memmingen and in further warehouses all over the world. High-performance logistics partners guarantee fast delivery. Thanks to optimised packaging, every reel reaches its destination worldwide well protected.

**Rope inspection**
After the delivery of the optimum rope we support our customers and are happy to assist with all questions regarding the rope application.

We analyse optimization potentials at rope winches and drives, check ropes for damages and abrasion to extend the lifetime and reduce rope change and down time costs.

We do this job on a daily basis – worldwide.

**Technical rope seminar**
Interested in a seminar at your premises?
We would be pleased to provide you with an individual offer.

**Rope application consultancy**
Through the correct selection of ropes and end connections to suit the conditions of use you can achieve the most economical lifetime, reduce possible dangers and avoid high failure costs.

**Repair service**
Steel wire ropes are subject to wear in tough continuous use and can be damaged by external influences. PFEIFER offers you a rope repair in original rope quality at your premises.

Using discarded products or disregarding basics of proper application by the use of wire ropes can cause enormous danger for humans and material.

Trained employees increase safety in your company, avoid accidents and reduce costs.

In our established technical seminars, our competent and experienced instructors train your staff in latest standards and in all theoretical and practical issues.
Rope services

Rope analysis

- PFEIFER analyses with extensive tests in the central Rope and Material Test Centre all properties of wire ropes and applied materials at the headquarter in Memmingen as well as at further machines at PFEIFER DRAKO in Mülheim/Ruhr. Also necessary tests can be done locally in our global subsidiaries.

- Aware that not only the usual catalog values such as weight per meter and minimum breaking force decide on the performance of wire ropes, all properties of the ropes are determined at PFEIFER in extensive tests.

- Equipped with this knowledge, we will choose the right wire rope for your application and so we optimize the lifetime of your equipment.

Further Offers:
- Test Facility for Lateral Pressure Resistance
- Coat Thickness Measuring
- Ultrasonic
- Torsion Test Facility
- Microscopic Analysis
- Elongation and Pull Test Facility
- Hardness Test
- Notch Impact Test
- Dye Penetrate Test

Test Facility for Determining Bending Fatigue
Spectral Analysis
Multi Layer Spooling Test Tower
Tension Fatigue Test Facility
Pull Test Facility 6,000 kN
Pull Test Facility 800 kN

Rope assembly

PFEIFER is expert in all kinds of rope assembly – from the high-precision manufacturing of the finest ropes for medical technology to the precise cutting to length of crane hoisting ropes and the casting of ropes with the largest of diameters.

Repair service

Steel wire ropes are subject to wear in tough continuous use and can be damaged by external influences. PFEIFER offers you a rope repair in original rope quality at your premises.

Rope stocking

PFEIFER guarantees fast availability in one of the industry’s largest stock assortments and a capacity of well over 4000 tonnes in a fully automatic rope warehouse in Memmingen and in further warehouses all over the world. High-performance logistics partners guarantee fast delivery. Thanks to optimised packaging, every reel reaches its destination worldwide well protected.

Rope application consultancy

Through the correct selection of ropes and end connections to suit the conditions of use you can achieve the most economical lifetime, reduce possible dangers and avoid high failure costs.

Interested in a seminar at your premises? We would be pleased to provide you with an individual offer.

Your specialist for ropes for mobile and crawler cranes 03/2018
Correct handling of wire ropes

Spooling of wire ropes

Correct
Lay wire rope rings on clean ground. Please consider the preferred bending direction when rewinding the rope.

Correct
Place reel on a suitable frame or spike, draw-off straight. Make absolutely sure that the rope is not fouled.

Correct
When winding on a rope drum, pay attention to the direction of rotation and the right distance between reel and drum. A too small distance can cause torsional damage in the rope during later operation.

Wrong
Drawing-off the rope of a ring or over the flange of the reel as well as counterwise spooling cause “twist” for each winding in the rope. Loops may occur, which may result in bends under tension.

Detailed handling constructions you will find in our operating manual for stranded ropes in the PFEIFER download centre at:

www.pfeifer.info/manual-strand-ropes

Your specialist for ropes for mobile and crawler cranes 03/2018
Storage and transport of wire ropes

**Correct**
Store wire ropes dry and cool. Avoid ground contact, so that humidity can not taper the rope. Take off air and water tight transport packing. Humidity causes oxidation.

**Correct**
Protect the rope of crushes and kinks.

**Wrong**
Improper transportation of wire rope reels and rings will cause irreparable damage to wires, strands or the rope structure.

Instructions for use

With the use of wedge sockets the rope is introduced on the balanced side so that under load the center line of the rope is in-line with the bolt hole. The dead end is passed through the asymmetric side and is secured with a rope clip.

The length of the dead-end should be 10 x the nominal rope diameter, at least 150 mm. The rope clip must be applied only to the loose, unloaded rope end, never on both strands. The maximum operating temperature for wedge sockets is 200°C / 400°F.

Detailed handling constructions you will find in our operating manual for wedge sockets in the PFEIFER download centre at:

www.pfeifer.info/manual-wedge-socket

Instruction

When a rope is to be re-terminated with a wedge socket assembly this can only be achieved by shortening the rope. No part of any previous flattening and/or damaged rope should be on the standing part of the rope or within the clamping area between either side of the socket body and the wedge.
Installation of wire ropes

Wire ropes can easily be damaged and must therefore be handled with utmost care during transport and unloading.

Only the installation of an untwisted and undamaged rope will guarantee a trouble-free operation. Ropes must always be recoiled from the reel or the ring in the direction of winding. Lateral uncoiling of the rope causes twisting and can lead to destruction by kink formation. It is recommended to use a frame-mounted reel for recoiling the rope onto the drum. Coiling in the direction of bend gives an excellent fit on the drum and avoids that any additional tension is built-up in the rope. Never drag ropes over soil or dirt.

For installing the new rope it has to be fixed to the still mounted old one or an auxiliary rope. Connection between the two ropes can be achieved either by a cable grip or two welded pad eyes connected with a swivel. Any transmission of torsion to the new rope from either the old one or the auxiliary rope must be definitively avoided. Nonrotating ropes must be protected from torsion by insertion of a swivel.

Multi-layer operation requires that even the lower layers must be tightly coiled with a pretension of 1–2% of the minimum breaking load of the rope. It is attained by braking the reel.

The end termination of non-rotation resistant and rotation resistant ropes has to be fixed on both end terminations against rotation.

It is NOT allowed to use non-rotation resistant or rotation resistant ropes with a turnable fixed point (e.g. swivel).

If the lower layers on the drum are hardly or seldom used the pretension of the entire rope has to be renewed from time to time. To renew the pretension in the hoist ropes the complete rope has to be spooled off and wound up again with tension of approximately 2% of the minimum breaking force or 10% of the maximum pull force in operation.

Ropes work most efficient if it is always used the entire rope length.

If the rope areas are used unequal the rope can be turned after a certain time. In multi-layer spooling the lifetime of the rope can be significantly extended by cutting away the length of half the drum diameter from the rope at the fastening point of the drum. Through this procedure the pre-damaged rope areas are relocated from the climbing zones on the drum into the parallel zones. The shortening procedure can be carried out, at most, two times.

Discarding time for wire ropes according to ISO 4309

Exemplary for single layer and parallel-closed ropes

Number of visible wire breaks, reached or exceeded, occurring in single-layer and parallel-closed ropes, signalling discard of rope

<table>
<thead>
<tr>
<th>RCN</th>
<th>Total number of load-bearing wires in the outer layer of strands in the rope</th>
<th>Sections of rope, running over steel sheaves and/or spooled on a single layer drum (random distribution of wire breakes)</th>
<th>Sections of wire rope spooled onto a multilayer drum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RCN Total number of load-bearing wires in the outer layer of strands in the rope (n)</td>
<td>Number of visible outer wire breaks* over a length of 6d&lt;sup&gt;a&lt;/sup&gt; 30d&lt;sup&gt;a&lt;/sup&gt; 6d&lt;sup&gt;b&lt;/sup&gt; 30d&lt;sup&gt;b&lt;/sup&gt; 6d&lt;sup&gt;c&lt;/sup&gt; 30d&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>≤ n ≤ 50</td>
<td>2 4 1 2 4 8</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>51 ≤ n ≤ 75</td>
<td>3 6 2 3 6 12</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>76 ≤ n ≤ 100</td>
<td>4 8 2 4 8 16</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>101 ≤ n ≤ 120</td>
<td>5 10 2 5 10 20</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>121 ≤ n ≤ 140</td>
<td>6 11 3 6 12 22</td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>141 ≤ n ≤ 160</td>
<td>6 13 3 6 12 26</td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>161 ≤ n ≤ 180</td>
<td>7 14 4 7 14 28</td>
<td></td>
</tr>
<tr>
<td>08</td>
<td>181 ≤ n ≤ 200</td>
<td>8 16 4 8 16 32</td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>201 ≤ n ≤ 220</td>
<td>9 18 4 9 18 36</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>221 ≤ n ≤ 240</td>
<td>10 19 5 10 20 38</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>241 ≤ n ≤ 260</td>
<td>10 21 5 10 20 42</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>261 ≤ n ≤ 280</td>
<td>11 22 6 11 22 44</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>281 ≤ n ≤ 300</td>
<td>12 24 6 12 24 48</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>n &gt; 300</td>
<td>0.04 × n 0.08 × n 0.02 × n 0.04 × n 0.08 × n 0.16 × n</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Ropes having outer strands of Seale construction where the number of wires in each strand is 19 or less (e.g. 6 × 19 Seale) are placed in this table two rows above that row in which the construction would normally be placed based on the number of load bearing wires in the outer layer of strands.

RCN = Rope category number

* For the purpose of this International Standard, filler wires are not regarded as load-bearing wires and are not included in the values of n.

* A broken wire has two ends (counted as one wire).

* The values apply to deterioration that occurs at the cross-over zones and interference between wraps due to flex angle effects (and not to those sections of rope which only work in sheaves and do not spool on the drum).

* Twice the number of broken wires listed may be applied to ropes on mechanisms whose classification is known to be M5 to M8.

* d = nominal rope diameter

Your specialist for ropes for mobile and crawler cranes 03/2018
**Discard**

**Warning:** Considering security ropes should be taken off operation in time, if one of the following criterias apply:

- Broken strand
- Local concentration of wire breaks
- Achievement of type and number of wire breaks according to the tablets
- Corkscrew deformation (fig. 1)
- Corkscrew (fig. 2)
- Hairpin like escape of wires (fig. 3)
- Decrease of diameter – regarding the nominal rope diameter
- Local increase of diameter
- Heavy corrosion: The surface of the wires is strongly affected or rosty dust comes out of the rope
- Loose rope structure (fig. 4)
- Constriction (fig. 5)
- Kinks or flattened areas (fig. 6 + 8)
- Bends or other deformations (fig. 7)
- bluish discoloration, broken or fused wires due to heat effects or electric arc

If several of the above mentioned criterias apply, they need to be considered in their entirety. Therefore ropes need to discarded, if none of the criteria are completely but some partially fulfilled. For example: Light Corkscrew with some broken wires.

The above criteria are an excerpt from the ISO 4309 maintenance and care, inspection and storage. Consequently, these criteria do not replace the instructions and requirements for inspection and maintenance of wire ropes as written in the standard. For evaluation of the discard criteria please refer to our original operating manual for strand ropes!

If in doubt on the estimation of the cable damage, the rope must be discarded or your rope specialist needs to be contacted: wirerope@pfeifer.de or via phone +49 (0) 8331-937-301.

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**Looping on a wire rope**

**Through corrosion and wear heavy loose strand**

**Constriction due to a broken rope core**

**Flattened wire rope caused by over-ride**

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1. Corkscrew deformation
2. Basket deformation
3. Looping on a wire rope
4. Through corrosion and wear heavy loose strand
5. Constriction due to a broken rope core
6. Flattened wire rope caused by over-ride
7. Bend caused by a pinched rope sling
8. Kind caused by mechanical impact