SELDIS polysteen

PRODUCT INFORMATION

USER INFORMATION

Steel ropes in service

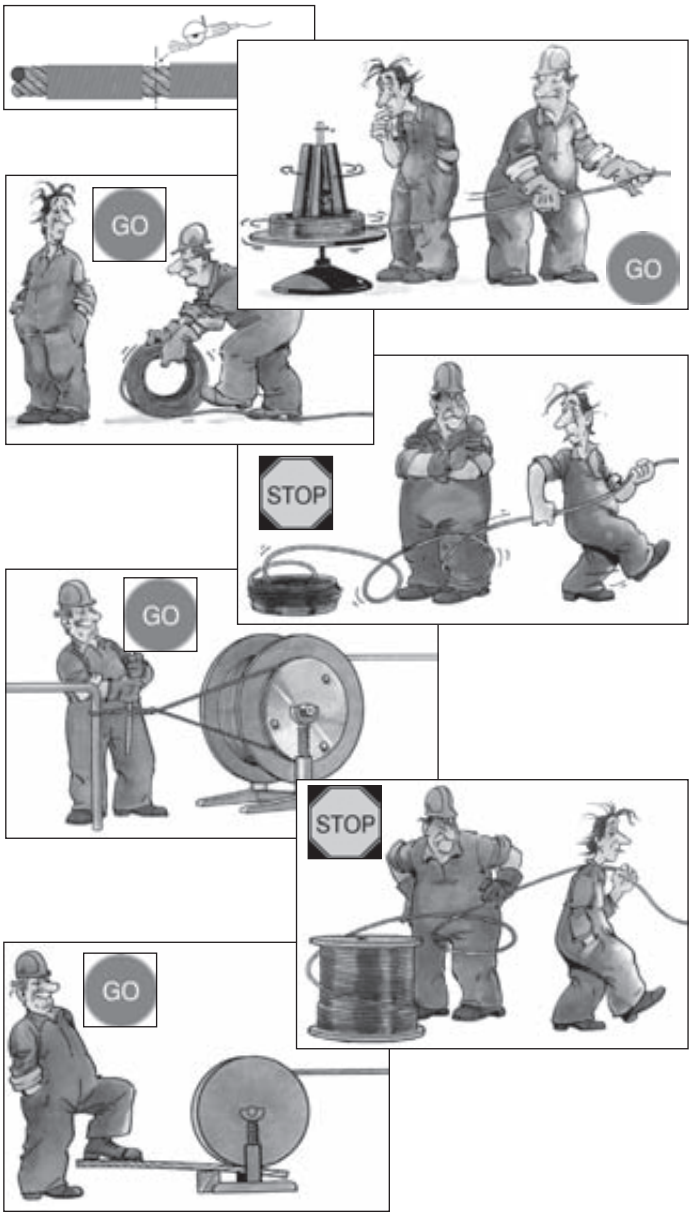
Rudolf Seldis GmbH & Co. KG . Martin-Luther-Straße 20 . 20459 Hamburg . Germany
Tel: +49 (0)40 37 49 49 0 . Fax: +49 (0)40 365 178 . seldis@seldis.de . www.seldis.de

Usage guidelines

Handling and installation

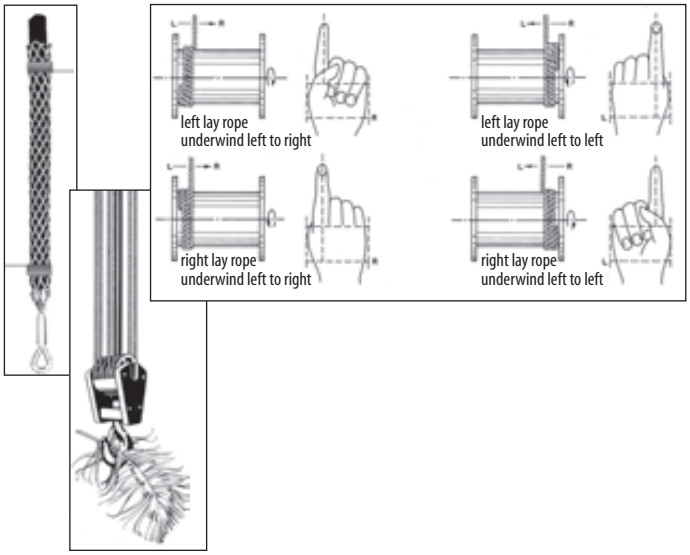
In order to guarantee flawless rope function attention must be paid to the following handling and installation guidelines.

- To prevent structural changes when cutting rope to size seize rope ends with iron wire or strands, or weld ends in front of and behind cut position prior to cutting.
- Unwind from coil either using turntable or roll out on ground. To avoid torsions under no circumstances should the rope be pulled sideways from coil.
- Unwind from reel either using turntable or jacked up. To avoid torsions under no circumstances should the rope be pulled from lying reel.
- Inspect functionality of equipment, especially end switches, overload protection, slack rope compensators, rope drums, rope drives.
- Ensure alignment of rope and rope guides and deflectors. The groove diameter should be 5% to 8% greater than the rope diameter.
- When changing ropes (replacing an old rope by a new one) the grooves may have to be reworked.
- When installing the new or replacement rope ensure correct lay and winding direction. To ensure avoidance of torsions the original bending direction should also be maintained. Avoid twisting/untwisting rope, dirt or pulling over sharp edges.
- Important when winding/unwinding: keep rope fleet angle from sheave as low as possible, (max. 2° for single layer, max 4° for rotation-resistant ropes) as otherwise contact with groove wall edge can damage rope.
- A forerunner rope (thin, rotation-resistant steel rope or three-strand fibre rope) can be useful for pulling in. A discarded rope can also be used as a forerunner. Ensure the rope ends are securely connected, either by pad eyes or cable grip. When using cable grips ensure that the ropes to be joined are wrapped in adhesive tape to prevent a grip slipping on excessively smooth rope surface (e.g. lang lay ropes or ropes with compacted strands).
- To avoid loose layers apply tension to the rope when winding onto drum (brake load).
- Installation offers a good opportunity to inspect rope for damage.
- Always work in a new rope by moving several times under reduced load. Then check end fittings, tighten screws, bolts etc.



Control and inspection

To guarantee operational safety the rope should be subject to thorough inspection by trained personnel with respect to the rope's intended service application. Operators must observe prevailing regulations and usage instructions, if necessary by referring to responsible supervisory boards and their recommendations. Steel ropes should be inspected for type, number, position and frequency of wire breakages, reduction of rope diameter, corrosion, abrasion, loosening of structure, rope deformation and service time.



Why?

During service steel ropes undergo changes such as loss of breaking force (after brief increase at beginning), abrasion, corrosion and wire breakage as continuous wear factors affecting the metal cross section. The purpose of inspection is to ascertain damage, establish cause, rectify cause, change environmental conditions and, if necessary, remove ropes from service.

Intervals
There are no general recommendations for when and how often to inspect ropes. However, regular inspection is advisable for newly installed ropes, ropes lifting extraordinary loads, ropes that have been out of service for a lengthy period, after a relocation of an appliance, and after initial evidence of damage.

Rope areas
Although the entire rope should be visually inspected, particular attention should be paid to the following:

- Excessive bending cycle strain is likely to cause abrasion and strand/wire breakage.
- Lifting points, i.e. areas where the rope contacts rollers or drums when lifting, are subject to heavy strain.
- Rope end fittings adversely affect rope elasticity; at these points even load distribution stops and corrosion risk increases.
- Increased oscillatory strain occurs in the area near to balancing sheaves.
- Rope on winch drums is subject to increased abrasion, strand breakage and structural change caused by continuous deflection, higher surface contact and possible rope crossover on multilayer winding.
- Rope pulleys can be a significant factor causing premature abrasion in the relevant rope area due to impaired running, too narrow or excessively wide grooves, damaged groove surface, lateral deflection from the groove contact area (never more than 4°) or asymmetrical strain on the rope pulley apex.
- Rope segments significantly exposed to aggressive substances or heat quickly lose lubrication and tensile strength, i.e. working load limit is reduced.

Removal from service
A number of criteria determine when steel ropes should be discarded.

- Wire breakage
  A minimum number of wire breakages on a length 6 times rope diameter and 30 times rope diameter, as identification of general wear or limited local damage. The exact limits depend on application, strain the rope is subjected to and prevailing regulations or recommendations (see table)
- Rope diameter
  A 10% or more fall in the nominal diameter of the rope in any area caused by abrasion, corrosion or structural changes
- Rope deformation
  Corkscrew formations exceeding 33% of nominal rope diameter
- Birdcaging effects
- Loop formation
- Loosening of wires
- Knot formation
- Heavy strangling effects
- Curly deformation caused by rope being pulled over edges
- Kinking
- Deformation caused by load release when rope twisted on itself under load
- Buckling
- Heat influence
  Temperature exceeding 300°C at any part of the rope

Max. number of visible broken wires before discard (examples)

on a length of	3d	6d	30d
Lifting slings			
–Stranded rope	4	6	16
–Cable lay rope	10	15	40
Crane ropes			
–6x19 cross lay MB		5	10
–6x19 cross lay HB		10	19
–6x36 cross lay MB		9	18
–6x36 langs lay HB		4	9
–6x36 cross lay MB		18	35
–6x36 langs lay HB		9	18
–8x36 cross lay MB		12	24
–8x36 langs lay HB		6	12
–Casar Powerplast cross lay HB		11	22
–Casar Turboplast cross lay HB		9	18

d = nominal rope diameter, MB = medium strain, HB = high strain.

All limits mentioned are generally recognized recommendations and are based mainly on existing regulations for crane systems. Special service applications may demand different limits.

Storage and maintenance
Appropriate storage and maintenance of steel rope is a condition for its safe usage

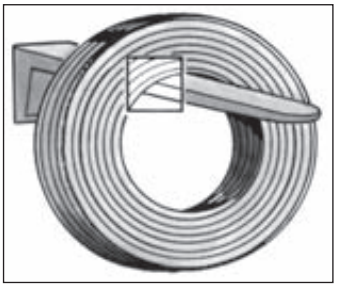
- Protect ropes from damage during loading/unloading. When lifting, do not clamp coils with edged forks, but use soft textile web, round or rope slings. Use axle and jack up rope if rope is put up on reel.
- Before storage inspect for damage. Ropes can incur damage during transport. If necessary, remove damp packaging.
- Store in slightly heated, dry, dust-free areas, protected from mechanical influences and strong sunlight. Avoid ground contact if possible by placing on pallets.
- Mark clearly for the duration of storage to exclude mix-ups and ensure traceability.
- If stored outdoors, use waterproof covers with an intermediate layer of jute cloth to absorb condensation.

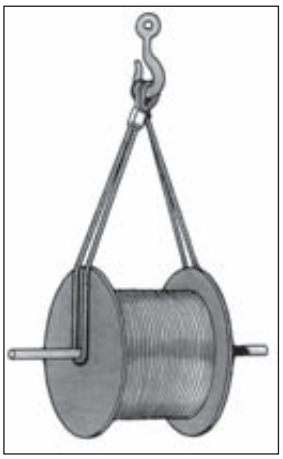
The life and safety of steel ropes can be significantly improved if properly cared for.

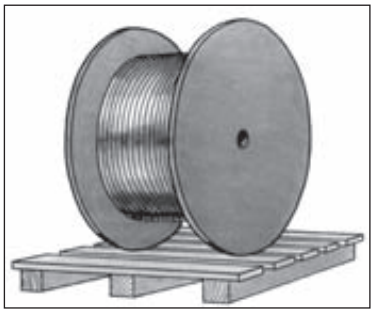
- Regular relubrication is a measure of considerable importance as it reduces corrosion and friction between rope constituents and rope and reel or drum. If application prevents rope from being lubricated regularly, the rope life will be reduced, therefore the need for more intensive periodic rope examination.
- Cleaning is particularly necessary when ropes are used in heavily abrasive environments and after contact with chemical substances. Brushes or other suitable implements available on the market are recommended.
- Broken wire ends (single wires) must be removed, not hidden, not pinched off, but by bending to and fro.
- Ropes may be shortened or reversed for reasons of economy and to prevent excessive strain in certain areas. Shorten rope only if the remaining length is sufficient for the intended purpose.

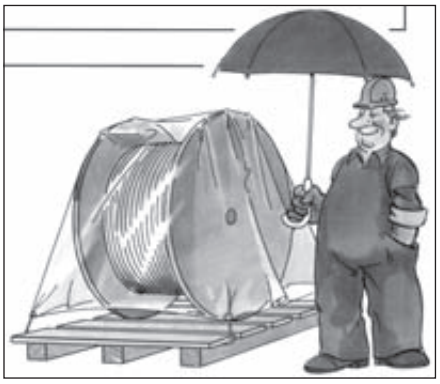
Caution!

Examples of damage to steel ropes are described and shown in detail elsewhere in this chapter (Steel rope in service) under the heading 'Typical rope damage'.









Test equipment
Recommended test equipment

- Rope (calliper) gauge, preferably with flat surface jaws (to measure diameter)
- Measuring tape (to determine sectional lengths)
- Chalk (to mark measuring points)
- Screwdriver (to open rope for view of interior)
- Magnifying glass
- Groove gauge (to measure groove diameter)
- Cleaning rags
- Logbook (with previous logs and space for new logs)

Problem areas
Damage in the rope interior caused by dampness and mechanical friction between the wires, strands and core remains largely invisible. In case of doubt, if careful opening of rope structure is not possible (without mechanical damage to the rope) or provides no definite result, expert advice should be sought or the rope removed from service.

General
Further information on steel ropes can be found in the chapter 'Steel ropes in perspective'.

These usage guidelines are based on existing European recommendations and standards. Further to these, consideration should also be taken of applicable local, national and international legislation, standards, directives and regulations from official societies (professional organisations, classification bodies, etc.) with regard to equipment safety (personal protection, industrial safety, accident prevention), as well as recommendations and operating instructions from manufacturers and/or operators of the equipment being used (lifting gear, conveyor systems, etc.).

In case of doubt about rope properties, suitability or safety requirements consult rope manufacturer or supplier.