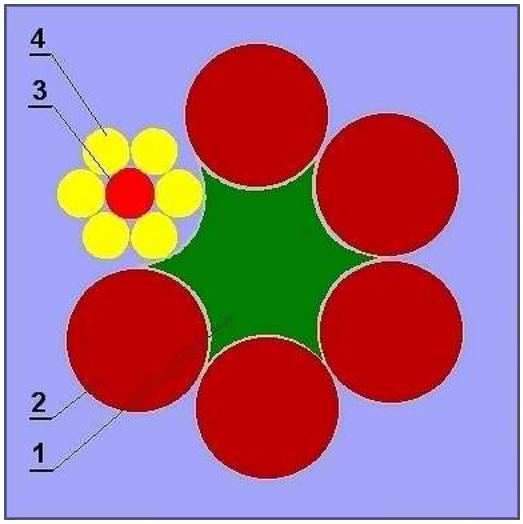
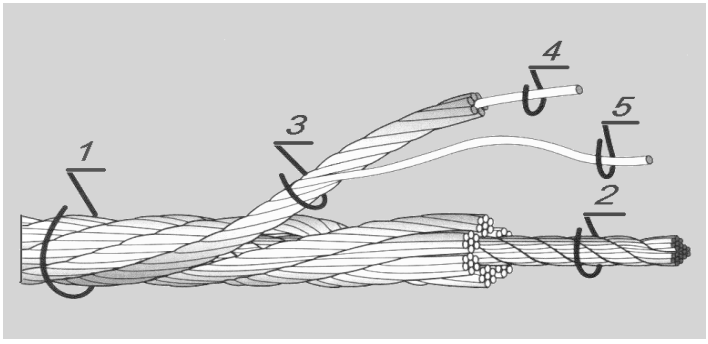
TECHNOLOGICAL INFORMATION

Construction of wire rope



Construction of wire rope: **1-**fibre core of the rope; 2 -rope strand; 3 - central core wire; 4 - strand wires



Double twisted wire rope: 1 - the rope; 2 - fibre core of the rope; 3 - rope strand; 4 - central core wire; 5 - strand wires

Wire rope structure

Steel wire rope consists of the strands and core. The rope core may be either fibre or wire. The core role in the rope is, first of all, to support rope strands, and it also is so called lubricant tank, as well as it is responsible for proper rope shape. Fibre cores may be produced either of plant fibres - sisal or cotton (DRUMET Ropes and Wires sp. z o.o. does not produce rope cores of other fibres) or man-made fibres - polypropylene ones.

Most often, wire cores are made in the form of the rope, structure 7x7, nor so often the strand of the same structure as wire rope strands is used for rope core, and, rarely, the independent rope of other structure is a core of a rope.

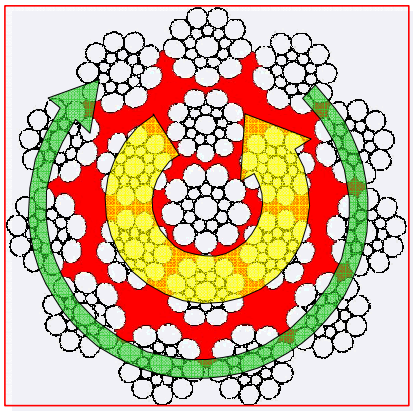
Comparing with fibre cores, wire cores ensure higher resistance of the rope for transversal pressures, higher resistance to exposed temperatures, higher breaking force and larger rope stiffness.

What means a non-rotating rope?

In the conventional rope, the external load creates the torque, which untwists the rope and rotates the load.

Non-rotating ropes are produced of, at least, two layers of strands, where the inner rope layer (or layers) is laid in the direction opposite to the direction of outer rope layer strands.

Such rope structure causes that, under the load, the inner rope part - that is, the rope layer, which is an independent rope - tries to spin the rope in one direction, and outer rope strands tries to spin the rope in opposite direction. In the production process, such situation should be achieved, where both torques mentioned above compensate each other within the wide range of loads to ensure operation at large lifting heights without spinning of the rope and load.



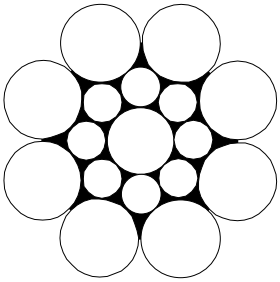
Principle of construction of a non-rotating rope.

What means a compacted rope?

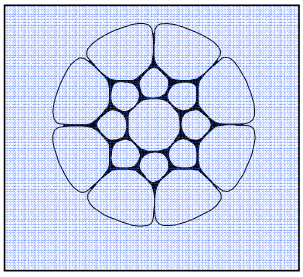
Compacted ropes are made of strands, which subject to compaction operation in the production process. Production of the compacted strand comprises drawing the conventional strand, made of round wires, through the compacting equipment, which may be either a drawing die or special compacting head.

In the compacting process, strand wires undergo plastic deformation, the strand diameter is reduced (and, simultaneously, the strand cross-section is filled with metal), and the outer strand surface becomes smoother. The conditions of contact between strand wires and between strands in the rope become better.

Comparing with ropes produced of conventional strands, the ropes made of compacted strands feature with higher breaking force, higher flexibility, better contact between the rope and winding drum and sheave grooves, also, their elongation is smaller. Due to thicker outer wires and closed outer strand surface, the compacted ropes are more resistant to corrosion and surface friction.



Conventional strand



Compacted strand

What does it mean swaged ropes?

Swaged ropes - there are steel wire ropes having compacted cross section done by full rope hammering. Sometimes such ropes are called hammered ropes or compressed, it is because of way of production.

Most important advantage of described ropes is considerable higher resistance against friction of steel wire rope outer surface then standard ropes.

Additional advantage is much higher swaged rope breaking load after swaging, in comparison to standard steel wire ropes same diameter.

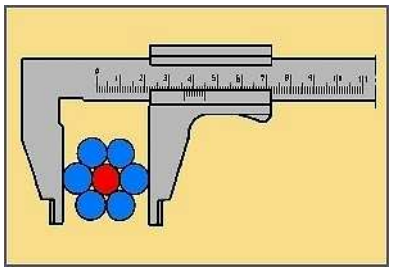
Above picture presents swaged steel wire ropes having different level of cross section compression. From left side - light level of cross section compression, centre - medium typical compression, right side - high cross section compression.

Terms regarding wire ropes

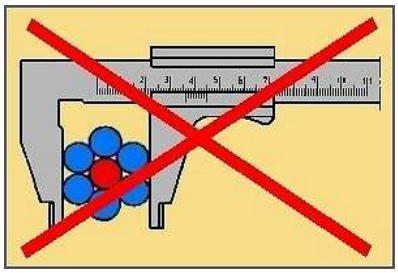
Nominal rope diameter - d [mm] - theoretical rope diameter, expressed with the value rounded to the integer.
This value is used for rope specification and description, when placing an inquiry, issuing the certificates, and for rope strength calculations.

Actual rope diameter [mm] - the rope diameter obtained as a result of rope diameter measurement by means of the proper measuring instrument - the slide calliper or micrometer gauge with proper jaws. The actual rope diameter is measured by measuring the diameter in two planes vertical to each other, two measurements for each plane. The results of measurement are averaged, and the average calculated is the actual rope diameter.

In case of doubts, measurement of the rope under the load is allowed.



Correct way of rope diameter measurement by means of the slide calliper



Incorrect way of rope diameter measurement by means of the slide calliper

Diameter tolerance - permissible nominal rope diameter deviation - permissible dimensional range of deviation of actual rope diameter measured for the rope without the load, defined by relevant standards
DIN Standards for rope diameters >/= 8.0 mm specify the diameter tolerance from 0 up to 5 %, ISO Standards from -1 up to +4%.
There is no technical possibility to produce the rope, for which the actual diameter is equal to the nominal one.

Minimum Breaking Force [kN] - the value corresponding to the guaranteed breaking force, the value required in specific standards, which the rope producer must comply with strictly.
The breaking force is measured at the tensile testing machine.
Also, some standards use the calculated breaking force, which, depending of the standard, is determined empirically, by multiplying the rope metal cross-section value by the strength of rope wires.

Rope Tensile Strength grade [MPa] - the level of required rope strength, for which the value of breaking force is defined, the strength levels (classes) are defined as 1770, 1960, 2160, etc.
The rope strength class corresponds directly to the tensile strength T.S. of wires used for rope production, which is expressed as the ratio of the wire breaking force to the wire cross-section. The rope strength class does not have to correspond to wire strength strictly (for example, the standards allow the wire manufacturing deviation within the range of +350 MPa, that is, the actual strength of the wire, for which the strength class is 1770 MPa, may have the strength within the range of 1770 - 2120 MPa).
Depending on the wire strength, the values of rope breaking force and stiffness change.

Nominal weight of 1-m rope section [kg] - the weight of 1 metre section of the rope as determined in the relevant standard as the result of theoretical calculations.

Actual weight of 1-m rope section [kg] - the weight obtained as the result of measurement.

Wire laying pitch in the strand (as well as - strand closing lay in the rope) - the distance, at which the same wire (strand) repeats, when laying the wires (strands) around the central wire (rope core). The pitch is marked with the letter "h".

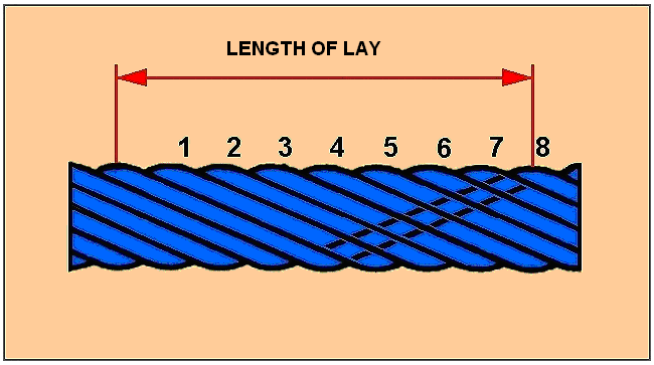
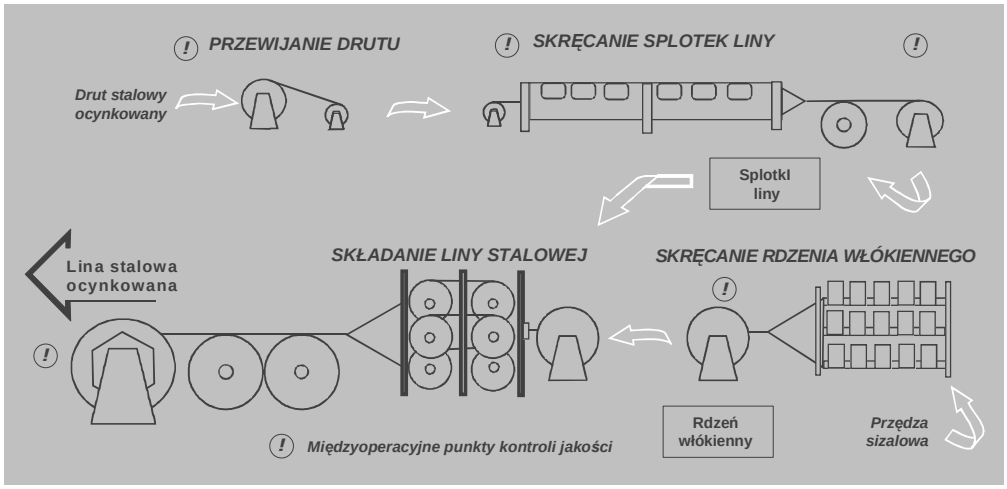


Fig. 3 Length of lay measurement way for 8 strands rope

Wire rope production diagram

Production of wire ropes consists of many technological operations. Number of those operations depends mainly of rope structure and diameter. The following are the basic operations:

1. Winding the wire into spools - rewinding the wire on stranding machine bobbins.
2. Production of strands - splicing the strands on stranding machines.
3. Production of rope cores - which are made of fibres or steel wires.
4. Production of the rope - splicing the ropes on closing machines.



Directions of wire splicing in strands and laying strands in ropes

Marking in accordance with EN 12385-2 Standard

The first, small letter is for wire lay direction in the outer strand layer, and the second, capital letter is for strand lay direction in the outer rope layer.

Wire lay in the strand: Letters **Z** and **S**, which are used for, respectively, right-hand or left-hand wire lay in the strand.

Types of lay:

Ordinary (regular) lay - the direction of wire lay in the outer layer is opposite to the direction of outer strand lay in the rope.

Lang lay - the direction of wire lay in the outer layer is the same as the direction of outer strand lay in the rope.

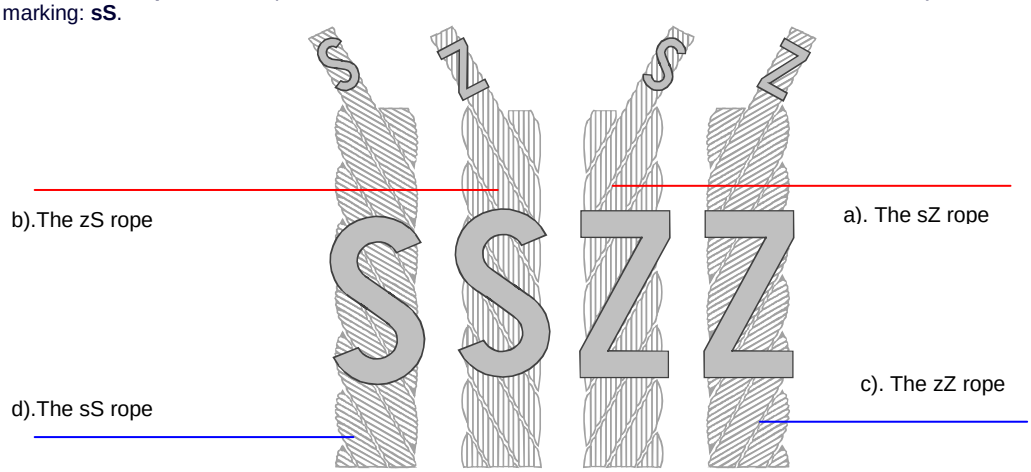
Wire and strand lays in the rope:

Regular lay, right-handed rope - outer rope strands are laid in right-hand direction and wires of outer strand layers are laid in left-hand direction, marking: **sZ**.

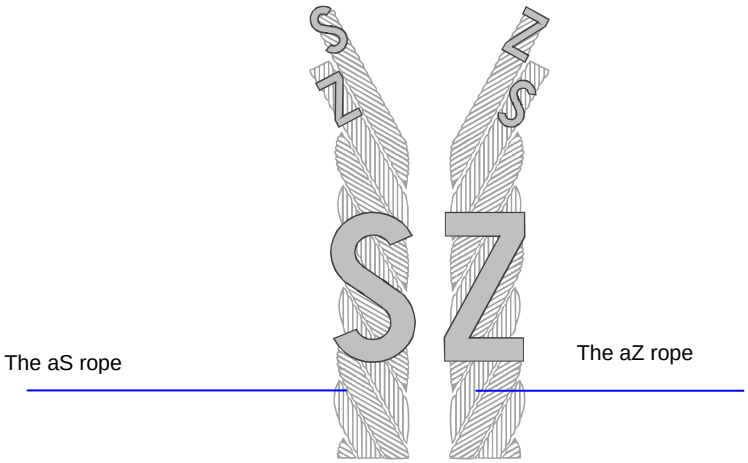
Regular lay, left-handed rope - outer rope strands are laid in left-hand direction and wires of outer strand layers are laid in right-hand direction, marking: **zS**.

Lang lay, right-handed rope - outer rope strands are laid in right-hand direction and wires of outer strand layers are laid in right-hand direction, marking: **zZ**.

Lang lay, left-handed rope - outer rope strands are laid in left-hand direction and wires of outer strand layers are laid in left-hand direction, marking: **sS**.



Alternative lay right hand – stranding lay where neighbour strands have alternative direction respectively left and right, rope strands direction right **aZ**
Alternative lay left hand – stranding lay where neighbour strands have alternative direction respectively left and right, rope strands direction left **aS**



If the order does not specify otherwise, the regular lay right-handed ropes are produced. They are used widely in most of industrial equipment.

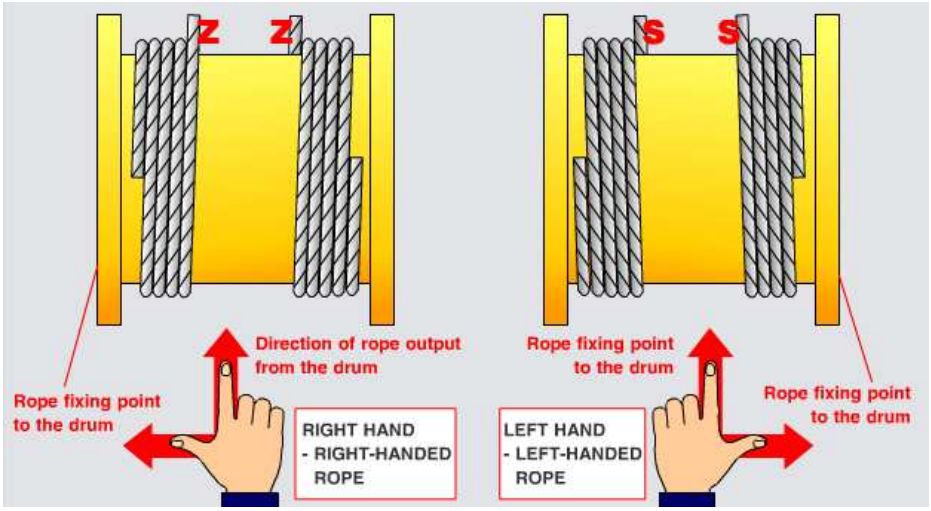
Lang-lay ropes are very flexible, and they feature with high fatigue strength. For ropes of that type, the arrangement of outer wires ensures more even abrasion of wires comparing to the regular-lay rope. However, Lang-lay ropes feature with the disadvantage, which limits the range of their use. Lang-lay rope, when loaded with freely hanging load, untwists, and makes a loop, when loosened. Therefore, it is suitable for the equipment, where the rope is loaded permanently only, and the lifted load is permanently fitted in guides, for example, for lifting equipment in mining, passenger lifts, cable railways.

Correct way of winding the rope on the drum

Selection of proper rope lay is very important for correct functioning of rewinding system for crane systems. Incorrectly selected rope winding direction lead to increasing the torque in the rope, problems with winding and structural damage of the rope.

Right-handed ropes should be wound on left-handed drum pitch, and left-handed ropes - on right-hand drum pitch.

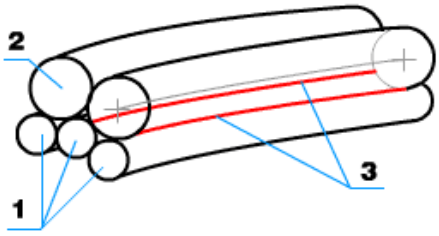
The correct rope twisting direction in relation to the drum pitch may be determined on the basis of a mnemonic rule as shown in the Figures below. If you point at the rope fixing point at the drum side with your thumb, point the rope output direction from the drum with the forefinger and the rest of finger lie in the direction of drum, the rope to be used must be of right-lay type, when we have used the right hand, and of the left-lay type, when we have used the left hand as described above.



Types of wire lying in strands

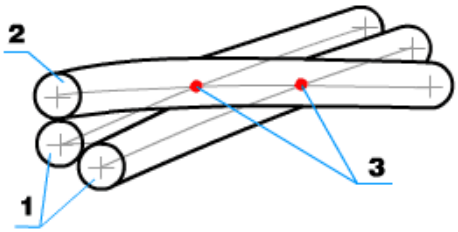
DRUMET Ropes and Wires sp. z o.o. produces the ropes of strands of two basic wire lay:

1) Parallel lay - the strands, which consist of at least two wire layers, all wires are laid in one operation (in the same direction), what gives the linear contact between wire layers in the strand.



Strand with parallel wire lay: 1- Inner layer wires, 2 - Outer layer wires, 3 - Linear contact between wires

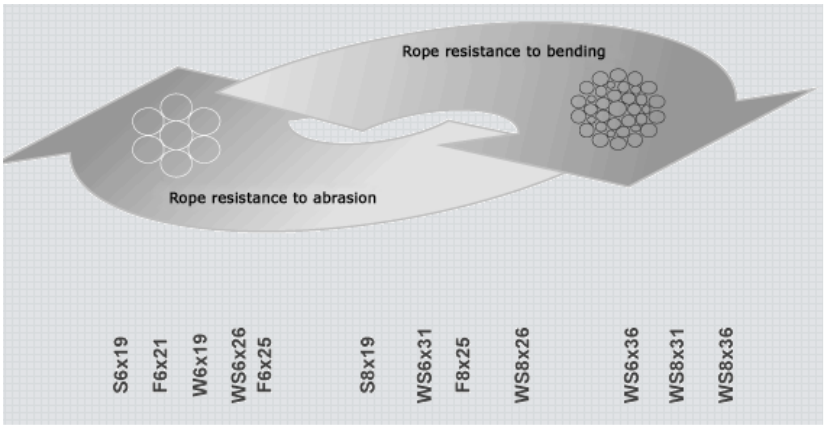
2) Cross lay - the strands, which consist of at least two wire layers, each layer is laid in the same direction in separate operations with different lay pitches. The wires in adjacent layers run crosswise and point contact between wires is obtained



Strand with cross wire lay: 1 - Inner layer wires, 2 - Outer layer wire, 3 - Point of wire crossing being the point of contact between wires

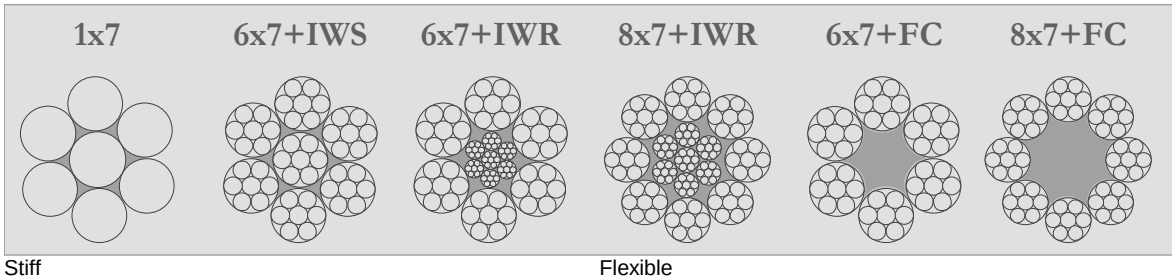
Influence of rope structure on rope stiffness, fatigue parameters and resistance to abrasion

The relation between rope structure and rope stiffness and resistance to abrasion is shown in the Figure below.



Relation between rope structure and rope resistance to bending and resistance to abrasion

Dependence of rope parameters on number of strands and core type for ropes of the same diameter and strand structure, illustrating the relation between rope stiffness and flexibility shown in the previous figure



Stiff
Resistant to abrasion
Low resistance to bending
Trick wires (In relation to rope diameter)
Resistant to tensile forces

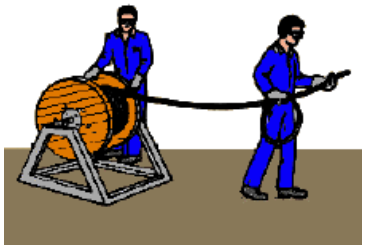
Flexible
Low resistance to abrasion
Resistant to bending
Thin wires (In relation to rope diameter)
Low resistance to tensile forces

Ways of rope unwinding

From the coil

Correct	Wrong
	

From the drum

Correct	Wrong
	

NOTE:

Incorrect rope unwinding may cause rope damage and premature wear.

Use shears for metal to cut the bands clamping the ropes, never use cut-off tools of files or other sharp tools, which may damage the rope. Non-observance of rope transport and installation rules and instructions specified may cause loss of guarantee, warranty and other rights in any form, as well as it may be a cause of severe failures, which may lead to accidents in work during operation of lifting equipment.

Rope lubrication

Why to lubricate the ropes.
The material has been prepared by Leszek Stańkowski, Dr Eng.

In general, it is assumed that the life of correctly lubricated wire ropes is three times longer than the life of non-lubricated ones. In particular, the following is ensured by lubrication:

a. Considerable reduction of corrosion,
b. Reduction of wear due to rope abrasion,
c. Reduction of fretting type wear, which sometimes is present for statically working ropes,
d. Reduction of rope core decay.

In additional, some lubricants allow increasing the rope friction coefficient for certain drum liners, thus causing anti-slip properties, which are very useful in many applications - for example, for ropes used elevators, and, in particular, for ropes used in mining lifts. In that last case, properly selected rope lubricant considerably influences the safety of lift operation.

Rope lubrication and maintenance may be potentially very advantageous due to economical savings resulting from longer rope life (reduction in rope wear, reduction of servicing and repairs of equipment or structures containing wire ropes) and improvement of occupational health and safety conditions (increase in equipment or structure reliability and improvement of equipment safety level by elimination of rope sliding). The costs resulting from the use of lubricants and costs of lubricant application are well grounded in the light of potential advantages.

Types of rope lubricants

Basically, rope lubrication and maintenance agents may be classified according to three things:

a. **Technology** - general use agents (rope maintenance agents, industrial oils, plastic greases, etc.) and special agents, prepared with consideration of specific requirements of wire ropes,
b. **Application way** - lubrication oil, greases (similar to petroleum jelly), which are applied after melting, and plastic greases,
c. **Place of application** - producer's agents and user's agents (usually, the last ones contain the thinner to facilitate applying).

Some lubricants and maintenance agents generally accessible on the market show positive results when applied on the wire rope. For example, many machine, anti-corrosion, transmission or hydraulic oils are used. In such cases, the results are positive but they are worse than when agents specific for wire ropes are used.

However, the common practice of use of the used oil for repeated lubrication of ropes. That procedure is wrong not only in the aspect of natural environment protection, but, also, corrosion protection is poor. More - used oils may increase corrosion.

In the Table below, general properties of three types of agents for rope lubrication and maintenance are show.

Properties	Lubrication oils	Greases applied after melting	Plastic greases
1. Highest potential operation temperature, ℃	100	80	150
2. Corrosion protection effectiveness	+	+++	++
3. Anti-wear properties	+	++	+++
4. Anti-fretting properties	++	+	+++
5. Durability of protective layer	+	+++	++
6. Easy application	+++	++	+
7. Anti-slippage properties (potential)	+	+++	-
8. . Notes	The soaked rope core may be a reserve of lubricant; May be diluted with petrol or other thinner in order to improve penetration		Penetration is poor, even after they were diluted

General rules for selection of rope lubricants

When selecting the rope lubricant, the following factors should be taken into account:

a. Expected working temperature range. In case of lubricants applied after melting, the lowest working temperature is approximately equal to the lubricant brittle point (the brittle point for rope lubricant is determined with the use of a special method, which is slightly different than the one for an asphalt - the tests are made for lubricant layer thickness similar to the thickness used in practice). In case of oils, the brittle point is close to the flow temperature, and for greases - to the flow temperature of the base oil. In case of oils and plastic greases, the highest working temperature is difficult to determine. For greases applied after melting, the highest working temperature is equal to lubricant creeping temperature.
b. Requirements for durability: Durability depends on viscosity and stability (resistance to deterioration) of the lubricant used. As a rule, high viscosity lubricants are more durable, but the coats made with the use of such lubricant are not always accepted due to its appearance. Durability of rope lubricant is important especially in case of ropes exposed to flushing with water.
c. Operating conditions and expected prevailing wear process (corrosion, abrasion, fretting or others).
d. Requirements for anti-slip properties.
e. Application technique accessible.
f. Occupational health and safety and environment protection aspects - for example, according to the Law, there are many limitations for lubricants containing asphalt or petroleum extracts. Hydrocarbon solvents are flammable, therefore, there is a problem of fire safety, when used. On the other hand, the use of non-flammable chlorine-organic solvents is limited by the Law due to the environment protection requirements or their toxicity.

How to use rope lubricants?

As a rule, excessive lubrication should be avoided. When producing the ropes, DRUMET Ropes and Wires sp. z o.o. uses a range of processes to meter lubrication and maintenance agents in an optimum way. Greases are applied with the use of spraying method, and oils are applied with the use of dropping methods by means of accurate metering equipment.

The excess of lubricant contaminates the natural environment. In case of rope lubricants, anti-slip properties may be lost in case of excess of lubricant.

In case of re-lubrication, the oils or greases used by the rope producer are used most often, but they are diluted in a volatile solvent. The use of oils is simple - they may be applied by spraying, with dropping method or with the use of brush. The excess of oil trickles with no problems. There is a possibility to apply the oil in the continuous way during rope operation.

There are two disadvantages, when using the oil. First, oil layers are not durable. Second, it is difficult to find out, when the rope should be re-lubricated, since the oil layer is effective even when it cannot be ascertained by touch (approximately 1 µm thick layer of good quality oil for ropes ensures good protection against corrosion).

Rope greases in a diluted form are considerably more effective. They are applied in a similar way as oils, however, the method of application with a brush is used most often. When applying the diluted grease, it is good to rub it in the rope in order to ensure grease penetration inside rope strands. Some solvent properties must be remembered, when applying. Petroleum solvents are flammable, and their vapours (even in case of so called "ecological" solvents with aromatic compounds removed) are rather harmful for health. Chlorine-organic solvents, which are used more rarely, are not flammable, but they are classified as toxic and extremely harmful for natural environment ones. Therefore, they must be applied outdoors or in rooms with perfect ventilation. Additionally, for petroleum solvents, relatively long evaporation time must be considered - approximately 48 hours. (Solvent producers want to ensure solvent flash point above 55℃, because, in this case, the product is classified in III explosion-proof class, for which no expensive fire protection is required.)

Application of hot grease after melting requires relatively expensive equipment, if you want to ensure the correct coating layer and even coverage of the entire rope. Therefore, that method is used mainly by rope producers. However, if the user is provided with proper equipment, he may obtain excellent results with no objections regarding occupational health and safety.

Plastic lubricants are used mainly in order to reduce friction in maximum degree or to protect the rope against rubbing, where anti-slip properties are not important. Plastic lubricants are applied mechanically (generally, with the use of brush). It should be remembered, that those lubricants penetrate poorly, even when diluted with the solvent. Soaking the rope core with the plastic lubricant is very difficult - even at producer's facilities. Therefore, it is recommended to apply again after a short time of operation, after a part of lubricant has penetrated into the strands.

The rope should be maintained with the use of the same lubricant, which was used by the rope producer.

Lubrication types used by DRUMET Ropes and Wires sp. z o.o.

Lubrication types used by DRUMET Ropes and Wires sp. z o.o.

Lubrication type	Lubrication method		Grease
A0	splicing of the rope	without lubrication	
	manufacturing of strands	without lubrication	
	manufacturing of the core	cotton, polypropylene, steel wire, sisal core: without lubrication	
A1	splicing of the rope	without lubrication	for cotton cores: oil for axles, for other cores: to be agreed.
	manufacturing of strands	without lubrication	
	manufacturing of the core	fibre core: slightly lubricated	
A2	splicing of the rope	without lubrication	to be agreed with the Customer
	manufacturing of strands	without lubrication	
	manufacturing of the core	fibre core: moderately lubricated wire core: lubricated core in the form of independent wire rope with fibre core: lubricated	
B0	splicing of the rope	without lubrication	to be agreed with the Customer
	manufacturing of strands	slightly lubricated	
	manufacturing of the core	fibre core: without lubrication wire core: without lubrication core in the form of independent wire rope with fibre core: without lubrication	
B1	splicing of the rope	without lubrication	to be agreed with the Customer
	manufacturing of strands	slightly lubricated	
	manufacturing of the core	fibre core: a. slightly lubricated b. moderately lubricated wire core: lubricated core in the form of independent wire rope with fibre core: lubricated	
B2	splicing of the rope	without lubrication	to be agreed with the Customer
	manufacturing of strands	slightly lubricated	

Lubrication type	Lubrication method		Grease
	manufacturing of the core	fibre core: a. slightly lubricated b. moderately lubricated wire core: lubricated core in the form of independent wire rope with fibre core: lubricated	
B3	splicing of the rope	without lubrication	to be agreed with the Customer
	manufacturing of strands	abundantly lubricated	
	manufacturing of the core	fibre core: abundantly lubricated wire core: lubricated core in the form of independent wire rope with fibre core: a. lubricated b. deeply lubricated	
C0	splicing of the rope	lubricated and wiped very much	to be agreed with the Customer
	manufacturing of strands	without lubrication	
	manufacturing of the core	fibre core: abundantly lubricated wire core: lubricated core in the form of independent wire rope with fibre core: deeply lubricated	
C1	splicing of the rope	ropes up to 16 mm are lubricated during splicing	to be agreed with the Customer
	manufacturing of strands	without lubrication	
	manufacturing of the core	fibre core: heavy greased wire core: greased core in the form of independent wire rope with fibre core: deeply lubricated	
D0	splicing of the rope	ropes intended mainly for coating with rubber; when splicing, the rope strands and core, as well as the rope itself, are degreased.	
	manufacturing of strands		
	manufacturing of the core		
S0	splicing of the rope	ropes intended mainly for coating with plastics; when splicing, the rope strands and core, as well as the rope itself, are coated with the special grease.	
	manufacturing of strands		
	manufacturing of the core		

There is a possibility to agree the lubricant and lubrication type with the customer.

1. Fibre cores - meaning of terms used:
   slightly lubricated: 30-50% of threads are lubricated
   moderately lubricated: lubricated with wiping.
   abundantly lubricated: lubricated without wiping.
2. Wire cores - meaning of terms used:
   lubricated: lubricated without wiping during rope splicing.
3. Rope core in the form of independent wire rope with fibre core - meaning of terms used:
   lubricated: lubricated during rope splicing; (fibre) core of the rope core: 30 - 50 % of threads are lubricated or lubricated with wiping.
   deeply lubricated: lubricated without wiping during rope splicing; core of the rope core: lubricated without wiping.
4. Strands - meaning of terms used:
   slightly lubricated: lubricated and wiped twice,
   moderately lubricated: lubricated with wiping,
   abundantly lubricated: lubricated without wiping.
5. Lubrication type A1: for ropes with the core consisting of 4 threads, it is allowed to have 25 % threads lubricated.
6. Lubrication type A1: lubrication of ropes with the wire core or the core made of independent wire rope is the same as lubrication type A2

For lubrication types B1, B2 and B3, it is recommended to select option a) or b), where applicable. If the customer will not select option a) or b), the option will be selected by our Rope Production Department.

Lubricants used by DRUMET Ropes and Wires sp. z o.o.

The rope lubricant shall feature with the following properties:

good protection against corrosion,
reduction of frictional resistance (for KOEPE system hoists),
proper dripping, brittle and freezing temperatures,
good adhering to the surface,
no corrosive action on rope wires,
solubility in solvents or light oils, when it is necessary to clean the rope,
adequate viscosity and high flash point,
quick curing after coating,
no staining, what is necessary, in particular, in fishing and shipbuilding,
good appearance (colourless, transparent)

Most often, DRUMET Ropes and Wires sp. z o.o. uses the following lubricant types:

1. Nyrosten T55-13-20510:
   green, plastic, solid compound,
   brittle point: -40 ℃,
   dripping point: 100 ℃,
   flash point: 220 ℃,
   viscosity: 80 mm^2/s,
   application: balance ropes, ropes wound on the drum, leading ropes.

2. NYROSTEN N113:
   green, viscous, solid compound,
   brittle point: -30 ℃,
   dripping point: 90 ℃,
   flash point: 220 ℃,
   viscosity: 122 mm^2/s,
   application: ropes for Koepe hoists.

3. VECONOL LR-PLUS 50:
   pale, transparent compound,
   brittle point: -25 ℃,
   dripping point: 55 ℃,
   flash point: 200 ℃,
   viscosity: 80 mm^2/s,
   application: general application ropes.

Lubricants removed from the offer:

4. KOLINSTAL I:
   brittle point: -23 ℃,
   dripping point: 70 ℃,
   flash point: 200 ℃,
   application: ropes for drum hoists and excavators, industrial ropes.

5. LWKP:
   alack tarry compound,
   brittle point: -20 ℃,
   flash point: 200 ℃,
   viscosity: 65 mm^2/s,
   application: ropes for Koepe hoists.

Lubrication of ropes used for lifts

General information

All ropes for elevators produced by DRUMET - **Drulift**, which comply with PN-EN 12385-5 standard, are pre-lubricated. In accordance with the Standard, the wires used for production of ropes are coated with grease, and the main rope core is soaked properly with lubricant.

Because the time between rope production and installation may be very long, it is recommended to lubricate the rope just before installation.
Lift ropes should not be installed without lubrication.

Lift ropes must be lubricated at least once a year. Also, rope lubrication frequency depends on crane operation time. Apply adequate quantity of lubricant. The lubricant should not flow or drip during lift operation. When the rope is lubricated in excess, proper friction between the rope and driving drum cannot be guaranteed. It is a good practice to use smaller quantities of lubricant, when lubricating the rope, and lubricate it more frequently.

Ropes not lubricated may contribute to considerable shortening of driving drum life, as well as of rope life.

It is good for lift ropes to re-lubricate them during operation. Higher temperature, high rope speeds, small bending radii dry the rope and remove factory applied lubricants. Lubricant is not applied for rope life. Proper lubrication of load-carrying ropes increases rope life by reduction of rubbing between rope wires and strands, as well as it delays core damage by elimination of rope deterioration. Also, lubrication reduces the wear of sheaves.

To maintain optimum rope life, it is recommended to re-lubricate them properly, in addition to other maintenance activities required by the regulations.

DRUMET recommends, for example, "UNOLIT SPRAY OIL" from the German Company DEA ELASKON in Dresden (www.dea.de) or "NYROSTEN Seioil Compound" produced by the German Company Nyrosten in Geldern (www.nyrosten.de) or similar lubricating agent intended for lift ropes.

Way of rope maintenance

Both lubricants mentioned above are intended for lubrication and maintenance of lift, overhead crane, crane and cable railway ropes.

They feature with very good lubricity, quick application and good penetration between rope wires, effective protection against corrosion and excellent adhesion.

The lubricants may be applied with the use of a brush, roller or by spraying. The lubricant shall be applied on clean and dry crane rope. It seems that the most adequate and efficient method of lubricant application is to use the roller fitted to the original lubricant bottle with the scale on its side, keeping the bottle bottom up. It is easy to observe proper volume of lubricant applied after touching the moving rope with the roller.

Recommended lubricant volumes

Re-lubrication of ropes:

Put approximately 1 litre of the lubricant on the rope section shown in the table below.

Rope diameter [mm]	Rope section length [m]
10	400
12	310
16	200
18	150

For example, 4 x 43 m /310 m = approximately 0,55 litre of lubricant shall be used for typical set of 4 rope sections, 43 m each, rope diameter 12 mm, however, in accordance with the rule of more frequent re-lubrication with smaller lubricant quantity, it is recommended to use 0,4 – 0,5 litre of lubricant, that is approximately 100 - 125 ml per each rope section.

After re-lubrication, sheave grooves should give the feeling of slight oily moisture or a streak in the inspector’s finger. No slight oily moisture at sheave grooves together with the presence of chips and dirt in the grooves indicates that cleaning and lubrication is required.

Few rules of proper maintenance of Lift ropes

Perform maintenance activities before the rope is dry or corroded

- Use lubricants recommended for crane load-carrying ropes
- Lubricate crane load-carrying ropes, lubrication of other ropes is not recommended
- Do not mix different types of lubricants together
- Excess of the lubricant may cause loss of rope properties, rope slipping and/or other unpredictable events (loss of frictional properties). Rope slipping, when accelerating or braking, may indicate lubricant excess
- Non-observance of recommendations specified above may be a cause of serious problems and/or accidents at work leading to serious injuries or death

NOTE:
Observance of the rules specified above does not release from compliance with the regulations for passenger and goods lifts, especially with the rules established by proper Technical Inspection Offices and/or suppliers or designers of lift parts. Therefore, the DRUMET Ropes and Wires sp. z o.o. is not responsible for correctness of lubrication rules specified above for specific application and possible damage to life, health and property, which may arise as a result of the use of those rules.