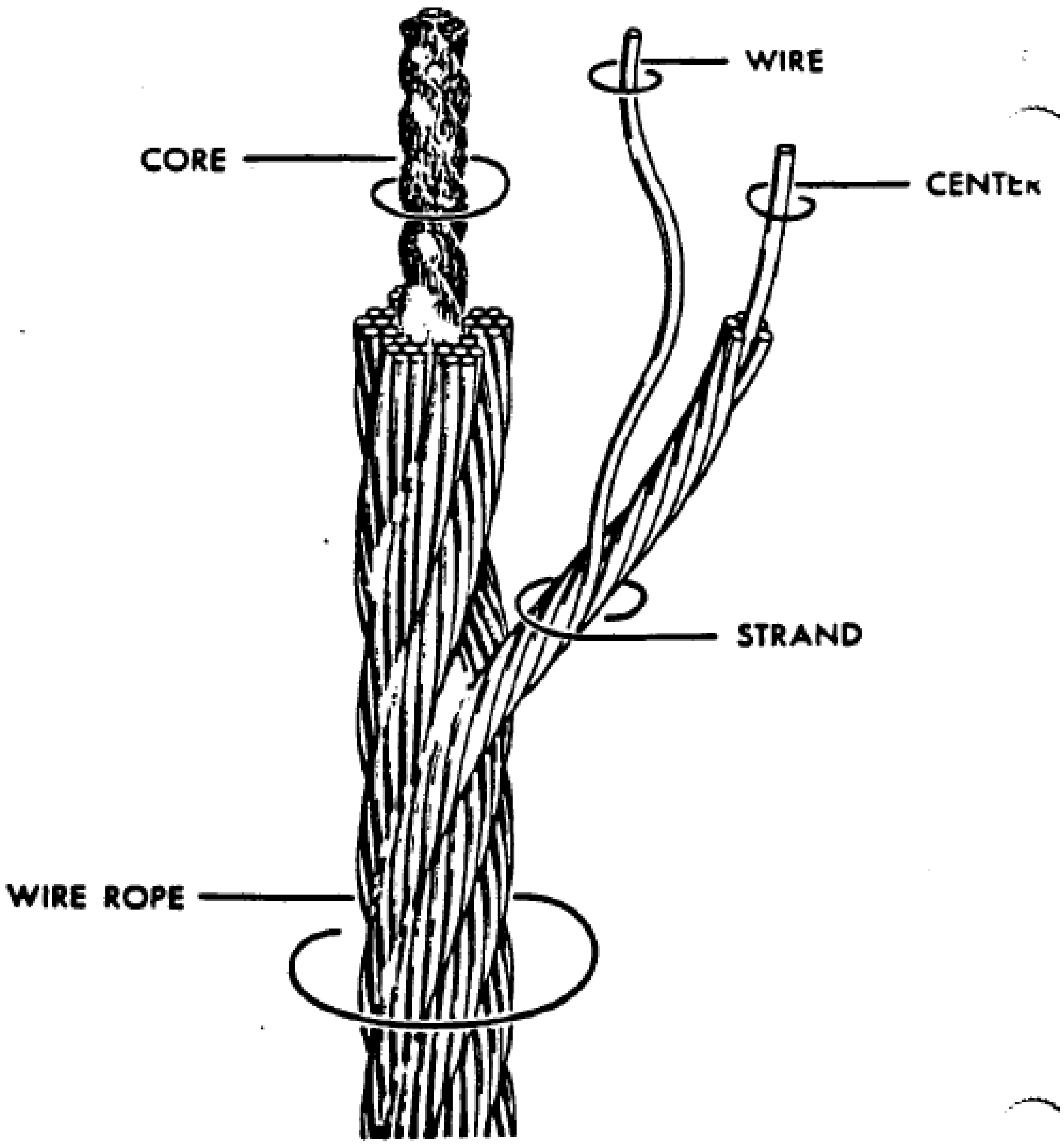


WIRE
CORE
CENTEK
STRAND
WIRE ROPE

Wire rope is a type of rope which consists of several strands of metal wire laid (or 'twisted') into a helix.

Steel wires for wire ropes are normally made of non-alloy carbon steel with a carbon content of 0.4 to 0.95%

C = 0.5
Si = 0.11
Mg = 0.48
S = 0.033
Ph = 0.014
Rest Iron

Ultimate tensile strength of steel rods is 640 Mpa.
These rods undergo the processes of patenting, coating and various processes. The ultimate tensile strength is increase and near about 1500 MPa.

Testing of wire ropes

1. Tensile test
2. Torsion test
3. Bending test
4. Wrapping test
5. Looping test

Types of rope ways

- Stationary or Standing ropes
- Running ropes: flexible, robust

- Stranded ropes
- Non –Stranded ropes

Stranded ropes

A stranded rope is built up of strands and each strand consists of a number of concentrically twisted wires laid in the form of a helix around a central steel wire.

The first refers to the number of strands in the rope and the second to the number of wires per strand. In general, the greater the number of wires, the greater the flexibility of the rope.

A seven wire strands consists of a single wires covered by 6 concentrically laid wires.

6x7 = It is made up of 6 strands and each strands is made up of 7 wires

6x19 =

6x35 =

The flexibility of a strands depends on

1. Types of core:
2. Thickness of individual wires
3. Number of wires

The types of Core

1. Fiber core
2. Steel strand core
3. Independent wire rope core

Wire rope lays

Right hand lays: wires spiral round the core in the same direction as the threads of a right hand screw.

Left hand lays : opposite

The direction strands lay in the rope – right or left. When you look down a rope, strands of a right lay rope go away from you to the right. Left lay is the opposite.

Lang's lay: wires are laid the same direction in the strand as the strands lay in the rope.

1. It is more fatigue resistant and abrasion resistant.
2. It never be used if there is fee end to rotate.
3. It offers better wearing surface.
4. It used in winding and haulage purpose.

Ordinary (regular) lay : wires are laid in the strand opposite the direction the strands lay in the rope.

1. It is more stable and more resistant to crushing than lang lay.
2. It can be used where are freely suspended.

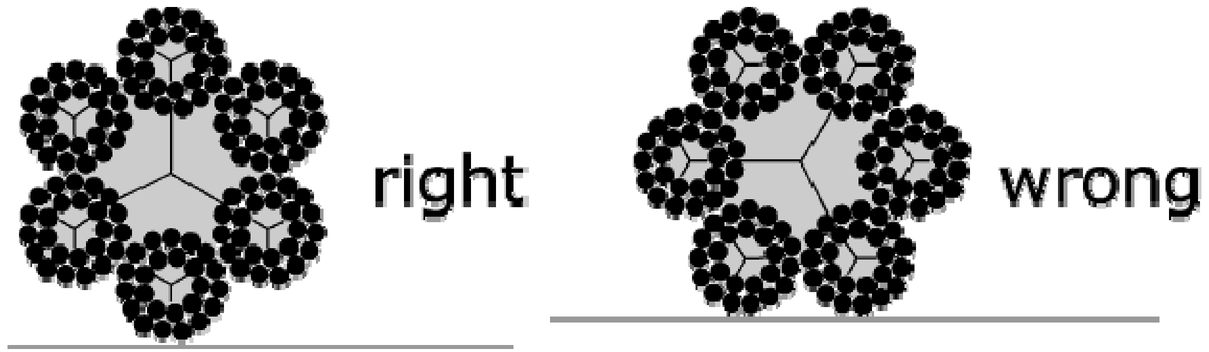
Right Regular Lay: In right regular lay rope, the wires in the strands are laid to the left, while the strands are laid to the right to form the wire rope.

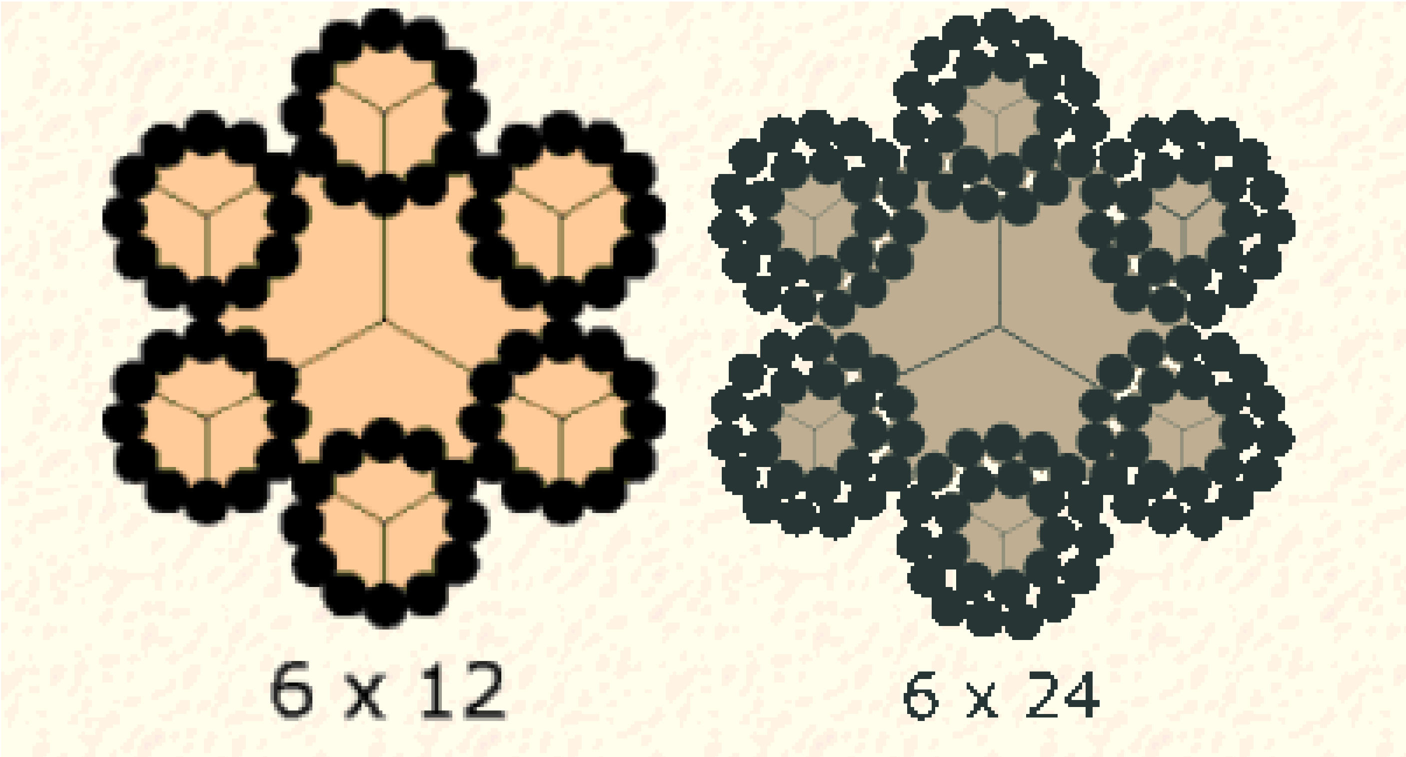
Left Regular Lay: In left regular lay rope, the wires in the strands are laid to the right, while the strands are laid to the left to form the wire rope. In this lay, each step of fabrication is exactly opposite from the right regular lay.

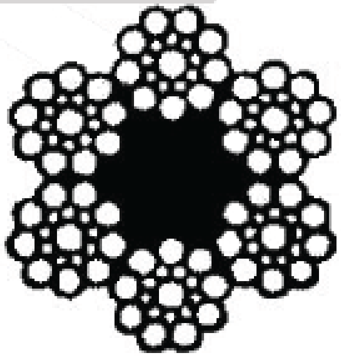
Right Lang Lay: In right lang lay rope, the wires in the strands and the strands in the rope are laid in the same direction; in this instance, the lay is to the right.

Left Lang Lay: In left lang lay rope, the wires in the strands and the strands in the rope are also laid in the same direction; in this instance, the lay is to the left (rather than to the right as in the right lang lay)

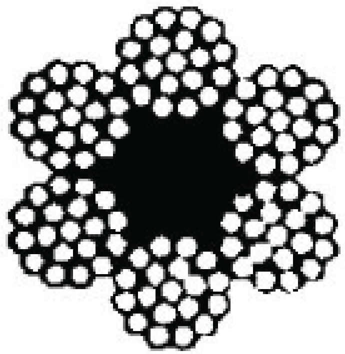
Wire rope, often called cable, is sized by diameter (not circumference, as large fiber rope is). The diameter is measured across the rope, not from flat to flat.



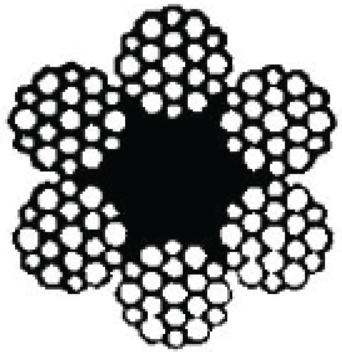

6 x 12
6 x 24



6 x 19 (9/9/1)



6 x 19 (12/6/1)



6 x19 (6 and 6/6/1)

Preformed wire ropes

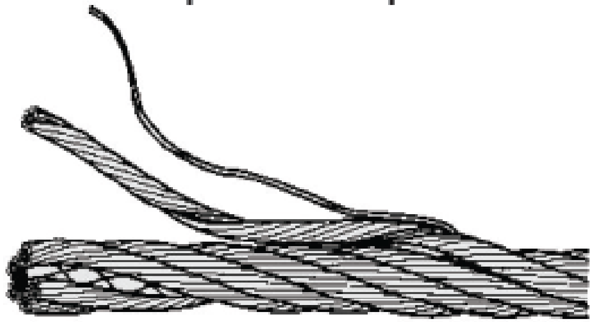
Preforming is a manufacturing process which has the effect of relieving the wires and the strands of much of the internal stress which exist in nonpreformed ropes. During the process the strands and wires are given the helical shape they will assume in the finished rope.

Preformed rope offers certain advantages over non-preformed rope, eg:

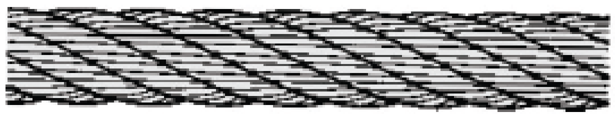
1. It does not tend to unravel and is less liable to form itself into loops or kinks and is thus more easily installed
2. It is slightly more flexible and conforms to the curvature of sheaves and pulleys
3. Due to the reduction in internal stresses it has greater resistance to bending fatigue

NON-PREFORMED ROPE

In PREFORMED rope the wires and strands are given the helix they take up in the completed rope



PREFORMED rope may be cut without servings although care must always be taken



Non-Strands ropes (locked coil ropes)

cross–section of a locked coil rope shows that the central portion consists of strands of thick round wires; only the outer layer (or two outer layers) consists of round wires placed between specially shaped wires of I section, rail section or trapezoidal section so that the wires lock with one another and the rope surface is smooth and plain compared to stranded ropes. By laying up the outer wires in the direction opposite to that of the inner wires, locked coil ropes are made non-spinning and this is a major advantage in sinking shafts where guide ropes are not installed.

- It is heavier and stronger but less flexible then the stranded rope of the same dia.
- It is used in winding and hoisting purposes.

- Its construction is difficult
- The interior cannot lubricated from outside
- It cannot spliced
- It is not flexible

Selection of wire ropes

1. Watery places and corrosive atmosphere: a galavanised rope should used.
2. High temperature: rope with fibre core should avoided
3. Stationary and running coil rope:
4. Spinning or rotating quality
5. Shock loads
6. Resistance to wear
7. Tensile strength
8. Bending strength
9. Grove size
10. Crushing and distortion

Mass and strength of wire ropes

Space factor of rope 50 to 60 % and 75% lock coil rope

Mass of rope = kd^2

Where k is a constant depending upon rope design, d is dia of rope in cm. and mass is in kg/m

Strength = sd^2

Where s is a constant depending on rope design and quality of steel.

Type of rope	k	s
Round strand with fibre core	0·36	52
Round strand with wire core	0·40	56
Flattened stiand with fibrc core	0·41	55
Flattened strand with wire core	0·45	58
Locked coil	0·56	85

Example

A wire rope, round stranded with fibre core, has a diameter of 2.54 cm. If the steel has a tensile strength of 160 kg/mm², find out the mass of the rope and the breaking strength in SI units.

mass of rope in kg/m $= kd^2$ (d in cm)

and using the value of k as 0·36 from the tables, we get mass

rope (kg/m) $= 0 \cdot 36 \times 2 \cdot 54^2$

$= 2 \cdot 32$

For 100 m long rope mass is 232 kg.

Breaking strength is given by the formula

B. S. (in kN) $= sd^2$, (d in cm)

From the tables, value of s is 52.

B. S. $= 52 \times 2 \cdot 54^2$

$= 335$ kN