# General Guidance On Rope Selection

## 1. Construction of wire rope

The design of a rope is determined by
**STRAND CONSTRUCTION :** The number and arrangement of wires in each strand

**ROPE CONSTRUCTION :** The number and arrangement of strands in each rope

**THE CORE**


## 2. Grades of rope wire

Steel wires rope are classified into following tensile strength grades to meet various requirements according to the applications.

Grade 135 kg/mm$^2$ : Special grade to meet requirement of hoisting ropes on traction elevators.

Grade 150/160 kg/mm$^2$ : Galvanized wires coated with zinc through hot dip process for protection against corrosion.

Grade 165kg/mm$^2$ : Ungalvanized and drawn galvanized wires for general purpose wire ropes.

Grade 180kg/mm$^2$ : Ungalvanized high tensile grade wires for general purpose wire ropes.

Grade 195kg/mm$^2$ : Extra high tensile grade is used in the manufacture of the wire rope where ultimate breaking strength is required.

* Other higher grades are also available.

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## 3. Lubrication

Lubrication reduces internal friction of the wires and strands and protects against corrosion. Grease is applied to all ropes. If special lubricants are required, this must be specifically stated at time of ordering.

| Type of Lubrication | | Lubricating Method | Suitable on Wire Rope | Appearance (Type of Grease) | Note |
|---|---|---|---|---|---|
| A-2 | Closing | No Lubrication | Galv/Ungalv Wire Rope | Yellowish - Brown (Petro-Chem grease) | For general application of Galvanized Wire Rope. Slightly oily to the touch. |
| | Stranding | Light application Loose wipe | | | |
| | Core | Heavier than on Strand No wipe | | | |
| A-3 | Closing | No Lubrication | Galv/Ungalv Wire Rope | Yelloeish -Brown Petro-Chem grease) | For general application of Ungalvanized Wire rope. Lightly tacky to hand touch. |
| | Stranding | Applied during stranding by running it through a bath of lubricant Tight wipe | | | |
| | Core | Heavy application No wipe | | | |
| B | Closing | No Lubrication | Ungalv Wire Rope | Black (Asphaltum grease) | For special usage and long term storage where maximum protection against corrosion. |
| | Stranding | Applied during stranding by running through a bath of lubricant | | | |
| | Core | Heavier than on strand Loose wipe | | | |
| C | Closing | No Lubrication | Ungalv Wire Rope | Black (Asphaltum grease) | Lubrication sets up to a medium hard consistancy. Ideal for oilfield, construction equipment and logging use. Lightly tacky to hand touch. |
| | Stranding | Applied during stranding by running it through a bath of lubricant Loose Wipe | | | |
| | Core | Heavy application No wipe | | | |
| D | Closing | Heavy Application Loose Wipe after the "bath" application | Ungalv Wire Rope | Black (Asphaltum grease) | Wire rope valley is filled with lubrication. For special purpose lubrication of Ungalv Wire rope where maximum protection against corrosion is desired. |
| | Stranding | Applied during stranding by running it through a bath of lubricant Tight Wipe | | | |
| | Core | Heavy application No Wipe | | | |





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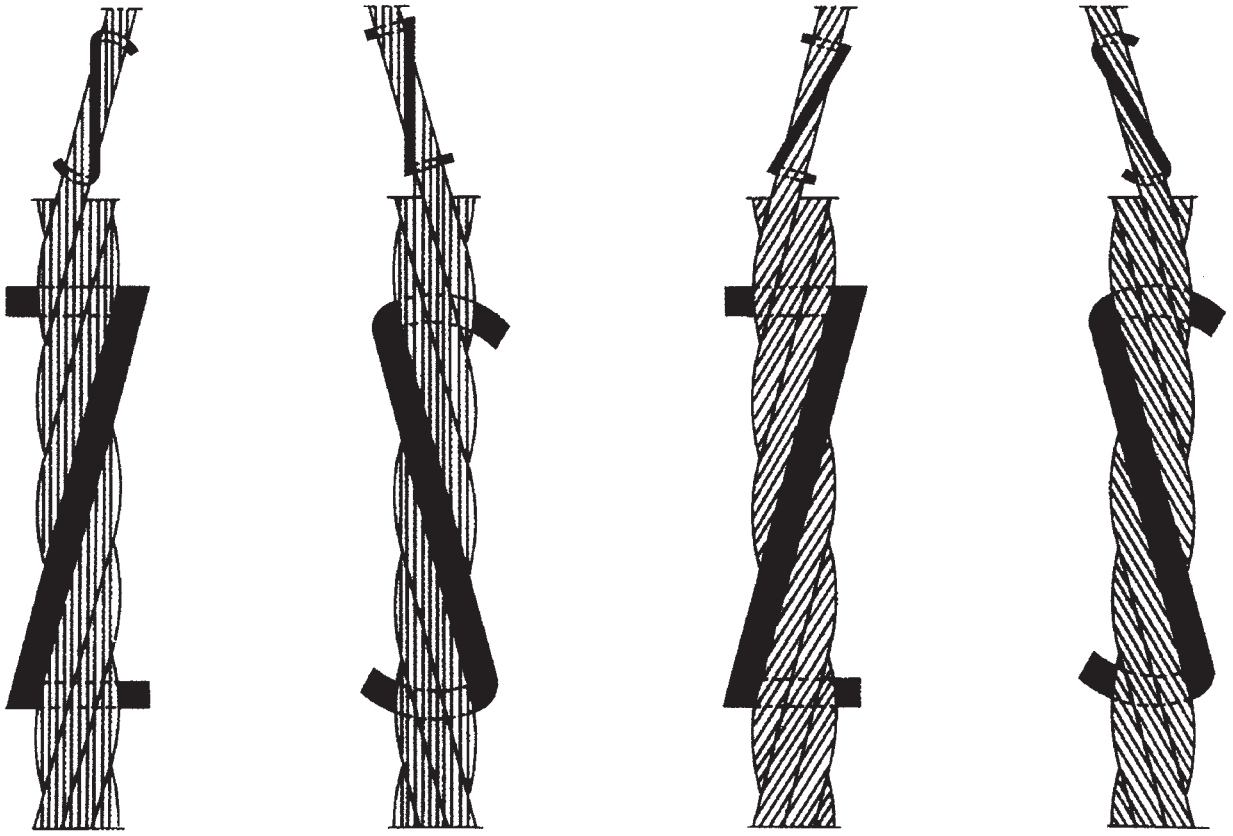
## 4. Wire Rope Lay




## 5. Cores for wire ropes

**Steel**

IWRC (Independent Wire Rope Core) The main core is an independent wire rope, normally having the construction 7 x 7. IWSC (Independent Wire Strand Core) The main core is an independent wire strand, normally having the same construction as the outer strands of the rope.

**Fibre**

Fibre cores are stranded and comprise either; Natural fibres such as sisal hemp, jute, and cotton. Synthetic fibres such as polyamide, polyethylene, and polypropylene Asbestos fibres (heat resistant).

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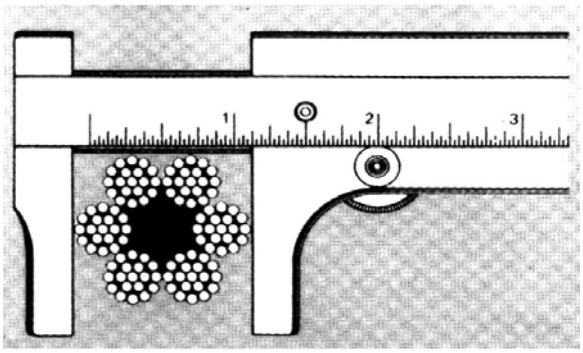
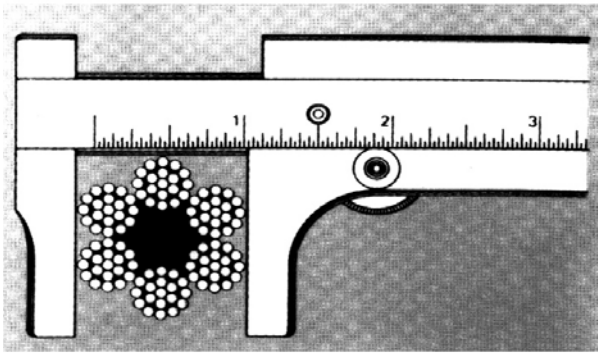
## 6. Diameter of wire rope

The diameter of a wire rope is the diameter of the circle which encloses all of the wires. When measuring wire rope it is important to take the greatest distance of the outer limits of the 'Crown' of two opposite strands. A measurement across the valleys will result in incorrect lower readings.

Correct



Incorrect



## 7. Sheave and Drum

When a rope is bent around the sheave or drum, individual wires in the strand are subjected to bending stress and repeated bending fatigue. To obtain a smooth operation and longer life for the wire line, it is necessary to keep the diameter of sheave and drum above the recommended figures of the table and to keep the surface of the grooves sharp and smooth.

**Minimum Diameter of Sheave and Drum (D=Wire Rope Dia.)**

| Construction | Min. Dia. | Recommended Dia. |
|---|---|---|
| 6 x 7 | 45 x D | 70 x D |
| 6 x 19 | 30 x D | 45 x D |
| 6 x 37 | 20 x D | 30 x D |
| 6 x S(19) | 33 x D | 50 x D |
| 6 x Fi(25) | 26 x D | 39 x D |
| 6 x Fi(29) | 24 x D | 35 x D |
| 8 x S(19) | 27 x D | 40 x D |
| 18 x 7 | 35 x D | 50 x D |

## 8. Safety factor of wire rope

It is difficult to fix the safety factor for each type of wire rope to be used for various equipments, as this factor depends not only on the load carried, but also on the speed of rope working, the kinds of fitting used for rope ends, the acceleration and deceleration, length of rope, the number, size and arrangements of sheave and drums etc. The following safety factors are minimum requirements for safety and economy in the common installation.

**Safety Factor of Wire Rope**

| Purpose | Min. S.F. |
|---|---|
| Elevator | 10 |
| Crane, Hoist Derrick, Sling | 5 |
| Guy or Stay, Horizontal Pull or Traction | 4 |
| Main Wire of Aerial Rope Way | 3 |

## 9. Rope Maintenence

Avoid :

* Twist, Loop or Kink on wire rope.
* Moisture, Dust and Acid or Sulphuric Hume gas.
* Overload.
* Severe or reverse bending (S-Bending).
* Too small Sheaves, Drums and Guide Rollers.
* Hard rolling of Sheaves and Rollers.
* Worn Groove, Broken or Soft Sheaves and Rollers.
* No Lubrication.
* Heat Influence.
* Wrong Fitting and Spooling on the Drum.
* Excessive Fleet Angle.
* Vibration.
* Obstacles, Sand and Grit on the surface of operation line.
* Shock-Too fast start or stop.





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