

## APPROX. WEIGHT

- The formula to calculate the approx. weight per 100 meters:  $M=kD^2$  ;
- M-Approx weight per 100 meters, kg/100m ;
- D- Rope Nominal diameter, mm ;
- k- Weight factor for one construction rope length after being fully lubricated,kg/100m ·mm<sup>2</sup>(see table).

## BREAKING STRENGTH

- The formula to calculate the minimum breaking load:  $F_0 = \frac{K' \cdot D^2 \cdot R_0}{1000}$  ;
- F<sub>0</sub>-minimum breaking load, kN;
- D- nominal diameter of rope, mm;
- R<sub>0</sub> -nominal tensile strength of rope, Mpa;
- K'-minimum breaking strength factor for one designated construction rope ( see table for K' value).

## TABLE OF WEIGHT FACTOR AND MINIMUM BREAKING STRENGTH FACTOR FOR THE WIRE ROPE WITH IMPORTANT APPLICATION

| Item | Rope construction | Weight factor K ( kg/100m·mm <sup>2</sup> ) |                      |                | $\frac{K_2}{K_{1n}}$ | $\frac{K_2}{K_{1p}}$ | Minimum breaking strength factor K' |                 | $\frac{K'_2}{K'_1}$ |
|------|-------------------|---|----------------------|----------------|----------------------|----------------------|-------------------------------------|-----------------|---------------------|
|      |                   | Natural fiber core                          | Synthetic fiber core | Steel core     |                      |                      | Fiber core                          | Steel core      |                     |
|      |                   | K <sub>1n</sub>                             | K <sub>1p</sub>      | K <sub>2</sub> |                      |                      | K' <sub>1</sub>                     | K' <sub>2</sub> |                     |
| 1    | 6X7               | 0.351                                       | 0.344                | 0.387          | 1.10                 | 1.12                 | 0.332                               | 0.359           | 1.08                |
| 2    | 6X19              | 0.380                                       | 0.371                | 0.418          | 1.10                 | 1.13                 | 0.330                               | 0.356           | 1.08                |
| 3    | 6X37              |   |                      |                |                      |                      |                                     |                 |                     |
| 4    | 8X19              | 0.357                                       | 0.344                | 0.435          | 1.22                 | 1.26                 | 0.293                               | 0.346           | 1.18                |
| 5    | 8X37              |   |                      |                |                      |                      |                                     |                 |                     |
| 6    | 18X7              | 0.390                                       | 0.390                | 0.430          | 1.10                 | 1.10                 | 0.310                               | 0.328           | 1.06                |
| 7    | 18X19             |   |                      |                |                      |                      |                                     |                 |                     |
| 8    | 34X7              | 0.390                                       | 0.390                | 0.430          | 1.10                 | 1.10                 | 0.308                               | 0.318           | 1.03                |
| 9    | 35WX7             | --  | --                   | 0.460          | --                   | --                   | --                                  | 0.360           | --                  |
| 10   | 6VX7              | 0.412                                       | 0.404                | 0.437          | 1.06                 | 1.08                 | 0.375                               | 0.398           | 1.06                |
| 11   | 6VX19             | 0.405                                       | 0.397                | 0.429          | 1.06                 | 1.08                 | 0.360                               | 0.382           | 1.06                |
| 12   | 6VX37             |   |                      |                |                      |                      |                                     |                 |                     |
| 13   | 4VX39             | 0.410                                       | 0.402                | --             | --                   | --                   | 0.360                               | --              | --                  |

Note1 : in item 2 and item 4, when the wire quantity is 19 or much less, the weight factor should be 3% less than the factor in the table.

Note 2: in item 11, the weight factor and min. breaking strength factor of the 6VX21 and 6VX24 construction wire rope with fiber core should be 8% less than the factor in table. For 6VX30 construction, it is 10%.

In item 12, the weight factor and min. breaking strength factor of the 6VX37S construction wire rope should be 3% greater than the factor in table.

Note 3: K<sub>1p</sub> is the weight factor for wire rope with polypropylene core.

**TABLE OF WEIGHT FACTOR AND MINIMUM BREAKING STRENGTH FACTOR FOR THE WIRE ROPE WITH IMPORTANT APPLICATION**

| Item | Rope construction | Weight factor K ( kg/100m-mm <sup>2</sup> ) |                      |            | $\frac{K_2}{K_{1n}}$ | $\frac{K_2}{K_{1p}}$ | Minimum breaking strength factor K' |            | $\frac{K'_2}{K'_1}$ |
|------|-------------------|---|----------------------|------------|----------------------|----------------------|-------------------------------------|------------|---------------------|
|      |                   | Natural fiber core                          | Synthetic fiber core | Steel core |                      |                      | Fiber core                          | Steel core |                     |
|      |                   | $K_{1n}$                                    | $K_{1p}$             | $K_2$      |                      |                      | $K'_1$                              | $K'_2$     |                     |
| 2    | 6X7               | 0.351                                       | 0.344                | 0.387      | 1.10                 | 1.12                 | 0.332                               | 0.359      | 1.08                |
| 3    | 6X19(a)           | 0.380                                       | 0.371                | 0.418      | 1.10                 | 1.13                 | 0.330                               | 0.356      | 1.08                |
| 4    | 6X37(a)           |   |                      |            |                      |                      |                                     |            |                     |
| 3    | 6X19(b)           | 0.351                                       | 0.344                | 0.400      | 1.14                 | 1.16                 | 0.307                               | 0.332      | 1.08                |
| 4    | 6X37(b)           | 0.346                                       | 0.337                | 0.400      | 1.16                 | 1.19                 | 0.295                               | 0.319      | 1.08                |
| 5    | 6X61              | 0.361                                       | 0.354                | 0.398      | 1.10                 | 1.12                 | 0.283                               | 0.306      | 1.08                |
| 6    | 8X19              | 0.357                                       | 0.344                | 0.435      | 1.22                 | 1.26                 | 0.293                               | 0.346      | 1.18                |
| 7    | 8X37              |   |                      |            |                      |                      |                                     |            |                     |
| 8    | 18X7              | 0.390                                       |                      | 0.430      | 1.10                 | 1.10                 | 0.310                               | 0.328      | 1.06                |
| 9    | 18X19             |   |                      |            |                      |                      |                                     |            |                     |
| 10   | 34X7              | 0.390                                       |                      | 0.430      | 1.10                 | 1.10                 | 0.308                               | 0.318      | 1.03                |
| 11   | 35WX7             | --  |                      | 0.460      | --                   | --                   | --                                  | 0.360      | --                  |
| 12   | 6X12              | 0.251                                       | 0.231                | --         | --                   | --                   | 0.209                               | --         | --                  |
| 13   | 6X24              | 0.318                                       | 0.304                | --         | --                   | --                   | 0.280                               | --         | --                  |

Note1: in item 3 and item 6, the weight factor will be 3% less than the factor in the table when wire quantity is 19 or much less.

Note2: in item 13, the weight factor and minimum breaking strength factor of equidistant twisted length wire rope should be 4% greater than the factor in table.

Note 3: K1p is the weight factor for wire rope with polypropylene core.



**TABLE OF WEIGHT FACTOR AND MINIMUM BREAKING STRENGTH FACTOR FOR THE COMPACTED STRAND WIRE ROPE**

| Item | Rope construction | Weight factor K ( kg/100m-mm <sup>2</sup> ) |            | Minimum breaking strength factor K' |            |
|------|-------------------|---|------------|-------------------------------------|------------|
|      |                   | Fiber core                                  | Steel core | Fiber core                          | Steel core |
| 1    | 6×K7              | 0.410                                       | --         | 0.375                               | --         |
| 2    | 6×K19             | 0.425                                       | 0.477      | 0.373                               | 0.410      |
| 3    | 6×K37             |   |            |                                     |            |
| 4    | 8×K19             | 0.405                                       | 0.495      | 0.330                               | 0.410      |
| 5    | 8×K37             |   |            |                                     |            |
| 6    | 18×K7             | 0.427                                       | 0.470      | 0.350                               | 0.370      |
| 7    | 18×K19            |   |            |                                     |            |
| 8    | 35W×K7            | --  | 0.510      | --                                  | 0.410      |
| 9    | 15×K7             | --  | 0.490      | --                                  | 0.410      |
| 10   | 16×K7             |   |            |                                     |            |
| 11   | 8×K19-PWRC(K)     | --  | 0.51       | --                                  | 0.44       |
| 12   | 8×K36-PWRC(K)     | --  |            | --                                  |            |
| 13   | JL-1618K          | --  | 0.521      | --                                  | 0.410      |
| 14   | JL-1710K          | --  | 0.465      | --                                  | 0.410      |
| 15   | JL-1712K          | --  | 0.458      | --                                  | 0.390      |

**TABLE OF WEIGHT FACTOR AND MINIMUM BREAKING STRENGTH FACTOR FOR THE WIRE ROPE WITH LARGE DIAMETER**

| Item | Rope construction | Weight factor K ( kg/100m-mm <sup>2</sup> ) |            | Minimum breaking strength factor K' |            |
|------|-------------------|---|------------|-------------------------------------|------------|
|      |                   | Fiber core                                  | Steel core | Fiber core                          | Steel core |
| 1    | 6×37(a)           | 0.383                                       | 0.418      | 0.330                               | 0.356      |
| 2    | 6×61(a)           | 0.386                                       | 0.435      | 0.330                               | 0.356      |
| 3    | 6×61(ab)          | 0.380                                       | 0.435      | 0.318                               | 0.346      |
| 4    | 6×91(ab)          |   |            |                                     |            |
| 5    | 6×61(b)           | 0.361                                       | 0.398      | 0.283                               | 0.306      |
| 6    | 8×19(a)           | 0.357                                       | 0.435      | 0.293                               | 0.346      |
| 7    | 8×37(a)           | 0.375                                       | 0.445      | 0.293                               | 0.346      |
| 8    | 8×61(a)           | 0.380                                       | 0.455      | 0.293                               | 0.346      |
| 9    | 8×37(b)           | 0.356                                       | 0.420      | 0.261                               | 0.310      |
| 10   | 8×61(ab)          | 0.370                                       | 0.443      | 0.270                               | 0.336      |
| 11   | 8×91(ab)          |   |            |                                     |            |
| 12   | 8×61(b)           | 0.356                                       | 0.415      | 0.251                               | 0.297      |

## APPLICATION OF STEEL WIRE ROPE

| Application   | Name   | Rope construction  | Remarks  |
|---|--|--|--|
| Subvertical Hoist                                       | Triangle-strand wire rope                                | 6VX37S 6VX37 6VX34 6VX30 6VX43 6VX21   |  |
|   | Linear contact wire rope                                 | 6X19S 6X19W 6X25Fi 6X29Fi 6X26WS 6X31WS 6X36WS 6X41WS  |  |
|   | Multi-layer strand wire rope                             | 18X7 35WX7   | Suitable for vertical shaft of the wire rope canal |
| Digging subvertical hoist ( use for well building )     | Multi-layer strand wire rope and shaped strand wire rope | 17X7 24WX7 34X7 36X7 4VX39S 4VX48S   |  |
| Balance rope for subvertical hoist                      | Steel wire rope  | 6X37S 6X36WS 4VX39S 4VX48S   | Only for regular lay                               |
|   | Multi-layer strand wire rope                             | 18X7 17X7 35WX7 24WX7 34X7 36X7  | Only for regular lay                               |
| Incline shaft hoist(winch)                              | Triangle-strand wire rope                                | 6VX18 6VX19  |  |
|   | Steel wire rope  | 6X7  |  |
| Hoister for blast furnace                               | Triangle-strand wire rope                                | 6VX37S 6VX37 6VX30 6VX34 6VX43   |  |
|   | Linear contact wire rope                                 | 6X19S 6X25Fi 6X29Fi 6X26WS 6X31WS 6X36WS 6X41WS  |  |
| Vertical shaft tunnel and cableway                      | Triangle-strand wire rope                                | 6VX18 6VX19  |  |
|   | Multi-layer strand wire rope                             | 18X7 17X17   |  |
| Opened slope hoisting                                   | Triangle-strand wire rope                                | 6VX37S 6VX37 6VX30 6VX34 6VX43   |  |
|   | Linear contact wire rope                                 | 6X36WS 6X37S 6X41WS 6X49SWS 6X55SWS  |  |
| Oil drilling  | Linear contact wire rope                                 | 6X19S 6X19W 6X25Fi 6X29Fi 6X26WS 6X31WS 6X36WS   | Steel core also is available                       |
| Belt conveyor, cableway and ground cable car            | Linear contact wire rope                                 | 6X19S 6X19W 6X25Fi 6X29Fi 6X26WS 6X31WS 6X36WS 6X41WS  | 6X19W is not available for cableway                |
| Excavator(hoisting)                                     | Linear contact wire rope                                 | 6X19S+IWR 6X19W+IWR 6X25Fi+IWR 6X29Fi+IWR 6X26WS+IWR 6X31WS+IWR 6X36WS+IWR 6X55SWS+IWR 6X49SWS+IWR 35WX7 24WX7                             |  |
|   | Triangle-strand wire rope                                | 6VX37S 6VX37 6VX30 6VX34 6VX43   |  |
| Large casting crane                                     | Linear contact wire rope                                 | 6X19S+IWR 6X19W+IWR 6X25Fi+IWR 6X36WS+IWR 6X41WS+IWR   |  |
| Port handling hydraulic engineering and tower crane     | Multi-layer strand wire rope                             | 18X19S 18X19W 34X7 36X7 35WX7 24WX7  |  |
|   | Four-strand fan-shaped wire rope                         | 4VX39S 4VX48S  |  |
| Crane Frequent hoisting and other important application | Linear contact wire rope                                 | 6X19S 6X19W 6X25Fi 6X29Fi 6X26WS 6X31WS 6X36WS 6X37S 6X41WS 6X49SWS 6X55SWS 8X19S 8X19W 8X25Fi 8X26WS 8X31WS 8X36WS 8X41WS 8X49SWS 8X55SWS |  |
|   | Four-strand fan-shaped wire rope                         | 4VX39S 4VX48S  |  |

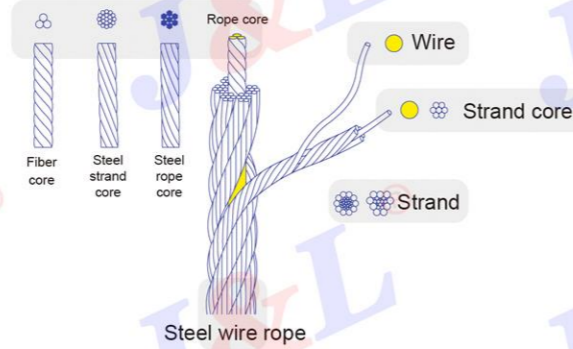
## APPLICATION OF STEEL WIRE ROPE(CONTINUED TABLE)

| Application  | Name                             | Rope construction   | Remark     |
|--|----------------------------------|---|------------|
| Moving machine for hot steel ( platform for pushing steel used in steel works) | Linear contact wire rope         | 6X19S+IWR 6X19W+IWR 6X25Fi+IWR 6X29Fi+IWR 6X31WS+IWR 6X37S+IWR 6X36WS+IWR                   |            |
| Shipping handling  | Linear contact wire rope         | 6X19W 6X25Fi 6X29Fi 6X31WS 6X36WS 6X37S   | Galvanized |
|  | Multi-layer strand wire rope     | 18X19S 18X19W 34X7 36X7 35WX7 24WX7   |            |
| Tugboat, Cargo net   | Four-strand fan-shaped wire rope | 4VX39S 4VX48S   |            |
|  | Steel wire rope                  | 6X31WS 6X36WS 6X37S   | Galvanized |
| Ship tension, mast hanging bridge  | Steel wire rope                  | 6X7+IWS 6X19S+IWR   | Galvanized |
| Salvaging wrecked ship   | Steel wire rope                  | 6X31WS 6X36WS 6X37S 6X41WS 6X49SWS 6X55SWS 8X19S 8X19W 8X31WS 8X36WS 8X41WS 8X49SWS 8X55SWS | Galvanized |

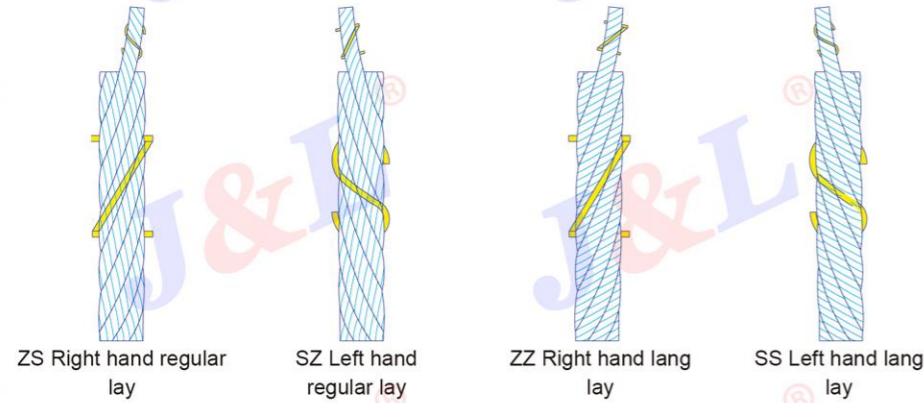


# KNOWLEDGE OF STEEL WIRE ROPE

## CONSTRUCTION OF STEEL WIRE ROPE

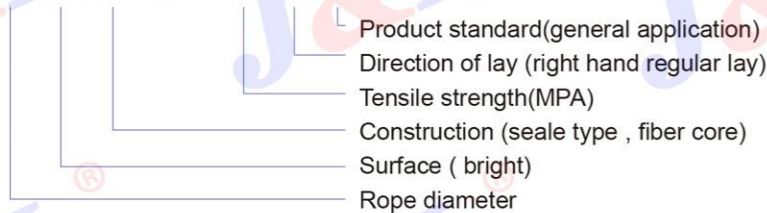


## TYPE AND DIRECTION OF LAY



## MARKING METHOD OF STEEL WIRE ROPE

18 NAT 6×19S+FC 1770 ZS GB/T20118-2006



## MESSAGE FOR ORDER STEEL WIRE ROPE

- 1.Product name
- 2.Construction (mark code)
- 3.Nominal diameter
- 4.Twisted way
- 5.Surface status
- 6.Tensile strength or minimum breaking strength
- 7.Quantity (length)
- 8.Product standard number
- 9.Application
- 10.Any other requirements from clients

# INSTRUCTIONS OF WIRE ROPE

## STORAGE:

Steel wire rope should be stored in a clean, draughty, dry, no dust warehouse, make sure to keep out of the sun and heat. When the rope was stored outside, make sure the ground is dry and put them on the wood block, covered by waterproof cloth. When put the rope in storage, the inspector should check the mark, and make sure it is clean and in accordance with the certificate. The rope package with wheel, it should be moved often especially in the heat environment to prevent the lube running off from the wire rope.

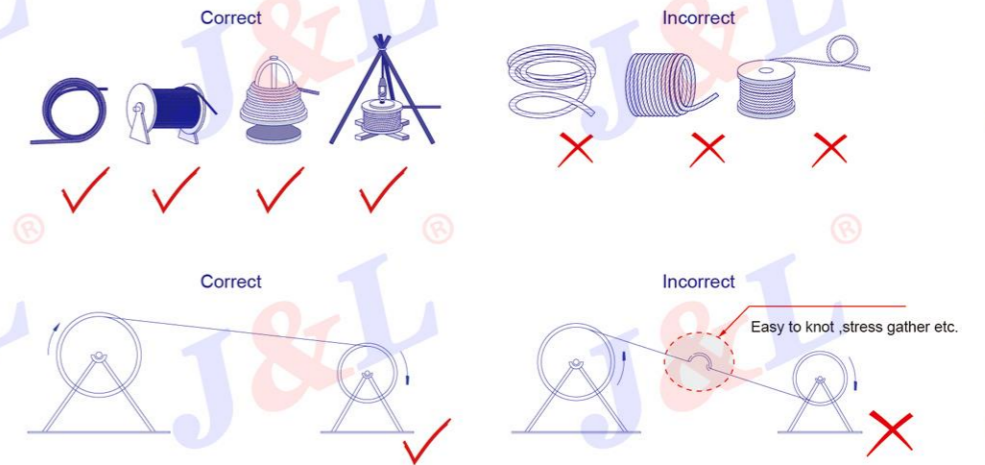
The wire rope could not be piled up layer by layer while storing, regularly inspection is necessary if large quantity need to be stored for long term. For the appearance of rust, please clean and re-lubricated. For the seriously rusty part, please reject it. When use the stored rope, please follow the rule of first in first out.

## STEEL WIRE ROPE TRANSPORTATION

- When handling the wire rope, please use the crane to avoid damaging the rope.
- Don't roll the rope on the accidented ground, to avoid damaging of the rope surface.
- Keep it clean when move it without the outside package.

## METHOD OF UNCOILING WIRE ROPE

The rope should be uncoiling with correct way, as show in the following figure:

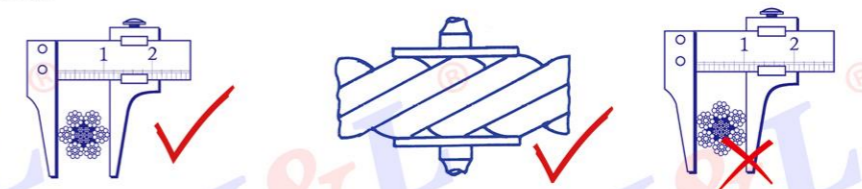


## STEEL WIRE ROPE INSTALLATION

Before install the new wheel wire rope, check the steel wire rope and the condition and size of the related parts, for example, the roll, pulley to make sure they are suitable with each other.

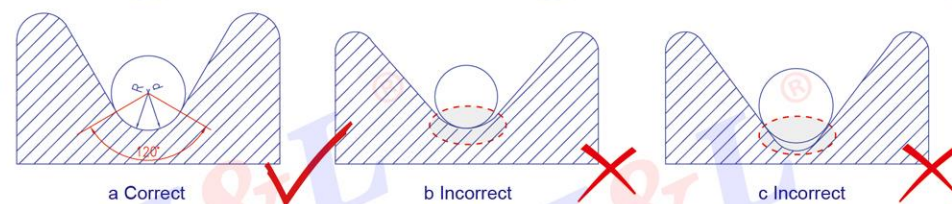
### MEASURE THE ROPE DIAMETER WITH CORRECT WAY

Use the vernier caliper to measure the wire rope diameter, and the caliper should be with sufficient width across two adjacent strands. Measure should be under the status of unstressing, at the straight line part where 15M far way from the end of the rope, on the two sections which apart at least 1M, then get two numerical value at the same section where is the orthogonal direction, the last measured diameter is the average of the four numerical value.

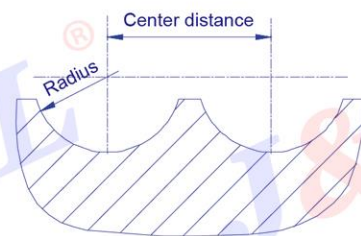


## STEEL WIRE ROPE INSTALLATION

- Using pulley standard gauge to check the dimension of the slot to make sure that it has enough space to keep the steel wire rope move freely and bend easily.



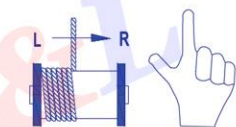
- If the coiling block is open type, please check the radius and center distance of the slot to make sure it can hold the different sizes of the rope.



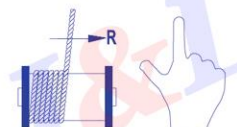
- Whether the coiling block is smooth or grooved, the wire rope twine around it should follow the method from left to right, as show in the following figure:



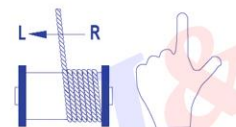
Right lay rope start coiling from the right edge of flange, picture a, right lay steel wire rope- underwind



Left lay steel wire rope start coiling from the left edge of flange, picture b, left lay steel wire rope- underwind

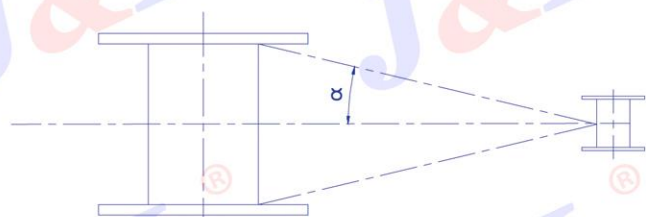


Right lay steel wire rope start coiling from the left edge of the flange, picture c, right lay steel wire rope- overwind

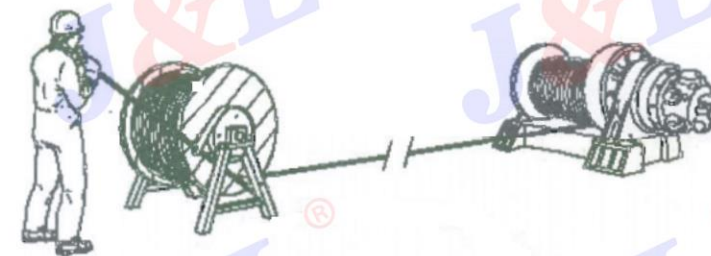


Left lay steel wire rope start coiling from the right edge of the flange, picture d, left lay steel wire rope- overwind

- The angle between the rope and the drum should be suitable during release or coiling, angle for the drum without groove,  $\alpha$  should be less than  $1.5^\circ$ , angle for drum with groove,  $\alpha$  should be less than  $2.5^\circ$ .

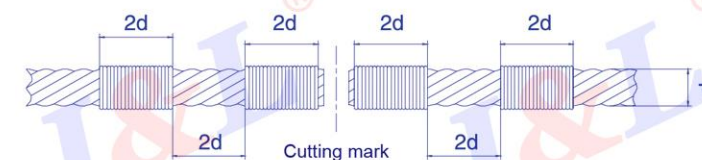


- Put the roll on the device which can supply the backward tension to the rope when coiling multi-layer, then the backward tension can transmit to the roll to make sure the under layer especially the bottom rope can coiling closely.



## STEEL WIRE ROPE CUTTING

- If you need to cut the steel wire rope, you should tie the two ends of the wire rope with the cutting mark at first. For the diameter less than 100 mm of single strand wire rope you should tie 1 round respectively at both ends with the cutting marks, and at least every length should be not less than 2 times of the rope diameter. For multilayer strands wire rope and single strand that of diameter which is more than 100 mm you should tie 2 rounds respectively at both ends with the cutting mark, and at least every length should not less than 2 times of the rope diameter.



## STEEL WIRE ROPE MAINTENANCE

Inspection, periodic overall inspection and rejected standard of crane steel wire rope should follow with Crane wire rope Maintenance Installation Inspection and rejection standard of GB/T5972.

- Inspection:**  
During the process of using wire rope, we should check periodically according to the relevant provisions, and record the inspection results. Also the content of the inspection should include the following: the wear degree, broken wire, steel wire connection or end lubrication condition, rope fastening parts, and other anomalies, etc.
- Maintenance:**  
In order to get the best performance, most of the wire ropes need to add oil during the usage period, the lubrication must be same as the original lubrication during manufacturing. The traction drive wire rope lubrication should not reduce the friction performance. The typical lubricating methods are including lubricated by brush, drip oil, portable pressure spray oil and high pressure injection oil during the period of use. The latter approach is under high pressure to lubricant powerful blasts into the steel wire rope that will at the same time clean the wire rope, dehumidification, residual oil dirties, and other contaminants.

### WARNING

- During the wire rope using process if there has phenomenon like overload, wear and tear, misuse, damage or improper maintenance method, those will make the wire rope lose efficacy.
- In order to protect your life and property safety, please pay attention when you use the wire rope.
- Each time when use the new wire rope, please inspect if the pulley, drum, and other working systems meet the requirements or not.
- Please check the abrasion and damage status of steel wire rope before usage.
- Forbid to use the attrited, damaged or rejected wire rope.
- Forbid to use the wire rope overloaded.