2MKABLO

Instructions on **Packaging, Transportation, Storage** and **Installation** Guideline

Introduction

Cable reels must be transported carefully. Incorrect transportation practices can easily cause problems such as breaking cable reels or visible or invisible damage to cables.

Invisible damages are of the main problems that lead to the non-use of cables. For this reason, some basic rules should be followed.

If a wooden reel is correctly transported and/or stored as described in this document, it shall be under **2M KABLO Warranty for 18 months following shipment in terms of durability and usability.**

If reels show damage signs resulting from transportation, the committed guarantees shall be invalid in the reels provided and in cable problems that may occur later on.

Please refer to the cable catalogues for the temperature ranges required for transportation and storage as well as general conditions and possible special cases.

Packaging

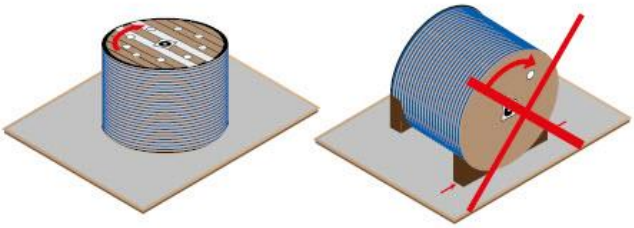
- Each reel should be tightly covered with stretch films.
  Plywood reels should be tightened with plastic strips onto the pallets they are putting on, and wooden reels with plastic strips. Wooden reel caps may also be nailed if appropriate.
- The 5 plastic reels should be placed on top of each other and then should be passed through the shrink machine.
- Coils should be individually bagged and passed through the shrink machine.
- Cable should be covered with a shrink cover or a cap-like material against the possibility of soaking in water.
- Cable shrink must be fixed in order to prevent the loosening of the winding during transport, transportation and storage.
- If necessary, an extra nylon strip can be used to make the loaded pallet more stable.
- The packed pallets cannot be loaded on top of each other.
- Euro Pallets in the dimensions of 120x120x15 and 120x80x15 will be used.
- Products weighing a maximum of 1400 kg can be placed on pallets measuring 120x120x15, and products weighing a maximum of 650 kg can be placed on Euro pallets measuring 12x80x15.
- All wooden materials used must be protected by disinfecting according to the ISPM 15 Regulation. For this reason, disinfected materials should be requested from the supplier and checked accordingly.
- On each reel, at least 2 labels are affixed. (One to the side and one to the belly).
- The coil cables with a length of 100 meters are delivered to the storehouse in such a way that they are placed in a package or a sack with barcodes affixed to it.
- In case of customized packages specified by the customer, packing is carried out in accordance with such a request.

Transportation

- Cables should be protected during transportation and storage. Special transportation procedures may be necessary.

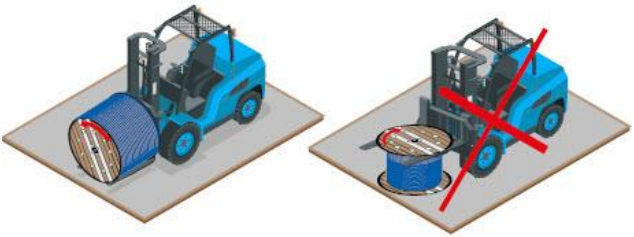
Reels should be protected against rises and falls in roads, and should be fixed with wedges.

Reels on the pallets should be fixed in the horizontal position.



- Plywood reels should be in the horizontal position during transportation and storage.
- A reel that is corroding, showing signs of wear, or damaged during transportation must be checked

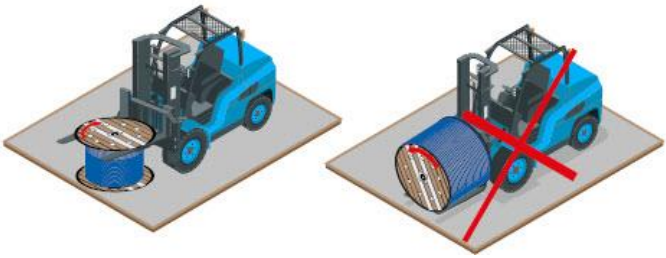
The forks of the forklift can use the edges of the reel during lifting but cannot use the cable or the protection parts.



- Wooden reels cannot be moved from the sidewalls.
- Reels can only be lifted from the edges of a forklift. The fork part of the lifter cannot touch the cable and the wrapped cover for protection. Forks must support both sides during lifting.

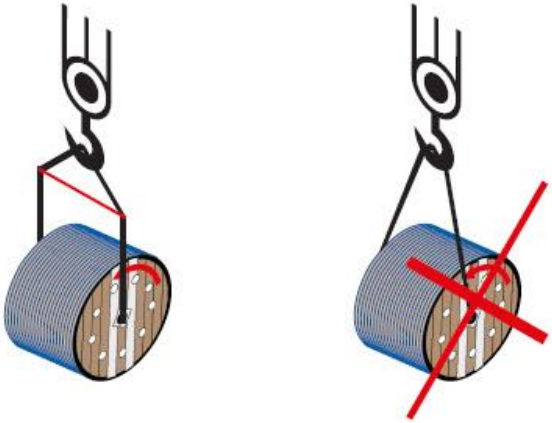
- 2 pallets can be placed on top of each other to optimize the container height. In this case, a protector will be placed on the lower pallet in order to prevent the upper pallet from damaging the lower pallet load during transportation.

The application methods shown in the figures on the side should be considered during transportation.



- Plywood rollers can be transported from sidewalls.
- Cables should only be transported and secured with appropriate means. If so, there will not be any place change during transportation. The same applies to the transportation and storage of reels in containers.

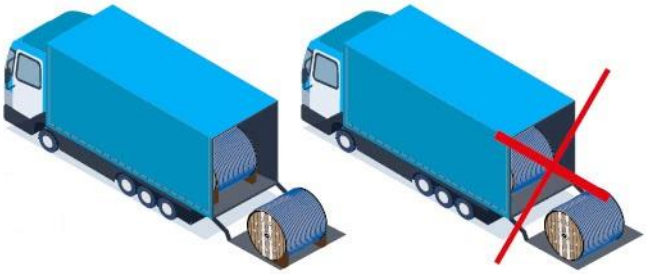
The crane should be fixed at the axis of the axled reel.



- If the reel is lifted by a crane or an axle, it is necessary to avoid pressure on the sides from sidewalls.

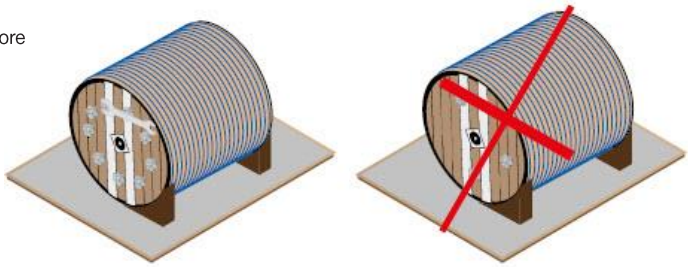
- Pallets up to 600 kg must be transported by a pallet truck, and pallets over 600 kg must be transported by a forklift.
- Wooden reels of 1400mm and above must be loaded vertically and fixed with wedges.
- There should be a cardboard separator between the reel layers on the pallet.

Appropriate loading equipment should be used. Reels should not be dropped.



- Appropriate devices must be used to prevent damage to cable and reel during loading and unloading. Reels should not be dropped from a truck or ramp.

Tighten loose screws before the moving of reels.



- In case of dry and hot weather conditions, screws should be tightened as required, in order to compensate for the wooden shrinkage. Tightening of screws will be done with a torque wrench.
- Plywood reels shall be placed in pallets in the horizontal position (on sidewalls). The reel side should be capable enough of carrying the full weight of the loaded reel.
- When plywood reels are placed in a palette, a space should be left between them by using a flexible wooden plate in the dimensions of 820x100mm.

- Measurement and strength values of plywood reels are as follows:

330x150x150mm = Strenght 200 Nm
330x150x250mm = Strenght 320 Nm
400x150x250mm = Strenght 350 Nm
400x150x150mm = Strenght 240 Nm
400x150x300mm = Strenght 400 Nm
440x150x250mm = Strenght 600 Nm
490x150x250mm = Strenght 800 Nm
550x200x250mm = Strenght 950 Nm
600x200x400mm = Strenght 1800 Nm
600x200x250mm = Strenght 1200 Nm
700x250x400mm = Strenght 2400 Nm

- Measurement and strength values of wooden reels are as follows:

600x300x450mm = Strenght 6640 Nm
700x350x450mm = Strenght 9300 Nm
750x350x450mm = Strenght 10810 Nm
800x400x450mm = Strenght 11800 Nm
800x550x600mm = Strenght 11060 Nm
850x400x450mm = Strenght 13820 Nm
900x450x600mm = Strenght 19910 Nm
1000x500x560mm = Strenght 22940 Nm
1000x600x560mm = Strenght 19570 Nm
1100x550x600mm = Strenght 29740 Nm
1200x600x750mm = Strenght 44240 Nm

- Each reel is given a number and is recorded.

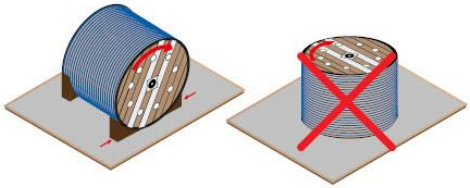
- Reels should be labeled as follows so as to enable quick and easy identification of the cable: ID tag shows the features of the cable such as type, length, code number, etc.

Storage

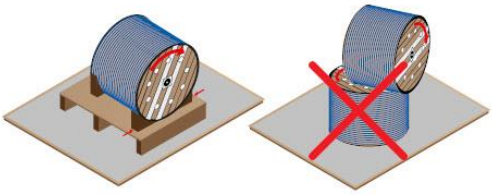
- Cables should be protected during transportation and storage. Special transportation procedures may be necessary.
- Indoor cables should be stored indoors.
- Outdoor cables can be stored outdoors. The permitted temperature range for storage should meet the conditions specified for storage.
- All cables on the reels should be protected by packing with insulation materials such as black plastic, wood veneer etc.
- Unprotected cables (especially those with black-sheathed) will become hotter than the ambient temperature if they remain directly in contact with sunlight. In this case it is necessary that the temperature of the cable does not exceed the permissible temperature for storage.
- Storing under shadow and foiling with a dark-coloured material will prevent the cable from being unprotected against the sunlight.
- Cable ends must be fixed in order to prevent the loosening of the winding during transport, transportation and storage.
- Cable ends should be covered with a cap or a cap-like material against the possibility of soaking in water.
- Reels should be labeled as follows so as to enable quick and easy identification of the cable:

  - ID tag shows the features of the cable such as type, length, code number, etc.
- Reels must be transported and stored in the vertical position.
- The ground should be flattened and even well drained and stabilized, so that the edges of the reel will not be embedded in the ground. The pressure on the edges must be equal on the entire reel sidewall surface touching the ground.
- When reels are stored, they must be protected against rolling.
- In order to prevent the corroding of the reels, they should not be in direct contact with humid soil or water.

Reels should be protected against rises and falls in roads.



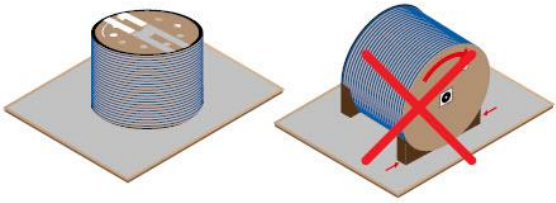
Reels on the pallets should be fixed in the vertical position.



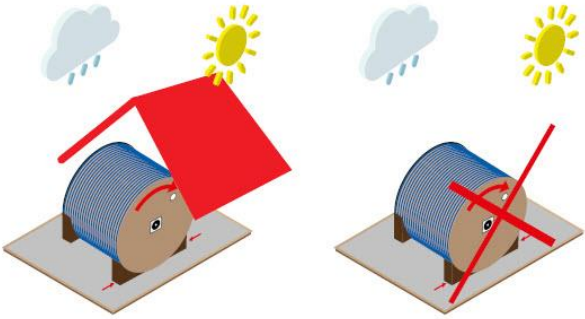
- Wooden reels of 1400mm and above cannot be stored or transported in a horizontal position. In such cases, damage to the reels or cables may occur. Horizontal transport and storage is only acceptable on small and light reels.

Reels should be protected against rises and falls in roads, and should be fixed with wedges.

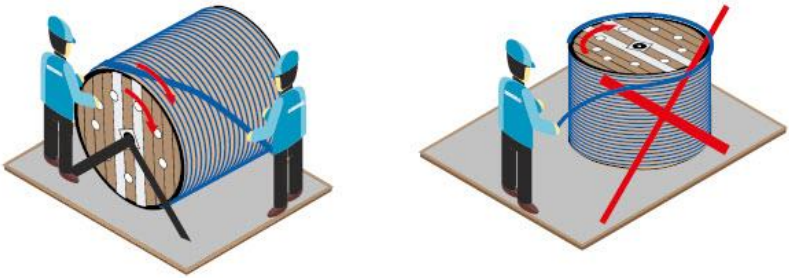
Reels on the pallets should be fixed in the horizontal position.



- Plywood reels cannot be stored and transported in the vertical position. In such cases, damage to reels or cables may occur.
- Areas where the cables are stored should not be near/exposed to high temperature effects or fire. It is necessary to take precautions in the areas where the chemical, petroleum derivatives etc. are likely to be overflowed.



- Periodic inspections are recommended at most every 3 months if an appropriate and safe area storage has been carried out. Inspection intervals should be shortened in case of vulnerability to weather, sunlight, etc.



- If the cable drums will be opened, they should be positioned on a moveable platform which does not touch directly to the floor. The cable should be realised by two authorized persons, who stand behind and in front of the cable drum winding surface, slowly and carefully.
- Damaged reels must be carefully checked. Special attention may be required during rewinding or transportation or mounting of the cable to another reel

Installation Guideline For General Purposes

Bending:

Bending operation creates compression at inside of the bending point and tension at outside of the bending point. In order not to create extra compression and tension, all installation processes have to be complied with the permissible minimum bending radius of the cable. Rollers or wheels shall not have smaller radius. Excessively small bending radii and multiple bends have to be avoided.

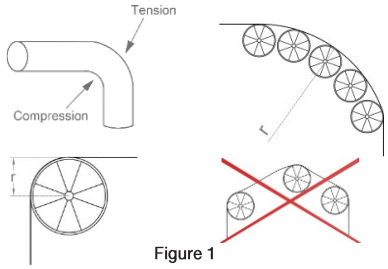


Figure 1

Permissible Bending Radii:

Below table generally shows the minimum bending radius of installed cable that has to be complied by the installer unless any special design is issued. Minimum bending radius has to be mentioned in the specification of issued cable. Reduction of permissible bending radii in extreme cases up to 50% may be considered provided that the following are all applicable:

- single bending (ex.: at termination point)
- the cable is at a temperature of not less than 30°C or adequately heated up to 30°C by a professional.
- the cable is bent by means of a template or performed rollers.

Cable Type	Min. Bending Radii
Metallic Tape Armoured Cables	15 x D*
Metallic Wire Armoured Cables	12 x D*
Metallic Shielded Cables	10 x D*
Un-armoured Un-shielded Cables	8 x D*

*D: Overall diameter of cables

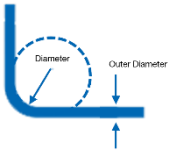


Figure 2

Cable Training (Offset bending):

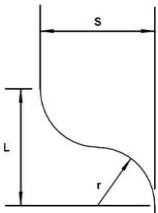


Figure 3

Use the following formula to calculate the minimum distance required for permanent cable training

$L = \sqrt{S(4r - S)}$

Where:
L= Minimum distance required S= Offset
r= Bending Radius to cable centerline

Cable Pulling Eye, Cable Pulling Swivel and Cable Socks (Single/Double Eye):

Pulling eye or cables socks are used for pulling cables. Pulling force is transferred to cable by using pulling eye and/or cable socks. While the cable socks is connected only to the outer sheath, the pulling eye provides connection between all bearing layers. That is why pulling eye allows more pulling force than cable socks. A cable pulling swivel should be used to hold the cable in line.

Note: It must be ensured that the maximum tensile force permitted for the cable is not exceeded.

Cable Pulling Swivel reduces cable tension while pulling.

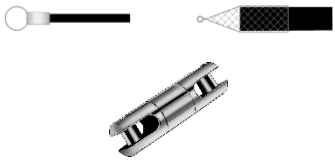


Figure 4

Cable Rollers:

In order not to have damage due to the friction force, cables shall not pulled on the floor during installation. Cable rollers should be used to avoid damage.

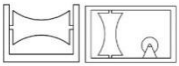


Figure 5

Tensile Load / Pulling Force:

During the pulling stage of installation, permissible tensile loads have to be taken into consideration and shall not be exceeded. Tensile load is very much depending on the amount of conductors and armours (if any) in cables. Usually, armoured cables have higher tensile loads than unarmoured cables. For max. permissible tensile load, please check the technical datasheet of manufacturer for related cables.

Installation of Armoured Cables:

During the installation of steel wire armoured cables, payoff process has to be handled with care to avoid extra torsion occurred by multiple bends.

Installation of Halogen - Free Low Smoke Cables:

For halogen-free cables, permissible installation temperature is from -5°C to + 50°C unless larger range is specified by manufacturer. Installation temperatures above 50°C is more risky for Low smoke halogen-free sheathed cables as they are less resistant to mechanical stress and more susceptible to cracks. In terms of tear resistance, halogen-free low smoke sheathed cables are low durable compared to PVC sheathed cables.

Mechanical Stress can be Caused By:

- Applying smaller bending radius than min permissible bending Radius.
- High temperature variation in short periods.
- Careless handling at pulling.
- Creating extra torsion on armour during rewinding (releasing) process.

Re-winding from Drums:

If the cable is re-winded from drum to the ground, Figure 6 method shall be used in order not to have any destruction on cable. By Figure 6 method, cable can no longer be exposed to extra torsion.

Figure 6

Installation/Assembly at Termination Points and Sharp Angles:

In order to avoid damages on sharp corners and to relieve the strain, installation shall be handled with care as follows:

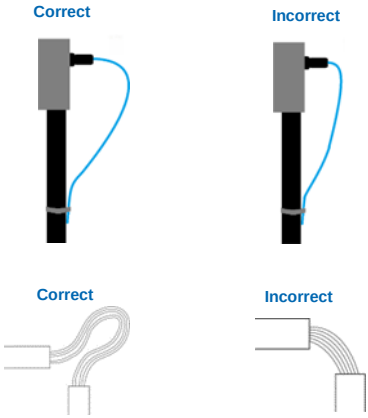


Figure 7

Installation Tips:

- In the first guide roll at the manhole inlet, the cable entry angle must be well adjusted and the input area must be illuminated. The installation area should not be dark.

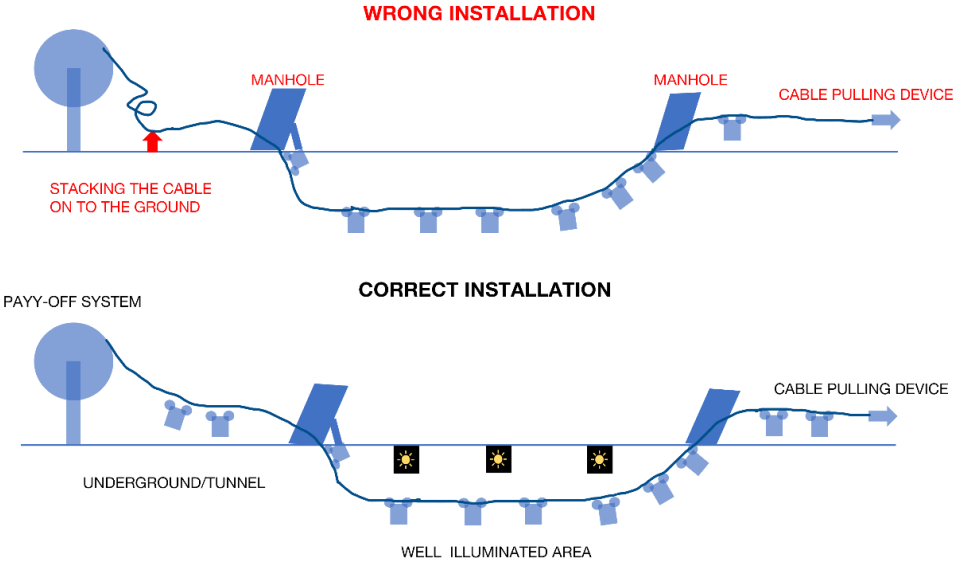


Figure 8

- Cable pulling socks and cable pulling swivel bearing prevent the cable from slipping and changing direction while pulling and provide convenience.
- Operator should observe both the swivel rotation and the return of the cable. In cases where the cable or swivel does not rotate, the operator should inform the responsible.
- Using a cable pulling winch ensures balanced and constant force pulling of the cable.
- Cable pulling socks and cable pulling swivel bearing prevent the cable from slipping and changing direction while pulling and provide convenience.
- Operator should observe both the swivel rotation and the return of the cable. In cases where the cable or swivel does not rotate, the operator should inform the responsible.
- Using a cable pulling winch ensures balanced and constant force pulling of the cable.
- The acceleration of the cable unloader must be kept under control. During the stop phase the cable unloader, it should be paid attention that the cable does not pile up.
- If the cable pile up on the floor, using the cable without straightening may cause deformation of the cable. Ex. Kink, Birdcage.
- If the cable has pile up on the floor**, it must be straightened manually** by carefully rewinding it.
- The cable should **never be exposed to buckling force**.

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