aakash powertech pvt. ltd.

power channelling solutions

Product: Cables

Cable Care

(Handling, Storage & Installation)

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(Handling, Storage & Installation)

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- Great care is taken in the manufacturing of cable to ensure quality at every stage.

- Handling is the next important factor to ensure that by poor workmanship and mishandling the quality does not deteriorate.

- Of course laying is generally carried out by unskilled or semi-skilled men, strict supervision should be maintained so that this material, which can be very easily damaged, is handled with great care.

- If great care during installation is observed in the handling of cables on site the life of the cables is extended.

Cable Inspection

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Inspect every cable reel for damage before accepting the shipment.

Be particularly alert for cable damage if:

- A reel is lying flat on its side
- Several reels are stacked
- Other freight is stacked on a reel
- Nails have been driven into reel flanges to secure shipping blocks
- A reel flange is damaged
- A cable covering is removed, stained or damaged
- A cable end seal is removed or damaged. A reel has been dropped (hidden damage likely)

Cables Damaged in Transit

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- Transit Damage is a common problem which occurs during unloading /shifting of cable drums or during transshipment by transporter . It is normally not possible during loading in the factory as drums are packed with wooden planks and handled using overhead cranes/forklifts
- During a mechanical damage on cable, there are possiblities of:
  - Tearing of Outer Sheath
  - Bending of armour wires/ strips
  - Damage of insulation
- When a mechanical damage is observed visual inspection is to be done to assess the condition.
- If armour found intact the cable can be considered for using after confirming the insulation resistance to be normal. The insulation resistance can be compared by carrying out the megger test.
- If insulation resistance is found not to be satisfactory there is no other way than cutting the cable. After cutting both the pieces are to be again megger tested. Pieces with good megger values can be taken for jointing and charging.
- If any damage to the outer sheath is observed is should be repaired before backfilling is commenced

Cable Handling & Storage

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- Damage to cables can occur due to the incorrect handling to which the drums and cables may be subjected; causing breakdown of the drum flanges and in exceptional cases, movement of the drum barrel takes place.

- Once this breakdown of the drum occurs, the cable is immediately exposed to damage.

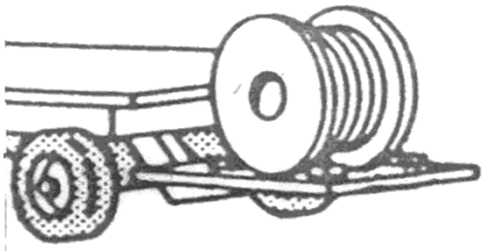
- Cables damaged during handling & storage can cause service failures when the subject cable is put to use.

- Thus the following is a list of Do's and Don'ts that should be followed while handling and storing the cables before it is put to use.

Do’s & Don’t

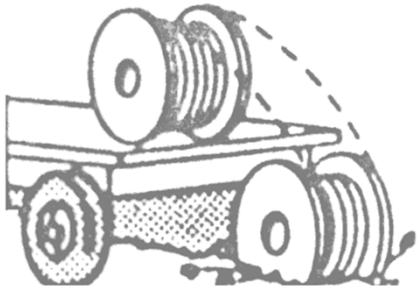
DO

When off loading reels from a truck, lower reels carefully using a hydraulic gate, hoist or forklift truck



DON’T

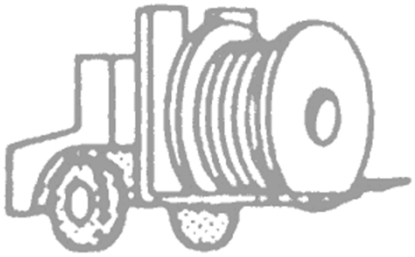
Never drop reels. If reels must be rolled, roll in opposite direction of the cable wraps to keep cable from loosening on the reel.



Do’s & Don’t

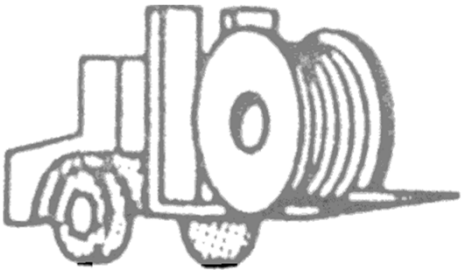
DO

If a fork lift is used, approach the reel from the flange side. Position the forks such that the reel is lifted by *both* reel flanges. Also Consideration should be given to, Traffic patterns during off-loading & damage during the time in storage



DON’T

Do not allow the lift forks to contact the cable. Care must be taken by the fork lift operator not to make sudden turns or stops.



Do's & Don't

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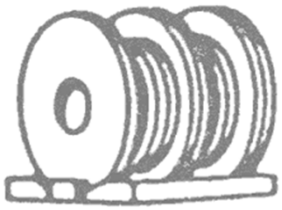
DO

It is always safer to use a strong and well-drained surface for storing drums. If possible, the drums should be raised from the ground by the insertion of wooden planks, etc, below and on both sides of the drums : some check pieces should be placed so as not to allow the drums to be rolled loosely and easily. Cable drums should also be stored away from the sun and rains.



DON'T

Multiple reels stacked on top of each other ("Pancake" storage) is not recommended for cable drums. The weight of the stack can total thousands of kgs. creating an enormous load on the bottom reel. Also, damage to the reel and/or cable will likely occur when the reel is flipped for transit. A concentration of stress on the reel flange may cause it to break and subsequently damage the cable.

Do’s & Don’t

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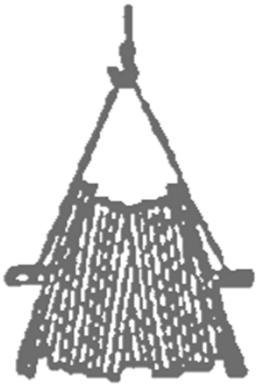
DO

When using a hoist, install a mandrel through the reel arbor holes and attach a sling. Use a spreader bar approximately 6 inches longer than the overall reel width placed between the sling ends just above the reel flange.

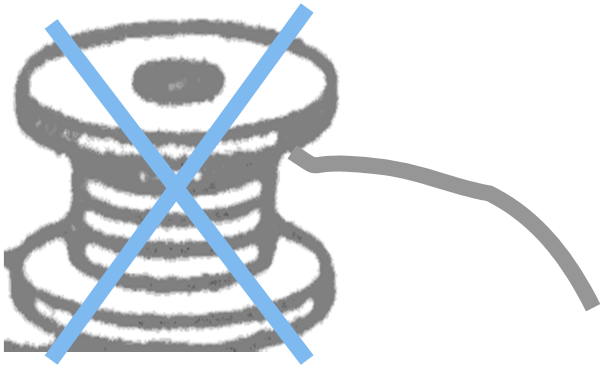
DON’T

This may lead to the bending of the reel flanges and mashing the cable



Cable laying by hand

A drum should be mounted with a strong spindle on cable jack. The drum should be jacked high enough to fit in braking plank.

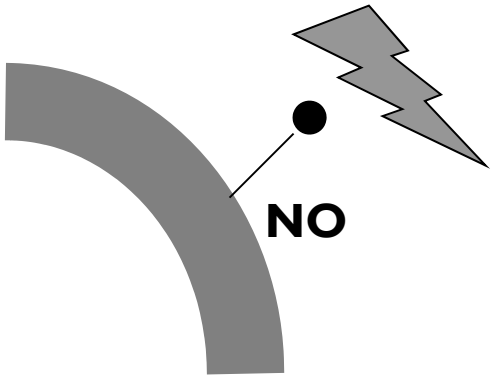


The drum should never be kept flat on its side on the ground and the cable taken away from the same.

THIS INVARIABLY LEADS TO KINKING AND BIRD-CAGING

Cable Care

Do not hammer metallic objects like nail on the cable for fixing it. This leads to direct shorting and failure of cable.



During installation, take care of any sharp object on the drum/on ground/inside duct. It will tear off the Cable sheath leading to damage.

Pre Installation

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To ensure safety during cable installation, following shall be checked prior to installation.

- While opening the packing, a careful watch should be made to ensure tools used in opening do not damage the layers of cable.
- The cable has not been damaged in transit or storage.
- Before starting, laying electrical test should be carried out by Megger for checking open circuit short circuit, moisture, insulation etc.
- Is also desirable to check the size/type of cable to avoid possible labeling errors by the packers and also the cable selected is proper for designed application.

Lugs & Glands
(Observed to be loose on conductors)

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- It is seen as a practice of few of the users that they insert the conductor in the lugs or the cable inside a gland and if found loose they complain that the conductor/cable is undersized
- Cables of same size has so many types of conductor constructions with which the OD can vary to great extent i.e. cables with rounded stranded conductors, bunched conductors, compact and shaped conductors etc.
- Sector shaped conductors and compact round conductors are the types which have minimum possible conductor diameter. When cables are made with this conductors the OD will be minimum.
- When such Conductors are used for making XLPE insulated cables, the OD will be further reduced as the thickness of XLPE insulation is further less than that of PVC.
- In such cases it may experienced that lugs and glands etc . are much loose to the conductors/ cables.
- This practice is not the method to assess the size of the conductor or cable. Capacity of the conductors can be confirmed by measuring conductor resistance of the cable.

Installation & Laying

Mechanical stresses during installation are generally more severe than those encountered while in service. Thus care should be taken as regards to the following while installation and laying of cables.

- Polycab recommend the laying and installation of cables as per IS: 1255/84.
- Care shall be taken during laying to avoid sharp bending, and twisting.
- Cable shall be un wound from the drum by lifting the drum on the center
- Shaft supported both ends with suitable jacks / stands.
- Under no circumstances the cable winding shall be lifted off a coil or drum lying flat at the flanges. This would cause serious twist and damages.
- Suitable protection shall be provided to the cables against mechanical damages, it includes covers, pipes etc.
- If the drum is rolled, it should be rolled as indicated by the arrow marked on the drum. In case the marks are illegible, the drum should be rolled in a direction opposite to the direction in which the cable is wound, as otherwise the layers of cable will get loose and damaged while rolling along the ground.

Installation & Laying

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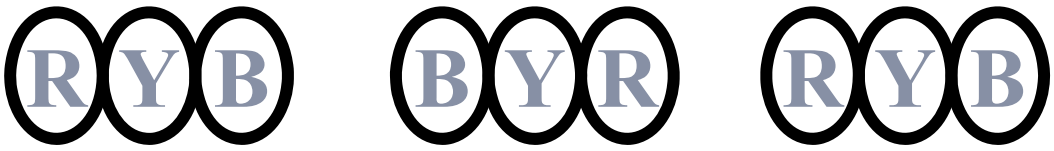
- If the cable is to be pulled, the drum should be fixed on stands for freer movement. It is always better to unroll the drum keeping the cable at the top instead of in reverse to avoid damage while rubbing against the ground.
- A careful watch should be maintained to ensure that no projecting material comes in the way of the cable, which may result cuts etc.
- If the drum is damaged, the cable should be unwound by the method using rotating turn-table. To open the coil and merely pull it straight out is very dangerous practice as the cable will get twisted. If the cable gets twisted, it may result in breakage of stand wires, cracking and tearing of insulation, insulation damage by knife edging of armour strips or tapes, breading of armour strips and wires, etc, it is very important to watch that the cable does not twist as even a single twist may permanently damage the cable.
- Rubbing of the cable along the ground should always be avoided.
- In case of multi-cables, crossing of cables should always be avoided.
- At every state of laying, the bending dia. should never cross the permissible limits

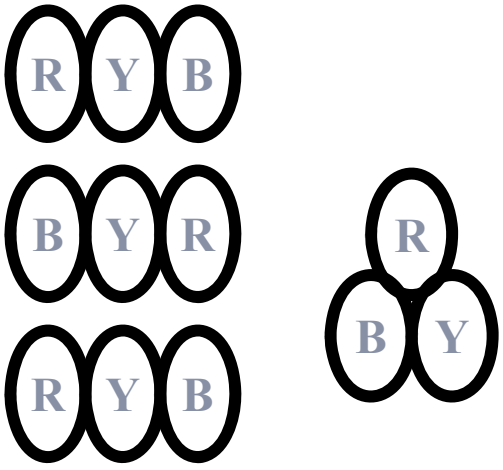
Cables pertaining to the same phase should be as far as practicable alternated with those cables of the other phases so that unequal division of current is avoided.

For three single core cables per phase, the correct dispositions are:

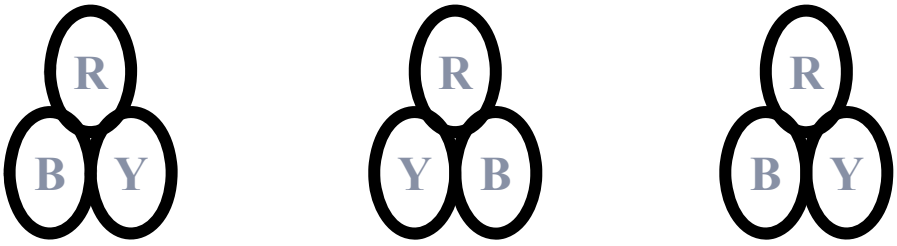
Flat Horizontal



Flat Vertical



Trefoil Horizontal



Pulling & Bending of Cables

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- The technique of pulling cables is also an important factor, Sub-standard and haphazard handling can cause damage to the cable which may weaken the qualities, and cause a failure in due course. Care must be taken to select a suitable position for the cable drum jacks in order to ensure that the drum may be raised and rotated with full safety. The jacks should therefore be placed on a firm support of thick boards.
- Care should be taken to exert a steady pull avoiding any jerks. Twisting or kinking or cable is very dangerous as this may cause damage to the insulation and sheath, shifting and knife-edging of the armouring and damage to the serving, etc. Care should be taken to avoid short bends and consequent straining of conductors.
- For pulling longer lengths and higher diameter of cables nowadays Pulling Eyes are used.
- In case of smaller lengths, pulling is carried out by manual labour and when the length is longer by means of winches or other mechanical means.
- While pulling with a rope, care is necessary to avoid bending of the cable a close watch should be take to ensure the cable runs freely over the cable rollers and passes smoothly without rubbing against any surface.

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RECOMMENDED MINIMUM BENDING RADIUS FOR HEAVY DUTY CABLES

Single Core : 20 x D
Multicore : 15 x D
Where D= Diameter of cable in mm

RECOMMENDED SAFE PULLING FORCE WITH STOCKINGS

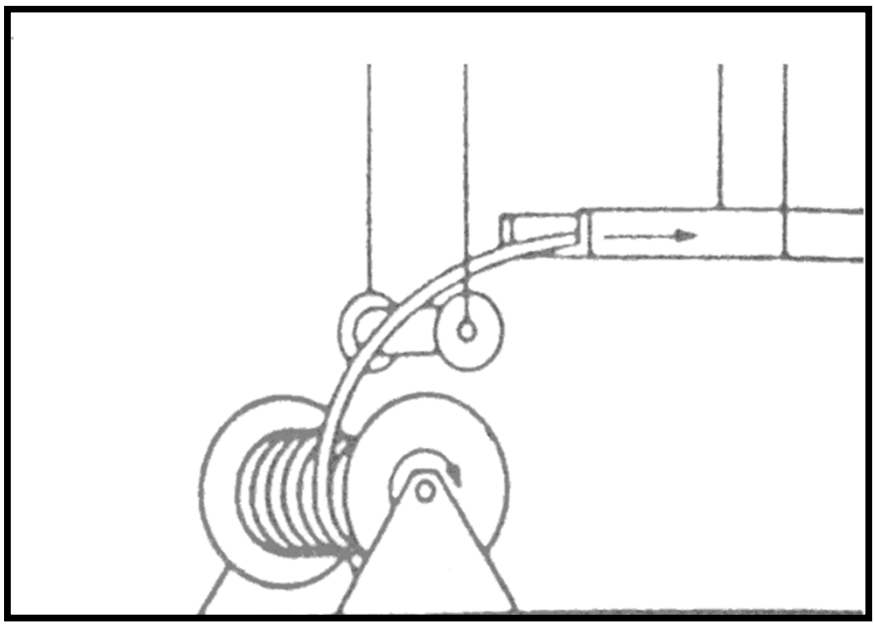
a). For Unarmoured Cable: $P = 5 D^2$
Where P= Pulling Force
b). For Armoured Cable : $P = 9 D^2$
Where D= Diameter of cable in mm

RECOMMENDED SAFE PULLING FORCE WHEN PULLED WITH PULLING EYE

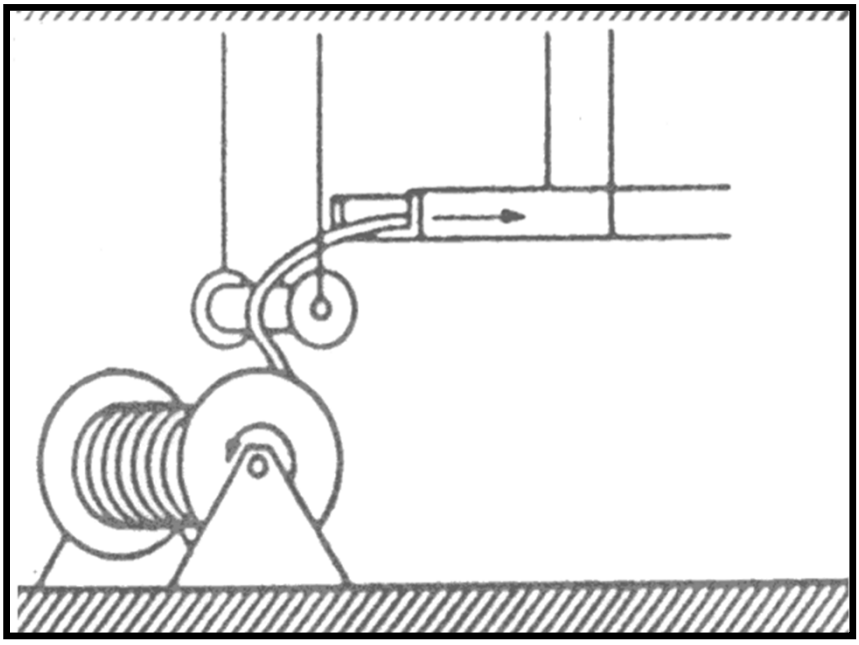
a) For Aluminium Conductors : 30 N/mm^2
b) For Copper Conductor : 50 N/mm^2

Pulling & Bending of Cables

Proper feeding into cable tray

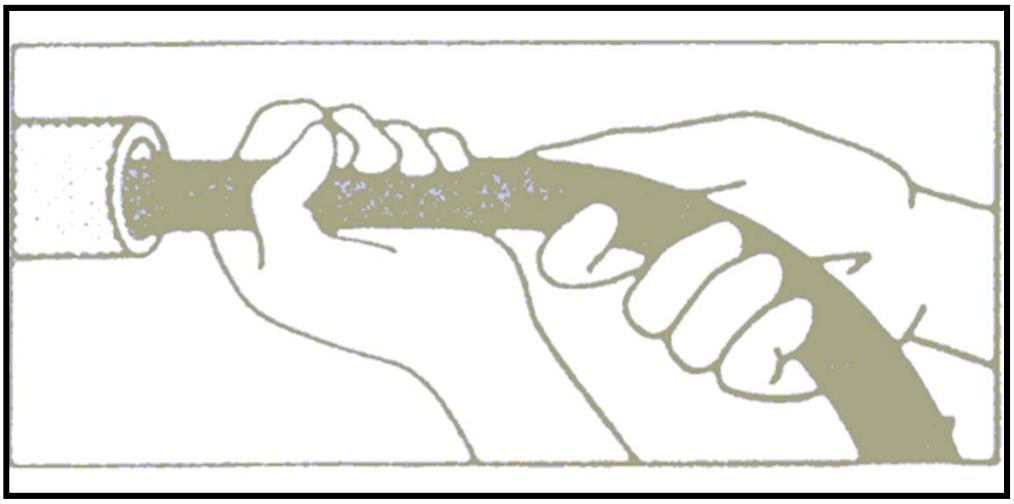


Improper feeding into cable tray



Pulling & Bending of Cables

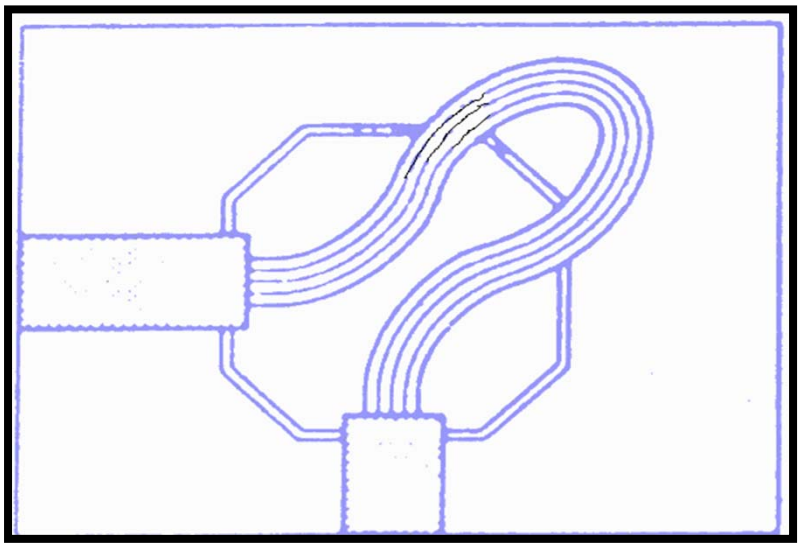
Proper feeding into conduit



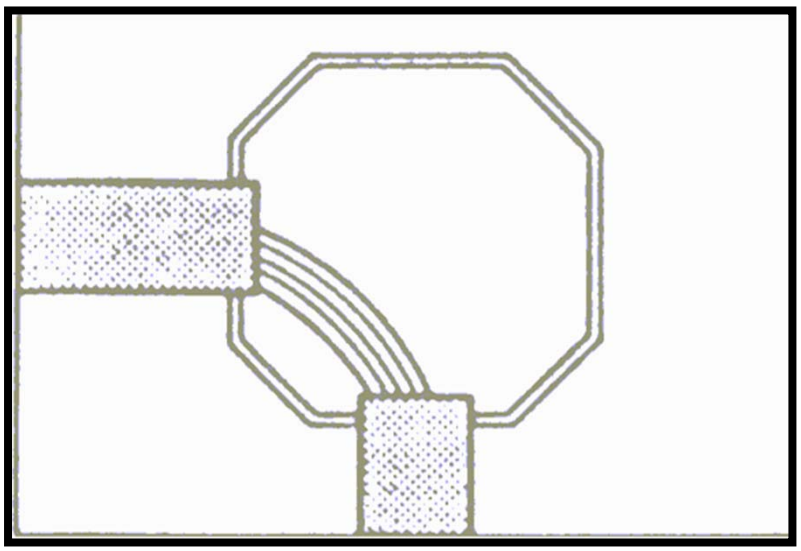
Improper feeding into conduit

Pulling & Bending of Cables

Proper pulling through enclosure



Improper pulling through enclosure



Special Precautions for handling / installation of Low Smoke sheathed cables

Cables like LSF sheath needs to be handled with care during installation. While special additives are used in formulation of LSF compound to give the typical flame retardant characteristics of Zero halogen polymers some mechanical properties deteriorate. The following basic precautions are necessary

- Cables should not be exposed to sunlight for considerable period before installation. i.e. the temp of cable sheath should be below 40degree celsius.
- Preferably installation is done during morning hours when the ambient temperature is low.
- Wire/ Rope should not be used directly on the cable sheath for pulling.
- When pulled on cable trays/or any uneven surface, special attention is needed to weldings or unusually rough terrains.
- Rollers and bends should not have any sharpness which may damage sheath.