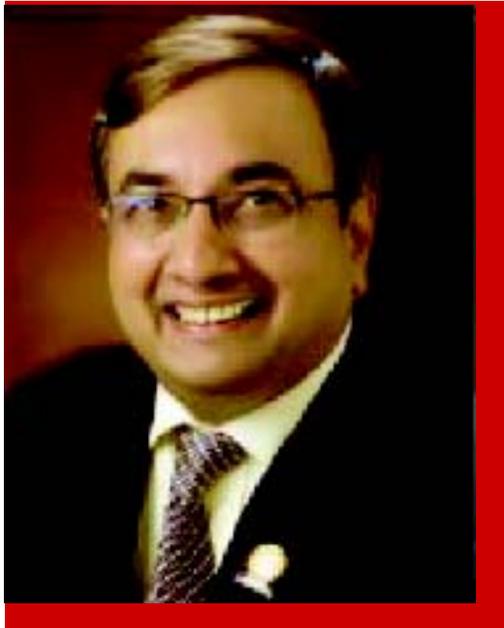


# ABC Installation Practices



## Introduction

Aerial Bunched Cable (ABC) is an innovative concept for Over Head power distribution. When compared to the conventional bare conductor OH distribution system, ABC provides higher safety and reliability, lower power losses, stability in terms of voltage regulation and ultimate system economy by reducing installation, maintenance and operation cost. This system is ideal for rural distribution and especially attractive for installation in difficult terrains such as hilly areas, dense forest, coastal regions etc. This line can be laid without cutting or trimming any trees.

ABC is also considered to be the best choice for power Distribution in congested urban areas with narrow lanes and by-lanes. It is convenient to lay it in thickly populated areas with dwelling having narrow gaps between buildings, where it is not possible to run bare conductors. Also being insulated accidents due electrocution are prevented.

This system has distinct advantage in terms of cost of laying compared to underground cables. Underground cable installations are more expensive to install than overhead lines, with capital cost ratio as high as 20:1. Also since it is clearly visible; the faults can be detected and rectified quickly with ease. Also damage due to water logging is avoided unlike underground cables.

## Reliability, Safety And Flexibility

ABC Cables are highly reliable and insulation has been developed to withstand

heat, cold and intense sunlight. Disturbance and faults occur five to ten times more in open wire lines than in ABC lines. There is no risk in working on the live cable and the insulation reduces the number of short circuits and over-voltages and transformer burn outs during thunder-storms. Fewer hardware accessories are needed as each one can be used with many different sizes of cable. Since the cable can also be supplied with conductors for street lighting, it is more cost effective.

## Construction Of Abc Cable

AB Cable is formed by twisting together insulated phase conductors of aluminum around a bare or insulated messenger made up of aluminum alloy, which acts as a supporting system and also serves as a neutral or earth conductor.

This assembly is directly strung on to distribution pole/towers or building facades by means of standard hard-wares easily available from reputed manufacturers in India.

They are available in three basic configurations

1. Four core systems:
2. Insulated Messenger wire system
3. Bare messenger wire system

In Indian Bureau of Indian standard has floated IS 14255 as standard for Aerial Bunched cable. This standard recognizes bundled cables with bare and/or insulated messengers. This has led to much confusion as hardwares required for both are different in design and application. Also section 6 of IS 14255:1995 states that the standards for Accessories which are in common use are in consideration and will be issued shortly. However no standard has been formed so far.

There are two methods for laying of ABC networks:

- a) Layout Method.
- b) Slack Tension Method.

This method is used in the following situations:

1. Road crossing.
2. Single service supply.
3. Less than 3 spans.

## Work Description

**The layout method uses following procedure:**

After ensuring that the ground is free from sharp objects, the whole ABC cable is laid on the ground and its ends are connected to a hauling rope. Suspension or anchoring devices are fixed on intermediate poles and temporarily pulleys are hung on top of them.

The entire cable is lifted up using the

hauling rope through the pulleys by use of a manual winch. The ABC cable is tensioned until reaching the required sag. Then the cable is anchored or suspended to each pole span by span and the pulley & winch are taken out.

**Slack Tension Method:**

This is most commonly used method in the erection of ABC networks as it quick and faster. It can be done in the following steps: the suspension or anchoring devices are fixed on intermediate pole along with temporary pulley.

2. The hauling rope is run out through each pulley and one end of the hauling is connected to the ABC cables by means of swivel & pulling grip, the end of the rope is connected to an automatic winch on the ground.
3. The winch is used to pull back the hauling rope and then the ABC cable. At the same time a breaking device on the cable drum carrier prevents the ABC cable from slipping back till the cable reaches the end pole. Lastly, the ABC cable is anchored or suspended to each pole and the pulleys taken out.

**Comparison between slack tension & layout methods:**

1. Slack tension can lay cable on more spans while in lay out method number of spans is limited.
2. Slack method saves time as more time is spent in lay out method to adjust & fix the manual winch or to lift the cable manually.
3. Slack method saves the ABC cable from damage caused by sharp edges or objects on the ground and while lifting.

Parameter for sag and tensioning of the cable bundle will depend upon ambient temperature, distance between the poles ie span, cable configuration and weight. There are ready formulae available for the same.

**Mechanical Fixings on the poles:**

1. Four Core system:

a) *Anchoring Assembly:* The entire bundle is supported on the pole by the anchoring clamp. All the four conductors are clamped together inside the anchoring device where the load of entire bundle is distributed on each conductor. This assembly can be fixed on the pole with the help of suitable brackets or bolts.

- b) Suspension Assembly:

Suspension clamp is used to hold the entire bundle of four core system on the pole with the help of suspension bracket or hook bolt through pole.

2. Bare Messenger Wire System

a) *Anchoring Assembly:*

**REC specs**

In this system anchoring clamp is used to hold only the bare messenger and not the entire bundle. This assembly is fixed on the pole with the help of PCC pole clamp and eye

hook.

- b) Suspension Assembly:

**REC specs**

Similarly suspension clamp is used to hold only the bare messenger wire which takes the load of entire bundle. This assembly is fixed on the pole with the help of PCC pole clamp and eye hook.

**3. Insulated Wire System**

Success depends on quality of the cable...

a) *Anchoring Assembly:*

Anchoring clamp is made up of aluminum alloy outer body with inner wedges of UV stabilized thermo-plastic to avoid damage to the insulation of the messenger wire. The clamping of the messenger wire is done in such a way that no other mechanical components are required. Anchoring brackets and stainless steel straps are used to hold the assembly on the pole. The most commonly used standard for anchoring assembly is NFC 33 041.

b) *Suspension Assembly:*

The suspension clamp is made of UV stabilized thermo-plastic glass reinforced.

Specially designed weak link also called as fuse link is provided to allow the breakage of the hardware rather than snapping of the cable.



The entire assembly is fixed on the pole with Suspension bracket and stainless steel straps or bolts. The most commonly used standard for the suspension assembly is NFC 33 040.

#### Connections

##### 1. Insulation Piercing Connections:

The IPC is used to tap the ABC networks to service line. This is the most critical component in AB line as it establishes electrical continuity without the need to strip the insulation and hence can be used on a live line. The construction allows the joint to be completely sealed for any water ingress, thus preventing any damage to the conductor in the long run.

#### Terminating & jointing

##### a) Preinsulated sleeves

The preinsulated sleeves are used to connect two low voltage ABC. It is used in the installation, repairing or replacement of the connection.

##### b) Preinsulated lugs

The preinsulated lugs are friction welded with copper palm and aluminum barrel. It is used to connect the ABC cable to an equipment terminal. The dielectric strength under water is over 6KV.

#### Mechanical fittings for Service Line:

- a) Service line clamps
- b) Facades
- c) Pole hooks
- d) Façade plates
- e) Pole brackets and eye hooks
- f) Fixing nail for wall mounting

#### Conclusion

With all these advantages, it is apparent that AB lines are most suitable for urban as well as rural India. This fact is well recognized by many nodal agencies like Power Grid, REC & BIS. Several discoms in Rajasthan, west Bengal, Orissa, Gujarat etc. have taken lead and started implementing Bundled Conductor lines. Wherever implemented, there has been substantive reduction in power loss, sometimes up to 40%.

However, the initiatives taken are scattered leading to unplanned, haphazard development and serious mis-match of product specifications. Most contractors have been expressing dissatisfaction about quality and timely availability of the material, leading to delay in the projects.

Lack of coordinated effort and absence of central agency supervising the efforts, resulted in different SEB's adapting the product specifications directly from available International standards. Let us quickly examine the root cause of these initial hic-ups.

Somewhere down the line the entire essence of AB line network is lost. Traditionally, as we have been using open wire system, over a period of time all the people working on this system have developed a good understanding

about the checks during installation. A major concept in open wire system, the accessories used are of equal or more than the mechanical strength of the cables being suspended. This is good for open wire system. When it comes to AB cable system, this concept needs to be changed and infact this change of concept is taken care of in various standards particularly the French std. who are the major users of the system. Now, this concept is, since the cables are insulated, taking care of the insulations by the grips provided by various accessories is of paramount interest. This is the main reason for which the standard says that the mechanical strength of the accessories employed on AB cable system should be lesser than the ultimate mechanical strength of the AB cable being used. The logic behind this is, since we can do live line working on the AB cable, the AB cable needs to be protected from snapping which can happen if the mechanical strength of accessories is more than the AB cable. This also justifies the fact that snapping of the cable means loss of powers to the connected units and thereby a loss of revenue. The French std. accessories are designed to be weaker in mechanical strength thereby if there is a failure of accessories; it is only the cable which drops out from those points, which can be re-laid by using new accessories without power disruption and without loss of revenue.

Like any product variant, there are several variants of this technology evolved in different countries.

As the technology has originated in EUROPE, it is best suited for the specific European regional, technical as well as environmental conditions. It is highly essential for all potential users in India to understand the "core" of the new technology & tailor it to match our regional, technical & environmental conditions.

We need to develop crystal clear understanding of the technology & desired end result. For achieving that end result, all those involved need to make a concerted and coordinated effort to evolve in consensus-

- Thorough Technology awareness & understanding
- Uniform code of practice
- Standards for all products & components involved.
- Creating Facilities for testing & verifications in laboratories across the country

It is time for all of us to unite & create this frame work to have hassle free absorption of new technology and reap its benefits. We can therefore only wish end-users, manufactures, testing laboratories and approving authorities to come together on a common platform and help strengthen the country's distribution system through this innovative technology.