

ADSS Fiber Optic Cables

Installation Safety & handling Recommendations

1.0 Scope & Purpose

This guide provides general recommendations for the selection of methods, equipment, and tools for the stringing of ADSS (All Dielectric Self-supporting) fiber optic cables including short and Long Span ADSS cables. The installation methods for ADSS cables are essentially the same as those used for installing power utility conductors. The IEEE Guide to the Installation of Overhead Transmission Line Conductors will provide additional relevant information about installation practices.

2.0 References

IEEE Standard 524-1992, Guide to the Installation of Overhead Transmission Line Conductors.

IEEE 1993 National Electrical Safety Code.

3.0 Safety

All safety practices of the Power Utility and the Installation contractor must be followed. These safety procedures take precedence over any information contained in this document.

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4.0 ADSS Stringing Methods

The “Stationary Reel” method is recommended to install ADSS cable. This method requires the cable reel to be stationed at one end of a pull with the take-up reel at the other end. A pull line is threaded through travelers using a p-line of matched weight and diameter. Once the p-line is threaded and all the travelers are balanced/tied up, the ADSS cable is attached to the p-line using a woven wire pulling eye and the take-up mechanism can start the pull. The ADSS cable must be pulled through the travelers under tension to prevent damage from minimum bending radius violations.

The “Moving Reel” method is not recommended for ADSS installation because pulling tensions and loading on the hardware are uneven. Also, it is difficult to keep constant tension on the cable in the tangent travelers between dead-end points. Uneven tensions can cause damage to the jacket and create minimum bending radius violations.

ADSS cable distribution and transmission line installations are similar. Transmission lines require more precautions if the line voltage is 230 kV or greater and grounding of the travelers may be required. Another concern is the distance from the live conductors at the attachment point on the structure. Standard utility precautions should be used if the length of the fiber optic dead-end reaches close to the region of the conductor.

5.0 Precautions & Safety

Care must be taken to avoid damage to ADSS cable during handling and placing. It is critical to observe the cable specified minimum bending radius and maximum pulling tensions. Precautions must be taken to avoid sharp bends or exceeding the recommended tensions.

Cable reels should be transported in an upright position, on the flanges only. Never lay the cable reel on its side. Inspect the reel flanges and ensure the inner surfaces do not contain any splinters or nick that could damage the cable jacket when paying off.

Safety devices such as guard poles or mid span pulleys need to be installed for protection at all public roadways, utility lines, and railroad crossings. If crossing distribution lines, those lines need to have temporary insulators installed. Survey the cable route before starting to ensure it is clear of obstructions, including fences and walls. Don't allow cable to drag over obstructions.

6.0 Installation Equipment

Grips and Pulling Eyes: Chinese finger type pulling eyes are recommended to attach the cable to the pulling line.

Travelers (Sheaves, Pulleys): The travelers must have a soft neoprene or similar material liner to cushion the cable from the bare metal of the traveler. The liner or insert must be smooth and show no signs of wear and tear. It is unacceptable for a traveler to have chunks of cushion missing or worn through at the bottom of the groove.

Pulling Rope: The pulling rope must be well matched to the cable diameter and cable weight. This will better prepare the travelers in the system to balance the load as the cable is pulled and allow the cable to ride in the bottom of the traveler groove.

Tensioner: A bull wheel tensioner with a brake is required for an ADSS installation.

Puller with sufficient pull rope capacity: The puller should be equipped with a brake to keep constant tension of the cable as it is being installed

7.0 Cable Hardware

7.1 Fiber Optic Tangent: Used as cable suspension hardware only on spans less than 350 feet when the angle of change, either horizontal or vertical, is less than 15° . The tangent clamp is designed to hold the cable in the air at the pole without gripping the cable as with a suspension (described below). The tangent is designed to allow the cable to slip through the unit at a tension imbalance greater than 400 pounds. There are several different approved suppliers of the tangent hardware, each with different designs. Please refer to Draka Comteq for recommendations of the advantages/disadvantages of each for your applications.

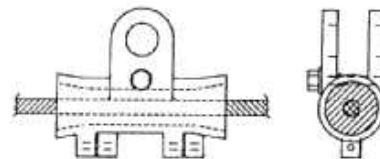


Figure 1. Fiber optic Tangent

7.2 Armor Grip Suspension (AGS): Used for any span length with an angle change, either horizontal or vertical, less than 30° . An AGS Suspension shall be used for in-line structures if the span is greater than 350 feet.

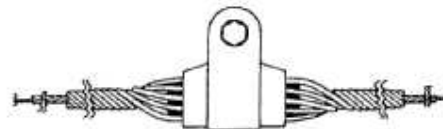


Figure 2. AGS Suspension

7.3 Fiber Optic Dead-ends: Used in several instances. A dead-end is installed at each end of the cable length to attach to the structures. Two deadends are used at angle changes of 30° or greater, either horizontal or vertical. If the structures are in-line but have a vertical difference greater than 20° , deadends shall be used to distribute the cable through the incline/decline.

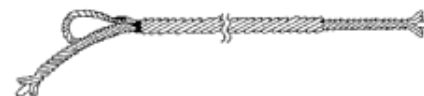


Figure 3. Fiber Optic Deadend



8.0 Typical Stringing Operation Procedures

- 8.1 Installation Equipment Sites: It is important to pick proper locations for the pay-off and take-up equipment. The ADSS cable reel (pay-off) must be located directly in line with the first traveler and must be back from the structure four times the height of the traveler (4:1 distance to height ratio). It is recommended to have at least three structures before the first large angle change. The equipment and ADSS cable reel should be in a safe and secure location, worry-free from vandalism or theft since the equipment could sit overnight.
- 8.2 Traveler Installation- Each structure in the pulling segment must have a traveler installed and a pulling rope threaded (reeved) through it. Each traveler must be balanced so that the rope, and the following ADSS cable, rides at the bottom of the neoprene insert's groove. It is important to tie up the traveler at each angle so the pulling rope and ADSS cable enter and exit the traveler smoothly (See Figures 4 and 5 at right). If the cable enters at an angle, it increases the chance of jumping from the traveler groove into space between the traveler and the yoke holding the traveler to the pole. This would cause severe damage to the cable.

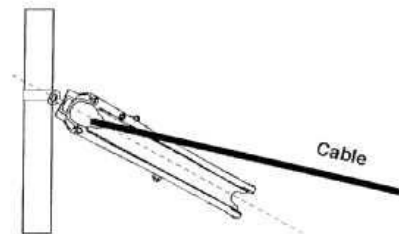


Figure 4. Incorrect Traveler

- 8.3 Pulling Lines- Once the travelers are installed, the pulling rope shall be threaded (reeved) through the system. It is extremely important that the pulling rope and the ADSS cable have the same diameter and approximate weight. This will allow the travelers to float at the same level with the pulling rope as they will when the ADSS cable enters the travelers. The pulling line should be all dielectric and not susceptible to internal, electrical static charge build up. The pulling rope should never be allowed to drape over distribution lines or slump between pole attachments. It should have constant tension throughout the operation.

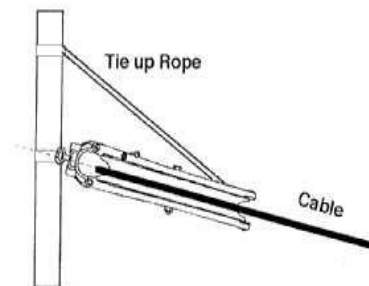


Figure 5. Correct tie up of Traveler



9.0 Pulling ADSS

The ADSS cable shall be attached to the pulling rope using a double swivel eye and woven wire grip. The double swivel eye insures the ADSS cable will not see an induced torque as the pulling line enters and exits each traveler. A 'flag' shall be attached just behind the swivel eye on the ADSS cable jacket.

This flag should stay straight through each traveler. If the flag starts to flip over the cable, it shows the swivel eye is not working properly and the pulling operation should be stopped and oil or fix the swivel. The woven wire grip shall be of sufficient length on the cable jacket to insure even loading of the cable strength members. The edges of the woven wire grip should be taped smooth so the grip does not damage the neoprene inserts of the travelers as it passes through.

10.0 Sagging

The ADSS cable shall be sagged from the pay-off (cable reel) end and work back toward the take-up equipment starting with the deadend at the first structure near the cable reel. The sag can be adjusted using several methods. The recommended method is the 'line of site' method. This requires the sag distance to be determined ahead of time for each particular span length. One or more spans between deadend locations should be checked using this method.

"Line of Sight" sagging method requires climbing both structures on either side of a span to be checked. The structure closest to the pay-off end of the system is deadended. Then the next structure is marked using bright colored tape with the appropriate mid-span distance from the attachment height. The lineman returns to the pay-off end structure and measures down the mid-span sag distance and places his line of site at that same height. This person should have radio contact with the take-up operator and give instructions of how much to tighten the cable in the system so that the belly of the sag of this particular span rises to match the bright colored tape mark on the opposite structure. Once the sag matches the requirement, the take-up side deadend structure can be climbed and clipped in. The belly of the sag shall always be brought up to the proper sag, not loosen or brought down to the correct sag.

There are two methods of pulling the cable back to the structure to deadend it. A deadend can be partially installed to supply a pulling loop, or an aramid yarn braided pulling eye may be used. It is not acceptable to use a hose or clamping device at mid segment to temporarily pull cable.

11.0 Clipping-in and Deadending

The system segment shall first be sagged and deadended at the appropriate structures. The deadends shall have a sufficient drip loop between two deadends on a structure to allow free movement. The deadends shall be attached to the structure using an extension link (Draka Comteq recommends using at least a 12" extension link) in order to get proper distance from the structure to allow the drip loop. The drip loop should be positioned downward and at least 12" deep. Next the AGS Suspensions and Tangents can be installed. The installing of the suspension hardware, i.e. Deadends, Tangents and AGS Suspensions shall be prompt. The ADSS cable shall not be allowed to sit in the travelers more than one week without approval from Draka Comteq. Grounding the suspension hardware is the choice of the owner of the system. Transmission line installation typically ground the hardware at each pole, while distribution installations typically don't use grounding. Refer to Draka Comteq for further recommendations for a particular project.

12.0 Damper Installation

If the system requires Aeolian vibration dampers, they can be installed after the suspension hardware is in place at each individual structure. Dampers are generally needed only if the installation tension exceeds 15% of the cable breaking strength and if span lengths exceed 350 feet. Please refer to Draka Comteq if there is concern about a potential vibration situation.

13.0 Splicing

Splicing should be performed on the ground. The splice can then be stored aerially (recommend at least 18 feet off the ground), at ground level in pedestal or cabinet, or underground in a hand hole or manhole. Sufficient length of cable ends should allow the cable to descend the structure and enter a splicing vehicle. Each splice should have at least a small storage loop to allow the splice to be moved from the base of the pole if the splicing vehicle can not be located close by. Twenty feet of cable shall be discarded from each pulling grip end to remove damaged or stressed cable. Then typically, each cable end should have at least 100 feet discarded from the deadend attachment.

Cable Down Guides should be used to attach the ADSS cable to the structure along the entire height.