High Temperature Aluminum Conductors Type ACSS & ACSS/TW

Aluminum Conductor Steel Supported Conductor (ACSS), consists of a stranded steel core with one or more layers of annealed aluminum wires of either round wires or with trapezoidal wires. In a normal ACSR conductor, aluminum wires are hard drawn, while those of an ACSS conductor are fully annealed. As compared to hard drawn aluminum wires, annealed aluminum wires are softer and more ductile and therefore proper care has to be taken during the installation of ACSS & ACSS/TW conductors to avoid damage during handling and stringing of the conductors.

GROUNDING

Adequate grounding should be established at construction work areas prior to stringing. The equipment used and methods followed should be based considering exposure to maximum system electrical hazards and soil conditions at the site so that a safe environment for the transmission line construction workers can be provided. All equipment, conductors, anchors, and structures within a defined work area must be bonded together and connected to the ground electrode for establishment of equipotential work zones to limit touch and step voltage to a safe level. Workmen should be given adequate training regarding safety standards at construction site.

TENSION METHOD

This method is used to keep conductor surface safe during stringing process. In this method, the conductor is kept under tension during the stringing process to keep the conductor clear of the ground. A pulling line is initially pulled into the travelers which is then used to pull the conductor from the reel stands using specially designed tensioners and pullers. Slack / Layout method **should not** be used for stringing ACSS and ACSS/TW conductors.

TENSIONER BULL WHEEL CHARACTERISTICS

Bullwheels should be lined and sized in accordance with “IEEE Guide to the Installation of Overhead Transmission Line Conductors”, Std.No. 524 Multi-groove Tensioners are to be used in the stringing process. The number of grooves in the bullwheel must be sufficient to prevent the outer layer of wires of multilayer conductors from slipping over underlying layers. In order to avoid loosening of outer layer of strands as it passes on bull wheel, for conductors having a right-hand direction of lay for the outer wires, bull wheels should be arranged so that, when facing in the direction of pull, the conductor will enter the bull wheel on the left and pull off from the right side and will enter the bull wheel on the right and pull off from the left side for normal conductor with outer layer having left-hand direction of lay. Payoff equipment and bull wheel tensioners have to be in line. The material and finish of the grooves must be such as not to damage the surface of the conductor. Elastomerlined grooves are recommended for ACSS and ACSS/TW conductors Tensioner bullwheels must be retarded so that conductor tension may be maintained at various pulling speeds. Positive braking systems are required for pullers and tensioners to maintain conductor tension when pulling is stopped. Failsafe-type braking systems are recommended. The pulling and braking systems should operate smoothly and should not cause any sudden jerking or bouncing of the conductor

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TRAVELERS

Stringing sheaves should be lined and sized in accordance with “IEEE Guide to the Installation of Overhead Transmission Line Conductors”, Std.No. 524.The sheaves must be in good operating condition .Sheaves with a bottom grove diameter at least 20 times the conductor diameter are preferred

OTHER EQUIPMENT

All come-along clamps and grips should be suitable for the size and type of ACSS or ACSS/TW conductor and the tensions being used during installation. Clamp manufacturers should be consulted. It is recommended to use long jaw grips. Also it has been seen that Klein “Chicago ” grips work best with TW conductor. There are two issues with usual grips like pocket grips.

1. The pocketbook grips must be specially ordered from a hardware supplier. A section of conductor has to be sent to them where they actually perform a gripping test and then make the grips to fit that test.

2. Pocketbooks off of the shelf will not be satisfactory. Pocketbook grips can only remain holding the conductor for 6 hours as they will loosen over time and release or damage the conductor.

When and if you get to higher tensions, then double the grips. The good thing about Klein Chicago grips is that they always maintain a constant pressure where as the pocketbooks do not. The other safety check one can perform in higher tensions is to tap on the Chicago grip to ensure it is locking down on the conductor. This is done after a little tension is taken on the hoist and then tap the grip. Take more tension and tap the grip again.

COMMUNICATION

Tension stringing requires good communications between the personnel at the tensioner end and those at the puller end and at intermediate check points at all times during the stringing operation. Contingency plans should be developed for potential radio failure due to signal or equipment problems

REEL HANDLING

Conductor reels are to be handled in a safe manner as per industry standards. Reel handling recommendation is provided on our website or can be requested from our office.

STRINGING OPERATION

The selection of a site for various equipment for stringing procedures should consider accessibility, terrain, angles in the pull section, location of usable dead ends, length of conductor to be strung, available conductor and line lengths, puller capacity, snub structure loads, the physical area needed for placement of the equipment, and the ability

to provide an adequate grounding system. To avoid core slippage in the ACSS conductor, the following procedure to be followed

Aluminum strands are to be cutback approximately the length of the steel sleeve to be compressed on the steel core and a washer having the same outside diameter as the conductor. The washer is to be inserted over the exposed steel core, up against the cut aluminum wires and then the steel sleeve is compressed over the steel core. Attachment of the conductor to the pulling line is accomplished by the use of woven wire grips. These grips should be of compatible strength and sized to the conductor or pulling line on which they are used. The overall diameter of the grip, when placed over the conductor or rope, should be small enough to pass over the sheaves without causing damage to the sheave or its lining.

The grip should also be capable of connecting with a proper size swivel link. Metal bands should be installed over the grip to prevent it from accidentally coming off and dropping the conductor. The bands should be covered with tape to prevent damage to sheaves.

Pulling speed is an important factor in achieving a smooth stringing operation. Slower speeds may cause significant swinging of the traveler and insulator hardware assemblies. Higher speeds create a potential hazard of greater damage in case of a malfunction. The maximum tension imposed on a conductor during stringing operations should not exceed that necessary to clear obstructions on the ground.

Light and steady back tension should be maintained on the conductor reels at all times to prevent over-run in case of a sudden stop. It is required to periodically loosen the brake on the reel stand as the conductor is payed off. As the reel empties, the tension increases since the moment arm available to overcome the brake drag is reduced, causing the conductor to wedge into the underlying layers on the reel. The reel should be positioned so that it will rotate in the same direction as the bullwheels.

Bird caging in conductor during stringing can be avoided by allowing enough distance between the reel and tensioner to permit the strand looseness to distribute along the intervening length of conductor and simultaneously maintaining enough back tension on the reel to stretch the core and inner strands to sufficiently tighten the outer strands

Conductor may be pre-stressed to the maximum anticipated tension and held for 10-15 minutes. Tension should be confirmed with proper measuring instruments. Conductor tension is then lowered and is adjusted to proper sag in the conventional manner. The conductor should be sagged to the final sag and tension values based on the temperature at which the conductor is pre-stressed. After pre-stressing when the tension is lowered, the conductor will have loose aluminum strands around the steel core. Always keep tension on the conductor in a manner that it is not in slack tension in order to avoid bird caging.

Conductor should not be strung if adverse weather is predicted before the entire sequence can be completed.

Conductor mid span and end joints should be done using correct fittings and practice as recommended by the fitting manufacturer.

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