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Working instruction

**This Working instruction is prepared for
Silicone Rubber Housed Composite Insulator**

1. Introduction

The following Handling Guide was created under consideration of the work performed in Working Group B2.03 of CIGRE Study Committee. This guide summarizes, easily to survey, recommendations to prevent damages of composite insulators on their way from the manufacturer to the customer side for

- receipt and storage
- transportation
- on-site handling
- installation
- conductor stringing

Despite the excellent insulating behaviour of the Silicone Rubber housing there might be circumstances for special care. On client`s request the guide contains also recommendations for

- on side inspection
- cleaning

The guide covers mainly line insulators, but the recommendations can be transferred to other insulator applications as well.

2. Receipt and Storage on Customer Side

2.1 On Receipt

- Examine the crate for signs of damage.
- Open the crate carefully, ensuring that all tools used are kept well away from the insulators.
- On removal of the lid and any internal battens, remove or flatten all exposed nails.
- Check that the type number on the insulators agrees with that on the order and the packing lists.
- Undertake an inspection of a sample or all of the insulators.
- Return the insulators to their original crates and re-seal.



If Crates are Damaged:

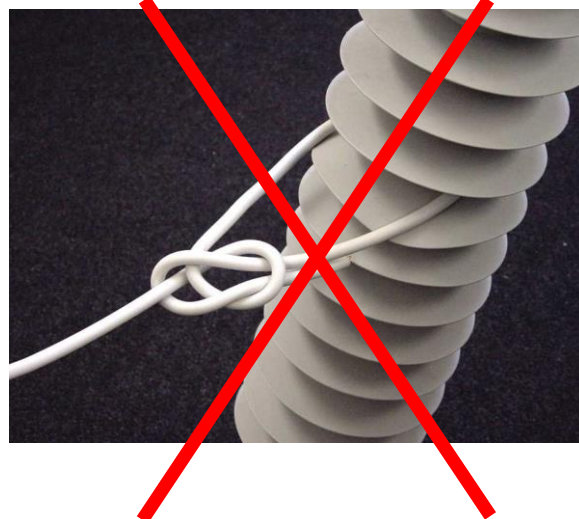
- Advise the supplier immediately.
- Visually examine every insulator in the crate in the presence of the supplier, his insurance agent and the project engineer.
- Reject any insulator with damage to the housing or end seals.

2.2 Storage

- If possible, store insulators in their original crates and protected from moisture.
- Crates should be raised off the ground and stored in an area free of standing water and contaminants such as oils and petroleum derivatives.
- Crates should be sealed to prevent the entry of rodents.
- If the insulators must be uncrated, they should be hung from suitable racks or provided with adequate temporary protection such as plastic tubes, but permit atmospheric ventilation to prevent mould creation.

3. Transportation

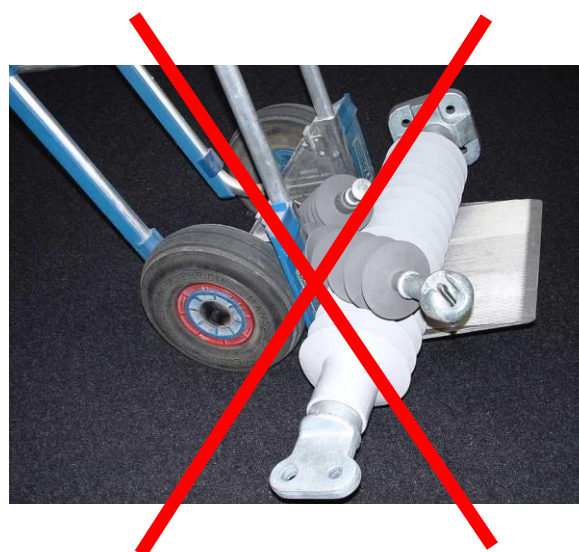
- Wherever possible, insulators should be transported in their original crate with the lid in place.
- Once the insulators are removed from the crate, temporary protective packaging should be provided.
- Insulators must never be transported loosely or tied together or tied down with chains, ropes etc.
- Other material and equipment must never be placed on top of insulators in transit.
- Transport insulators to the structure position only when immediately required.
- Check the crate or packaging for damage on arrival at the destination.
- If packaging damage is evident, visually examine every insulator.
- Reject any insulator with housing or end seal damage.



4. On site handling

4.1 Arrival at the Position of Installation

- Open the crate carefully and remove or flatten all exposed nails that could damage the insulator housings.
- Once removed from the crate, the insulators should be provided with some temporary protective packaging.
- Insulators must not be left lying where they are in danger of being driven over, stood on or struck by other components and equipment.



4.2 Assembling

- Do not place the insulator directly on the ground. Use a protective cover or, at least, lay the unit on a plastic or canvas sheet.
- Insulators showing signs of damage to the housing or end seals must be immediately rejected and removed from the site.
- Check that the type number marked on the insulator agrees with that given on the assembly drawing.
- Check that the insulator is the right way around and that all metal fittings are in the correct order.
- Check that the fitting sizes and dimensions of adjacent metalware are compatible and that all components can be coupled without undue force.
- Ensure that all cotter pins, clevis pins and split pins are fully inserted and that nuts and bolts are properly tightened.

5. Installation

- Lifting lines must be attached to the insulator metal fittings only and never the insulator housing.
- Where poles are dressed with line posts before being positioned, it should be ensured that, on lifting of the pole, the insulators do not make contact with the ground.
- All line post mounting bolts must be tightened to the recommended torque.
- Do not step, sit or crawl on the insulators - climbing ladders and work platforms should be used.
- Where buckets or cages are employed, it should be constantly watched that they do not come into contact with, or rest on, the insulators.
- Ladders, tools, blocks and other equipment should be kept away from the insulator housings.
- Lifting lines should not be thrown over the insulators.
- Ensure that line post trunnion clamp keeper pieces are installed the right way up.
- No bending or torsional loads must be applied to long rod insulators.
- When attached to the pole or crossarm, it should be checked that long rod insulators are free to swing in all directions.
- Corona rings and arcing horns must be properly attached and the bolts tightened to the recommended torque.



6. Conductor Stringing

- Do not use any equipment or stringing procedure that may subject the long rod insulators to bending or torsional loads.
- When stringing, a proper conductor swivel fitting should be used.
- The conductor should be carefully run out and handled to avoid the formation of loops and twists.
- Under no circumstances must attempts be made to un-twist conductor bundles by rotating the insulator or the string hardware.
- Ensure that all tensioning equipment is kept well clear of the insulators.
- Long rod insulators must be held and prevented from rotating when turnbuckles in the string assembly are adjusted.
- Ensure that long rod suspension strings are free to swing and follow the movement of the running-out blocks without bending.
- To prevent potential damage to line post insulators, all running-out blocks should be checked and, if necessary, serviced, prior to use.
- The appropriate stringing charts, sighting boards and dynamometers should be employed to ensure that insulators are not over-stressed.



7. In-Situ Inspection

Despite the robust nature of composite insulators, there can be the need to inspect composite insulators by time. There are different methods and philosophies, which cover failure modes of all insulator types:

- Simple visual inspection of insulators under voltage – visible and audible discharge activity can be a sign for unexpected external influences (such as organic pollution by birds, mould or domestic animals), interface changes or displaced arrangement (corona/arcing ring).
- Infrared or UV-corona camera inspection.

8. Cleaning

An essential property of composite insulators with Silicone Rubber housing is the hydrophobicity. This property includes the recovery after exposure to moisture and the transfer of hydrophobic properties into a pollution layer by the diffusion of low molecular weight polymer chains from the bulk material. This unique property of a well-formulated Silicone Rubber keeps the water-repellent properties in service. By this, cleaning is **not necessary** in general.

In case of unexpected pollution (e. g. caused by birds) cleaning with water and a solvent can be indicated. Typical solvents are Acetone, Isopropanol or Trichlorethylene. The cleaning should be performed by penetrating the cleaning agent into a cotton cloth or similar and wiping the insulator surface with. The complete insulator should not be put into a container with solvent to avoid swelling of the polymeric housing or other chemical interaction with the solvent by time.

WARNING

- cleaning agents should be used in well ventilated areas and not inhaled
- avoid skin contact
- do not use open flame in case of volatile fluids
- consider data sheets and National Laws