

## **2Safety precautions to be adopted while working in Electrified Area.**

1. The attention of all workers is drawn to the fact that under 25kV ac 50 Hz single phase traction, there is heavy induction on all metallic structures and conductors in the vicinity of the track.
2. Don't carry out any work within a distance of 2 meters from live parts of overhead traction wires unless the traction wires are made dead and earthed and PERMIT TO WORK is obtained from an authorized traction staff.
3. Don't cut or trim a tree near the traction OHE without the presence of an authorized traction staff and without obtaining PERMIT TO WORK from authorized traction staff.
4. Don't touch any fallen / hanging wire under any circumstances until it is made dead and earthed by traction staff.
5. Don't disturb track bonding or bonding provided to OHE structures. In the electrified section nearby metallic structure/part such as platform shelter, fencing, rail, FOB, traction mast etc will be charged due to induction effect. This effect will increase according to the length of parallelism and when the distance between the OHE and metallic structures is reduced. To nullify the induction effect, all the metallic structures in the vicinity of electrified track will be earthed by providing traction bonds. These bonds should not be disturbed / disconnected on any circumstances without adopting standard procedures. If bonds need to be disconnected the same shall be done under the supervision of TRD officials only.
6. In a railway yard, voltage of the order of 200 volts may be induced on yard lighting mains situated 8m away from the centre of a double line track, if it runs parallel to the 25kV lines for a distance of about 270m, it could be several thousand volts when parallelism is much longer. In such a case, a dangerous voltage due to induction will exist even after power supply to the line has been switched off. No one shall therefore attempt to work on any overhead line running alongside the electrified tracks without taking special precautions of earthing on both sides of the work. Before a section is electrified the necessary modifications to distribution lines in all stations and yards should be carried out, so as to limit the induced voltage within permissible values, but this by no means obviates the need of earthing the lines on both the sides of the working party. Earthing should be done individually by each working party as close to the work-spot as possible. The distance between the two earths shall not exceed 1km.

7. Such inductive effects occur on large metallic structures such as fencing, structural steelwork of platforms running parallel to the track. They will therefore have to be earthed suitably to afford safety.
8. Don't remove / loosen the fish plates without making a temporary connection with a jumper of approved design. To avoid electric shock due to return current through rail before starting any work in rail short jumper may be connected across the fishplate or fractured rail web by using rubber gloves. This jumper connection will provide path to the return current. Similarly long jumpers may be used for full length or long welded rails replacement. The jumper connection should be provided only on traction rail.
9. In track circuited area, for giving continuous path to the return current at glued / insulated joint polarity bonds / transverse bonds are connected. Insulation sleeve is provided above this bond where it crosses the signal rail. This is to avoid shorting of polarity bond with signal rail. Any damage / displacement/missing of insulation sleeve will lead to signal failure. Hence availability of the sleeve shall be ensured while doing any track work.
10. Don't have simultaneous contact with an insulated section of rail and non-insulated section of rail of the same or other track.
11. Don't use steel measuring tapes or long metallic wires / rods on the electrified track.
12. Don't use rails as foot path, a seat or for such other purposes.
13. Don't carry long pipes, poles, ladders, vertically which will come within the danger zone of 2 meters of live overhead traction equipment.
14. Don't allow loading and unloading of over wagon or hopper used for Material Trains in electrified tracks without the personal supervisions of P.W. Maistry or of OHE staff (who will ensure that no tool or part of body of worker will come within the danger zone of 2 meter from OHE).
15. During electrification, OHE foundation, mast erection, contact & catenary wire height, stagger of contact wire are adjusted and kept in position according to track alignment at site. Any change in the track alignment will affect the OHE and may lead to panto entanglement and subsequent OHE break down. As such any change in track parameters shall be done in the presence of an authorized TRD official.
16. During replacement of any insulation joint, before disconnecting the polarity bond, first provide continuity for the traction return current. This can be

provided with the help of long jumper wires having ending clamps on either end. First connect one end of the jumper clamp to the traction rail near to the work spot and other end of the jumper wire clamps is to be connected to the adjacent traction rail. This will ensure / provide the traction return path. Remove the polarity bond and dismantle the insulation joint. After re-insertion of the insulation joint, connect the polarity bond; ensure the insulation sleeve on the polarity bond in place, where it crosses the signal rail. Then finally the temporary jumper can be removed.

17. In track circuited area, one rail is used for traction return current and other rail for signal circuit. The signal circuits are working on low voltage & current. Due to the induction effect & parallelism, high voltage can develop, which may cause damage or erratic functioning of the track circuited relays, thereby affecting the signaling system. To avoid such problems the total rail length between home signal to home signal has been divided into small lengths of track circuit and connected in zigzag manner (transposition to nullify the effect of parallelism.) For separating signal & traction rail, insulated joints are used and polarity bonds are provided at these joints, for giving continuity path for traction current. One of the limb of the polarity bond may pass underneath of signal rail. To avoid shorting of this polarity bond with signal rail, insulation sleeve will be provided on the polarity bond. The availability of such sleeves shall be ensured while doing any track works.
18. From the safety point of view use of jumper wire, hand gloves are to be ensured. The insulated joints should not be shorted with any metallic tool or metallic part and also do not touch the joints with bare hand / foot as this may result in severe electric shock due to difference in potential.
19. If any work is being taken up under Power Block, duty of the supervisor at site to provide earth rods on OHE on either side of the work site. Depute staff with hand signal well in advance of the earth rod to protect the work site from the approaching trains.
20. No crane shall be worked on or near traction overhead equipments unless authorized by OHE representative. While working, care shall be taken to avoid hitting or damaging OHE structures.