Maintenance of Track in Traction Areas

1. General Instructions to staff

1.1 General Knowledge of Engineering Staff

a) Every engineering official working in electrical traction area shall be in possession of a copy of rules framed for the purpose of the operation of the Traction Power Distribution system pertaining to Engineering Department and ensure that staffs working under him are also acquainted with the rules. He will ensure that rules pertaining to carrying out engineering works are strictly observed.

b) All electrical equipment, every power line or cable shall be regarded as being 'live' at all times. No work shall be commenced adjacent to any electrical equipment except on authority issued in writing by a competent official of the Electrical Department to the effect that the equipment has been made dead and earthed.

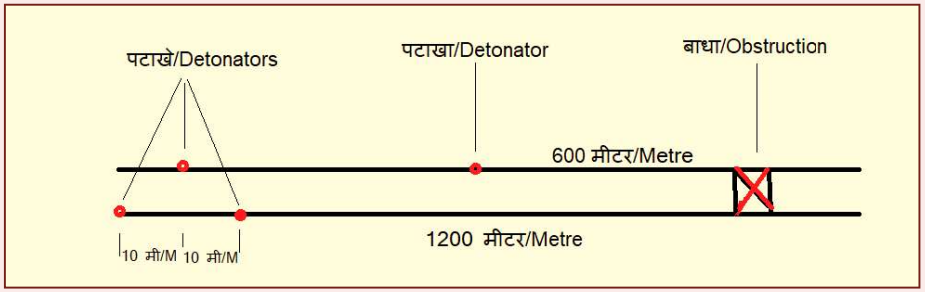
1.2 Defects in Overhead Equipment

Defects or break-downs in the overhead equipment including track and structure bonds noticed by the Engineering staff shall be reported immediately to the Traction Power Controller. When defects in the overhead equipment that are likely to cause damage to pantographs or trains, are noticed and it is not possible to convey information to Station Masters or signalmen to enable them to issue caution orders, the line shall be protected by the staff noticing such defects according to *General Rule 3.62 described below;*

Placing of detonators in case of obstruction

a) Whenever in consequence of an obstruction of a line, it is necessary for a railway servant to stop approaching trains, he shall proceed, plainly showing his Stop hand signal, to a point 600 m from the obstruction and place on the line one detonator and then proceed to a point 1200 m from the obstruction and place on the line three detonators, about 10 m apart from each other.

b) If the said railway servant is recalled before the obstruction is removed, he shall leave down three detonators and, on his way back, pick up the intermediate detonator.



1.3 Traction Bonds

In electrified areas the return current fully or partially flows through the rail. To ensure a reliable electrical circuit continuity and also to ensure proper earthing in case of leakage of current, various types of traction bonds as described below are provided at suitable places and maintained by the Electrical Traction Department.

a) Longitudinal Rail Bonds



At each rail joint at the fish-plates, at junction fish-plates and on points & crossing, continuity of return current path is achieved by using mild steel straps or G.I. wire ropes. Absence of such bonds may cause unsafe working condition and in extreme cases may damage the rail ends.

b) Cross Bonds



Cross bonds are provided between adjacent tracks at regular intervals to reduce resistance of the current to the minimum. Such cross bonds are also known as transverse bonds.

c) Structure Bonds

All structures supporting overhead equipment either in AC or DC track circuited areas are connected to the running rails for ensuring good earthing. Failure of insulator or leakage of current switches off the supply from the sub-station so that men coming in contact with supporting structure etc. do not get electric shock. Removal or tampering of such bonds can, therefore, result in unsafe conditions. Since the structures are grouted in concrete, they are likely to become charged in case such bonds are kept disconnected. Similarly, other steel structures such as foot-over bridges, sheds, etc., in the vicinity of O.H.E. lines are also connected to rails through similar structure bonds.



Note: *Preferably it should be ensured that traction bonds are fixed to the rail at the location of rail seat, so that while tamping with TTM it should not cause hindrance to machine tools.*

2. Special Instructions to Staff Working in Traction Area

2.1 Need for Precautions

Precautions are required to be taken on account of following:

a) Proximity of a Live Conductor

The risk of direct contact with live O.H.E. is ever present while working in electrified sections such as for painting of steel work of through spans of bridges and platform cover.





b) Buildup of potential due to return current in rails

The return current in the rails may cause a potential difference:

- Between rail and the surrounding mass of earth.
- Between two ends of a fractured rail.
- Between the two rails at an insulated joint.
- Between earth and any other metallic mass.

2.2 Precautions while working in Traction areas

a) No work shall be done within a distance of ***Two m*** from the live parts of the O.H.E. without a 'permit-to-work'.

b) For work adjacent to overhead equipment the Engineering Inspector shall apply to the proper authority sufficiently in advance for sanctioning the traffic and power block required. The Traction Power Controller through Traction Foreman will arrange to isolate and earth the section concerned on the date and at the time specified in consultation with the Traffic Controller. He shall then issue '**permit-to-work'** to the Engineering Inspector. On completion of the work the 'Permit-to work' should be cancelled and Traction Power Controller advised who will then arrange to remove the earth and restore power supply.

c) In the electrified territories, the cutting of the trees trunks shall be done by the Engineering Department in the presence of authorized TRD staff to ensure safety and satisfactory completion of the work. The day to day trimming of the tree branches, wherever required, to maintain the ***4 m*** safety clearances from OHE shall be done by the authorized TRD staff and Supervisors.

Engg. Deptt will maintain account of trees cut and their disposal. While the disposal of the trimmed tree branches will be the responsibility of the TRD Department.
The expenditure for cutting / trimming of trees to maintain safe clearance for OHE, shall be debited to revenue grant of TRD Department.



d) No fallen wire or wires shall be touched unless power is switched off and the wire or wires suitably earthed. In case the wires drop at a level crossing, the Gatekeeper shall immediately make arrangements to stop all road traffic.

e) Staff working on station roof and signal gantries & similar structures adjacent to Live Overhead Equipment shall not use any measuring tapes, tools and materials when there is a possibility of their being dropped or carried by wind on to the live overhead equipment.

f) Earthwork

For excavation work adjacent to tracks, the following action is taken:

i. In DC traction areas, intimation should be given in writing sufficiently in advance to the concerned Traction Distribution Officer to enable him to depute the Traction staff to be present in order to prevent possible damage to the traction underground feeder cables witch are always located near the running lines.

ii. In AC traction areas, intimation should be given to the concerned officers of the Electrical General services and also S&T Department, since all the S&T and Electrical lines are cabled on account of Electrical Induction.

In all AC & DC traction areas, cable markers showing location of cables are provided by the Traction Department. In addition, the cables are protected by tiles and bricks, and during excavation if workmen come across such tiles or bricks in an arranged manner, they should at once report the matter to the higher officials.

Any further excavation should be carried out only in the presence of the authorized staff of Electrical Traction and or S&T Department as the case may be.

g) Alteration to Tracks

The relative alignments of the centerline of the track with respect to the alignment of the contact wire must be maintained within the specified tolerances. This applies to both horizontal and vertical clearances. Slewing or lifting of track must not be done outside the agreed maintenance limits, unless the position of the contact wire is altered at the same time. Adjustment of cant has a magnified effect of the horizontal displacement of the center line of the track with respect to the alignment of the contact wire. Horizontal clearances to structures within the limits laid down in the Schedule of Dimensions must be maintained.

For Slewing or alterations to track involving adjustment of contact wire (outside the agreed maintenance limits) sufficient notice should be given to the traction staff so that they arrange to adjust the overhead equipment.

h) Alteration to Track bonding

All bonds removed by the staff of the Engineering Department shall be

replaced by the staff of the Engineering Department and all such removals and replacements shall be reported to the Assistant Electrical Engineer, Traction Distribution in-charge, concerned without delay.

i) Working of Cranes

No crane shall be worked except on the authorized **'Permit-to-work'.**

In every case of working a crane, arrangement should be made for the presence of authorized overhead equipment staff to ensure that all safety precautions are taken.

j) Inspection of Tunnels

For inspection of roofs and sides of a tunnel, the overhead equipment shall be rendered **'dead'**. Special insulated apparatus should be used if sounding the unlined portions to locate loose rock in the roof and sides, is required to be carried out, when the overhead equipment is **'live'**.

k) As far as possible closed wagons shall be used for material trains. In case open or hopper wagons are used, loading and unloading of such wagons in electrified tracks shall be done under the supervision of an Engineering Official not below the rank of a Permanent Way supervisor, who shall personally ensure that no tool or any part of body of the workers comes within the 'danger zone' i.e., within ***2 m. of O.H.E.***

l) Steel tapes or metallic tapes with woven metal reinforcement should not be used in electrified tracks. Linen tapes are safer and, therefore, should be used even though they are not accurate.

m) The top foundation blocks in electrified structures should be kept clear of all materials.

3. Maintaining continuity of track

3.1 During maintenance or renewal of track, continuity of the rails serving electrified tracks shall invariably be maintained. For bridging gaps which may be caused during removal of fish-plates or rails, temporary metallic jumpers of approved design shall be provided as under. The necessary jumper will be provided by the Electrical Department on requisition.

3.2 In case of rail fracture, the two ends of the fractured rail shall be first

temporarily connected by a temporary metallic jumper of approved design. In all cases of discontinuity of rails, the two parts of the rail shall not be touched with bare hands; Gloves of approved quality shall be used.

3.3 In the case of track renewals temporary connection shall be made.

3.4 In the case of defective or broken rail bond, temporary connections shall be made.

3.5 Before fish-plates are loosened or removed temporary connection shall be made.



4. Additional precautions in AC Traction area

4.1 Build-up of potential due to induction in metallic bodies situated close to O.H.E.

It is important to note that dangerous voltages may be induced in metallic masses such as fencing posts in the vicinity of traction conductors. To avoid possibility of shock due to such voltages, the metallic structures are bonded together and earthed.

4.2 Unloading of rails

When unloading rails along tracks, care shall be taken to ensure that rails do not touch each other to form a continuous metallic mass of length ***greater than 300 m.***

4.3 Permanent way staffs are advised to keep clear of the tracks and avoid contact with the rails when an electrically hauled train is ***within 250 m.***

4.4 Fire in Electrified areas

In case the fire is on adjacent to any electrified equipment, the Permanent Way Official shall make no attempt to extinguish the fire but shall report the occurrence of fire to the nearest Station Master by most expeditious means.

4.5 Catch Sidings

No person shall attempt to enter, or leave or in any other way make contact between the permanent way formation and the electric engine or single or multiple unit train or any vehicles coupled thereto while the overhead equipment of the sanded length of siding is alive.

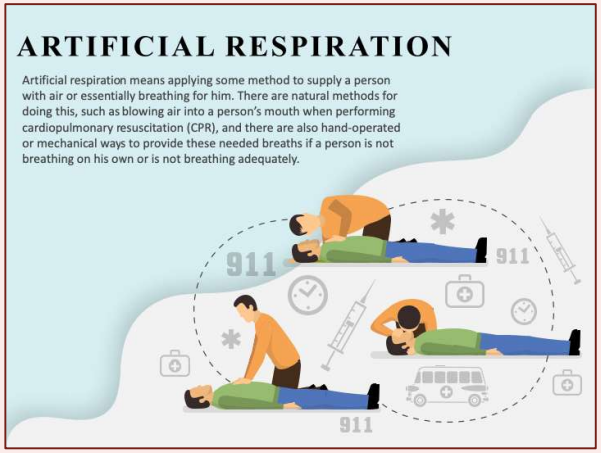
4.6 Permanent Way tools (insulated and un-insulated) along with gloves shall be used in manner as approved by the Chief Track Engineer of the railway.

5. Treatment of persons suffering from Electric shock

When persons receive electric shock, practically in every case they can be revived with prompt application of First-Aid.

5.1 Method of Resuscitation

The method of resuscitation resorted to should be that known as artificial respiration.



5.2 Continuity of Treatment

The efforts to restore breathing must be continued regularly and with perseverance, and must not be discontinued until a Doctor has taken charge of the case.

6. Accident to Power lines of outside bodies

The Engineering Inspector shall be in possession of the name and address of the officer in- charge of each power line across Railway land to enable an immediate report of any defect or accident appertaining thereto being made, under advice to the Assistant Divisional Engineer/Divisional Engineer.

7. Setting of Masts

7.1 Tangent Track

The standard setting i.e. the normal distance of the nearest part of the traction mast from the centre line of tangent track shall be as per table given below:

a) Implantation of Tangent Track (New Line/Doubling/Electrification)

Setting of Masts	Normal Setting Distance	Reduced Setting Distance (min.)	
i. For Mast Carrying Single OHE	2.80 m in main Line as well as in Yards	In tunnels, bridges cuttings & ballast less tracks (including washable apron) minimum of 2.36 m with the approval of the Principal Chief Electrical Engineer (Open line)	In Yards, Min. of 2.585 m with the approval of the PCEE (Open line).
ii. For Portal uprights, Masts carrying more than one OHE & Head span Masts	It should not normally be less than 3.4 m which may be relaxed to 2.575 m with the personal approval of PCEE (Open line) who may prescribe any special precautions like buried foundation etc. as may be considered necessary.		In Yards, Min. of 3.185 m with the approval of the PCEE (Open line).

7.2 Curved Track

The minimum setting distance of masts including portals, head-span masts etc. on curves is obtained by adding the curve allowance and 150 mm slewing allowance to the setting distance specified for tangent track in previous para.

Normally, the standard setting distance on broad gauge main lines on curves should not be less than the values given below:

a) Implantation of Curved Track

Inside/Outside Curve	Radius of Curvature	Implantation
i. Outside Curve	≥ 875 m	2.96 m
	< 875 m	3.245 m
ii. Inside Curve	≥ 1750 m	3.23 m
	1167 m to < 1750 m	3.39 m
	875 m to < 1167 m	3.47 m
	583 m to < 875 m	3.64 m
	438 m to < 583 m	3.655 m
	350 m to < 438 m	3.67 m
	292 m to < 350 m	3.69 m
	250 m to < 292 m	3.705 m
	219 m to < 250 m	3.720 m
	194 m to < 219 m	3.735 m
	175 m to < 194 m	3.750 m

Note: *During slewing of track it should be kept in mind that above distance of mast from centre of track should not be fouled.*

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संदर्भ / REFERENCE

IRPWM-2020 (Corrected Upto ACS-16), IRACTM Vol-II Part-I & II, General Rule-1976, Railway Board's letters and CE circulars of different Zonal Railways.

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हमारा उद्देश्य / OUR OBJECTIVE

To upgrade maintenance technologies and methodologies and achieve improvements in productivity and performance of all railway assets and manpower which inter alia would cover reliability, availability for use, utilization and efficiency.

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रेल मंत्रालय - MINISTRY OF RAILWAYS

(An ISO: 9001-2015 Certified Organization)



कर्षण क्षेत्रों में ट्रैक का रखरखाव
Maintenance of Track in Traction Areas

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