Government of India, Ministry of Railways
Research Designs & Standards Organisation, Manak Nagar, Lucknow – 226011

MAINTENANCE INSTRUCTION No. TI/MI/0053

1. **TITLE:** Pre and Post Monsoon Precautions for Traction Installation.

2. **APPLICATION:** Traction Installation.

3. **OBJECTIVE**: Objective is to minimize the damages due to monsoon hazards (e.g. Severe Rains/floods, Heavy wind/cyclone, lightening etc.) to Traction Installation. This SMI does not include and does not supersede specific instruction issued by zonal Railways regarding pre monsoon precautions.

4. **MAINTENANCE INSTRUCTIONS FOR PRE & POST MONSOON CHECKS:** Following should be ensured.

4.1. (i) **Monsoon Periods:** CEE/Zonal Railway, shall define the monsoon period (months of a year) for different sections of a zonal railway and issue to divisions. Divisions, in-turn, shall issue the same to subordinate offices. Monsoon periods may be different for different section of a Zonal railway depending upon geography and this should be taken care.

(ii) **Pre monsoon period:** Based on (i) above, CEE/Zonal Railway shall define duration of Pre-monsoon period in which all pre-monsoon activities should be completed. Pre-monsoon Period may vary from one month to 3 month depending upon nature of activity/works to be carried out.

(iii) **Bad weather warning and preventive action:** System of receiving the bad-weather warnings to TPC from Metrological Center shall be established. Controller with the assistance of TPC shall take preventive measures.

4.2 Pre monsoon activities:

A. PSI Installations

(i) Silica gel & Breather: Silica gel of breathers of Power transformers, Auxiliary Transformers is 100% replaced by specified quality silica gel. Silica gel breather should be maintained healthy by ensuring good condition of gasket, transparent cover, oil in the cup.

(ii) Door Gaskets & Cable Entry: Gaskets of doors of CB, BM, Marshaling box of transformer, Isolator key boxes, control panel etc should be ensured to be available and without damage. Cables should be taken through cable glands and redundant cable entry holes should be closed.

(iii) Oil level: It shall be ensured that oil level of power transformer, Auxiliary Transformers, PTs, CTs and other oil filled equipment is correct and it should not require any filing during monsoon period. Correct oil level will ensure reliability of the equipment.

(iv) AT drop Out Fuse: AT drop out Fuse replacement (100%) should be planned in pre monsoon period to ensure its mechanical and electrical strength in monsoon period. Released Fuse elements may be checked for its reusability at the depot by the Supervisor-incharge.

(v) **Heaters:** Heaters provided in CB, BM, C & R Panel, Marshalling Box of transformer etc should be ensured for proper working.

(vi) **Switching Stations :**

(a) Building roofs to be checked for leakage/seepage of rain water to avoid leakage on electrical equipment.

(b) Cleaning of cable trenches and water outlets to avoid water accumulation in substation/switching stations.

(c) Oil sump shall be made free from rain water

(d) Ensuring provision of all cables with cable gland and sealing of unused holes in cable tray, mechanism box, marshaling box etc.

(vii) **Transformer:** It must be ensured that transformer radiators, conservator tank, PRD are properly sealed to avoid ingress of moisture. The radiator corrosion should be attended. Bushing should be cleaned.

(viii) **Lightening and resultant surges Protection System:**

a. Ensure lightening arresters of all Traction Installations for its healthiness.

b. Ensure earths are properly connected to lightening Arrestors and its value should be within prescribed limits. Bolted Earth Connections should be properly tightened. Earth of LT and low voltage Equipments (Relays, Relay Panels, and Control Panel etc.) is equally important and should be checked for proper connections.

c. Ensure all surge protections of PSI, SCADA for their values within limit and their healthiness. Overaged should be planned for replacement.

d. Ensure all Arcing horns of PSI Equipments for their values within limit and defect rectified.

e. For Cables, which are provided with sheath and/or screen, it should be ensured that sheath/screen is terminated as per standard practice and guideline.

f. Leakage current meter reading connected in series with LA should be recorded and should be compared with previous reading. If sudden rise in leakage current is observed than LA should be thoroughly checked.

(ix) Bushing of CT, PT, LA, CB, BM & Transformer should be clean properly.

B. OHE Installations:

(i) **Bonds availability and tightening:** 100% bond connections shall be made available and re-tightened.

(ii) **Earth Pit Connections:** 100% Earth pit connection shall be re-tightened.

(iii) Buried rail Connections to and from earthing grid & track shall be checked.

(iv) **Guy Rod**: Guy Rods shall not be slack and 100% guy rods shall be retention by tightening U-bolts to prevent insulator breakage and other damages due to vibration and jerks during heavy winds.

(v) **Tower Wagons, Break-down Road vehicles, ART/SPART**: These shall be equipped with mandatory spares and T&P in good condition to meet emergency requirements. Materials shall have easy access. Generator sets, portable flood lights, lighting arrangements for breakdown vehicles shall be kept in good condition.

(vi) In the scheduled inspection just preceding the monsoon, special attention should be paid to the vulnerable points likely to permit ingress of moisture

resulting in reduction in dielectric strength of the equipments and rusting of parts.

(vii) Special Patrolling & Tower wagon Inspection: A special patrolling and Tower wagon inspection of all overhead lines should be done in pre and post monsoon period to identify defects/deficiencies which may cause failure during the coming monsoon season and afterwards. Following minimum checks shall be carried out and defects rectified.

(a) **Structures**: Locations of leaned structures; missing fasteners; damaged protective coatings like galvanizing or paints; shall be recorded and rectified.

(b) **Foundations**:

(i) Check the condition of embankments with respect to stability of mast. Signs of external damage; settled and washed out soil below normal ground level over foundations should be checked. Rectification with compact soil, sand bags, gravel etc. should be ensured for exposed foundations.

(ii) Ensure proper drainage of rain water surrounding the OHE foundation.

(iv) Muff of OHE mast which are cracked/broken or buried in soil, shall be rectified.

(v) Foundation of OHE structure should be in clean condition.

(c) **Insulators and Fittings**:

(i) One time cleaning of insulators in pollution zone is necessary to prevent excessive trippings and failures during initial monsoon rains. Cleaning of section insulators, 9-t insulators are also important.

(ii) Record of locations of damaged insulators, missing locking devices like nuts, washers and pin, burnt out fittings, deflected strings, damage to protective coatings, cracked insulators to be recorded and rectified.

(iii) Bird droppings, Bird nests, dense spider webs, kites with threads hanging on the insulator string shall be recorded and rectified.

(iv) Refer ACTM Vol II Part-I Para-20314 regarding Environmental Effect on OHE and Para 20325 regarding special checks and action should be incorporated on pre monsoon activity plan.

(d) **Cantilever**: Ensure free-movement by lifting contact wire. Insulator mast-attachment should be free to rotate. Apply lubricant if not free.

(e) **ATD**: Ensure free movement and correct X, Y values to avoid failures due to sudden change of Temperature and heavy winds. ATD Guy Rod shall be re-tensioned.

(f) **Overline structures**: Availability, condition and proper fixing of Protective screens and no water leakage on the OHE shall be ensured by Engineering department. Survey of unauthorized cable/pipes crossing through overline structure shall be carried out. Plugging of holes on ROB/FOB shall be carried out. TRD organization shall also advise engineering department. Checking of OHE on Girder Bridge for proper earthing.

(g) **Trees**:

i. Trimming of Shrubs and trees causing obstruction and Infringement shall be done by the authorized TrD staff and Supervisors. No part of, the tree shall be nearer than 4 m from the nearest live conductor. Any tree or

branches likely to fall on the live conductors should be cut or trimmed periodically to maintain the safety clearances.

ii. The cutting of the trees shall be done by the Engineering Department in the presence of authorized TrD staff to ensure safety and satisfactory completion of the work.

iii. Creepers on all portal structures & traction mast shall be removed.

(h) Non-railway Installations, which need to be periodically inspected by Traction distribution department e.g. Powerline crossings etc, should be got Inspected with the concern department/state government and deficiencies observed shall be made good through them. Refer ACTM Vol II Part-I Para 20331 regarding transmission line periodical inspection during pre and post monsoon period.

(i) Hoardings and Advertisement Boards in the vicinity of Railway Tracks or on Overline structures which may fall on track during rain/thunder storms shall be advised for removal to concern authority.

5. **MAINTENANCE OF RECORDS:**

a) Vulnerable location (leaning mast, poor foundations etc.) registers b) Bonding register c) Earth Register

d) PSI Equipment Maintenance Registers: make entry for replacing silica gel, arching horn gap, oil level drop out fuse etc

e) ATD Register: For free movement, Z-Y value, guide tube condition. Special entry shall be made for Guy Rod re-tensioning.

f) Tower Wagon/ Breakdown-Road vehicle/ART/SPART Spares and T&P register.

6. **AGENCY FOR IMPLEMENTATION:** All OHE & PSI depots on Indian Railways

7. **REFERNCE**:

(a) Railway Board letter No. 2008/Elect(G)/161/8/Punct. Dated 07.10.2011
(b) Railway Board letter No. 2008/Elect(G)/161/8/Pt. Dated 05.09.2012
(c) Railway Board letter No. 2017/13/CE-III/BR/Monsoon Dated 27.04.2017
(b) ACTM Volume II, Part I: para 20253, 10422, 20325(9), 20331.

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