



No. TI/OHE/INS/GEN/08/12

Dated-12.12.2008

**The Chief Electrical Engineer,**

1. South Eastern. Rly, Garden Reach, Kolkata-700 043
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4. Southern Rly, Park Town, Chennai- 600 003
5. South Central .Rly, Railnilayam, Secunderabad
6. Western .Rly, Chuchgate, Mumbai 400 020
7. Central .Rly. Stn Bldg. Mumbai CST - 400 001
8. Central Organisation, Railway Electrification, Allahabad - 211001.
9. South West Railway, DRM's Office, Hubli.
10. West Central Railway , Jabalpur
11. East Coast Railway, Bhubaneshwar
12. East Central Railway, Hajipur
13. North Central Railway, Allahabad.211001
14. North Eastern Railway, Gorakhpur
15. South East Central Railway, Bilaspur

**Sub:-Special Maintenance Instruction No. TI/MI/0042(12/2008) Rev "0".**

Ref:- 1) This office letter of even no. dated 25.5.2001.

2) Railway Board's letter no. 2003/Elect (G)/161/1 Vol.2 dated 20.11.2008

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Vide this office letter referred above, Special Maintenance Instruction No. TI/MI/0011 Rev "1" was circulated to all railways for testing of 25 kV solid core insulators before installation. However, it has come to notice that Routine Tensile Load testing facility is not as per RDSO SMI,

- Resulting in testing of insulator at a lower load.
- Facilities are not available at all the depot.

Further few cases of composite insulators core pullout from metal fitting have also been reported by Railways, which is a cause of concern. Accordingly, revised Special Maintenance Instruction (SMI) No. TI/MI/0042(12/2008) Rev "0" for testing of 25 kV Composite & Porcelain insulators before installation has been prepared and enclosed herewith. This SMI supersedes the SMI issued vide this office letter No.TI/OHE/INS/GENL/01 dated 25.1.2001.

It is requested that 25 kV composite & porcelain insulators must be tested as per SMI No. TI/MI/0042(12/2008) Rev "0" and before conducting routine tensile load test, the test jig should be calibrated with dynamometer for verification of load

applied on the insulator. It may also be noted that no other test i.e. Bending & Torsion etc. may be conducted on these insulators. Insulators may be subjected to tensile load as per procedure given in SMI.

Please receipt acknowledgement.

**( B.S.Bodh)**  
for Director General/TI

Encl.: SMI No. TI/MI/0042(12/2008) Rev "0" .

**Copy to:-**

1. Secy(RE), Railway Board, Rail Bhawan, New Delhi 110 001.
2. Secy(EEM), Railway Board, Rail Bhawan, New Delhi 110 001.
3. SE/DOC/TI
4. SE/ISO



GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS

**SPECIAL MAINTENANCE INSTRUCTIONS  
FOR  
TESTING OF 25kV PORCELAIN & COMPOSITE  
INSULATORS  
BEFORE INSTALLATION**

**No. TI/MI/0042(12/2008) Rev '0'**

Issued by:

TRACTION INSTALLATION DIRECTORATE  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
MANAK NAGAR, LUCKNOW – 226 011  
(For official use only)

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**SPECIAL MAINTENANCE INSTRUCTIONS (SMI) FOR  
TESTING OF 25KV PORCELAIN & COMPOSITE INSULATORS BEFORE INSTALLATION**

1. **OBJECTIVE :**
  - To specify testing procedure of 25kV solid core porcelain insulators and Composite insulators at site/depot before installation.
  - To furnish the tensile load values at which insulators of different types & specifications shall be tested.
  
2. **BACKGROUND :** To weed out the insulators which may develop defect due to various reasons beyond Railways control, Railways were advised vide SMI No. TI/MI/0011 'Rev 0' to test each insulator for routine tensile load test at site/ depot before installation. Later on, SMI was modified vide Rev '1' as per requirement of RDSO spec No.ETI/OHE/15(9/91).
  
3. **NEED FOR REVISION:** RDSO has issued revised specification for composite and porcelain insulators in Jan- 2007 and April- 2007 respectively, where in tensile load of 9-Tonne insulator has been enhanced to 11000kgf from 9900 kgf. Accordingly, applied load value for carrying out above test shall be different than already advised.

It has also been observed during site visits & reports that Routine Tensile Load testing facility is not as per RDSO SMI at all the OHE/RE depots. In addition, testing of insulator at a load different than the specified is being carried out. So much so , rails of 52kg/m have been used for jig formation but with the load calculations of 60kg/m rail.

Further, a few cases of composite insulators core pullout from metal fitting have also been reported by Railways, resulting in falling of OHE.. Accordingly, revised special Maintenance Instruction (SMI) for testing of 25 kV Composite & Porcelain insulators before installation is being issued

4. **TESTING INSTRUCTIONS**
  - 4.1 **Details of JIG/UTM :** For conducting the routine tensile load test either Universal Testing Machine of adequate capacity may be used or the simple arrangement shown in the enclosed sketch No. ETI/OHE/SK/611 (in 2 sheets) adopted.
  
  - 4.2 **DEAD LOADS TO BE APPLIED :** Taking weight of 60kg/52kg rail as reference, calculations have been made. Accordingly, the dead load 'Y' kg to be provided for conducting routine tensile load test for one minute, as per type of insulator and specification has been calculated & given in the following table:

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Table-1 Load to be applied for testing of 25 kV Porcelain Insulators

Specification no.	Type of Insulator	Specified SML in kgf	Routine tensile load (RTL) @ 55% of specified value in kgf	Dead Load 'Y' to be provided for double rail in kg	
				120 kg/m	104 kg/m
ETI/OHE/15(9/91) (Insulators manufactured prior to 2000).	Stay arm and Bracket	5400	2970	66	118
	9-tonne	9900	5445	447	499
ETI/OHE/15(9/91) with a & c slip no. 1 to 6.	Stay arm and Bracket	7000	3850	201	254
	9-tonne	9900	5445	447	499
TI/SPC/OHE/INS/0070	Stay arm and Bracket	7000	3850	201	254
	9-tonne	11000	6050	540	592

Table-2- Load to be applied for testing for 25 kV Composite Insulators

Specification no.	Type of Insulator	Specified SML in kgf	Routine load @ 70% of specified value in kgf	Dead Load 'Y' to be provided for double rail in kg	
				120 kg/m	104 kg/m
TI/SPC/OHE/INSCOM /0090 or TI/SPC/OHE/INSCOM /0091	Stay arm and Bracket	5400	3780	191	243
	9-tonne	9900	6930	675	727
TI/SPC/OHE/INSCOM/1070	Stay arm and Bracket	7000	4900	363	415
	9-tonne	11000	7700	794	846

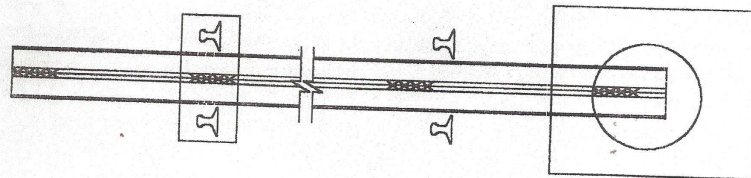
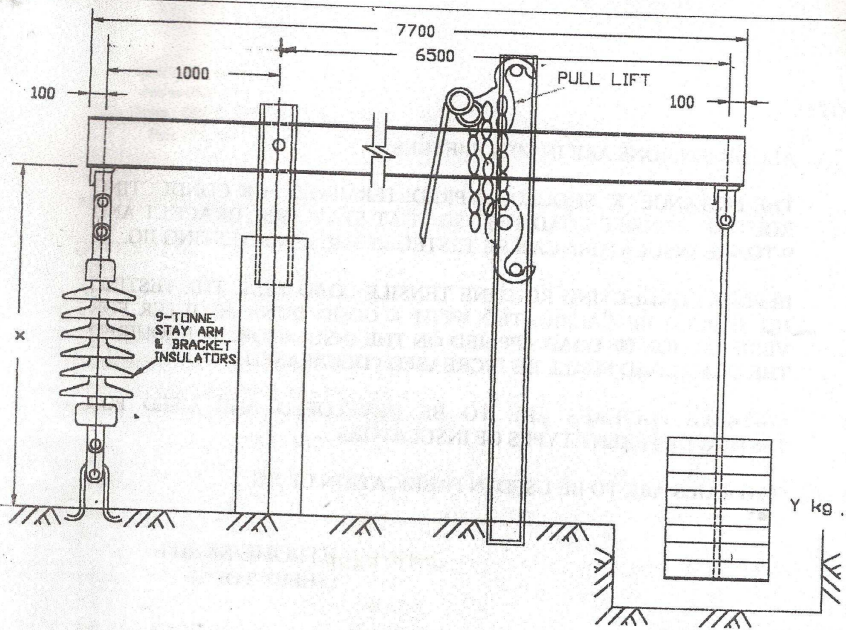
4.3 It would be seen from the above that RTL has been kept different in both type of insulator. The reason being :

- a) The porcelain insulator changes its mechanical characteristics at nearly 80% of its SML. There may be few insulators which may get manufactured with a reduced SML, say 80%its specified value. If such, insulators are tested at 70% of specified SML, the resultant force shall be more than 80% of its actual SML, thus making a permanent change in the listed at porcelain & also make this insulator a suspect for failure in service due to development of stresses.

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- b) In view of the above ,IEC standards have been followed wherein no case, the RTL will exceed the limits which shall cause permanent set in the chemistry of the porcelain.
- c) For composite insulator, above reasoning does not apply. In these insulators, idea is to check the soundness of crimping of the metal parts with the fibre rod core and this force should be as near to the SML as possible. 70% of SML is considered to be as ideal force, hence specified.
- 4.4 While fabricating the jig, additional fixtures, holding clamps/brackets, rails other than 60 kg/m & 52 kg/m rail etc. shall change the dead weight of the jig and vary the values of dead weight 'Y' to be provided. It is, therefore, imperative that the jig should be calibrated suitably using a good dynamometer to determine the exact dead weight 'Y' to be provided so as to apply the specified Routine Tensile Load on the insulators according to the type and specification to which they belong.
- 4.4.1 **TESTING PROCEDURE** : Pre installation test shall be carried out on all stay, bracket & 9-tonne insulators supplied by vendor/OHE contractor. Further, if insulators are to be erected from the available stock, they shall also be tested as per above values before reinstallation. Calibrate the testing jig using a good dynamometer to determine the dead load to be applied so that the specified routine tensile load is applied on the type of insulator tested as per the specification to which it is supplied. Maintain the routine tensile load for one minute and then release. Check the insulators along with metal fittings for any cement crack, core pull out/ loose crimping, deformation in the metal fitting, hook etc. during the routine test. **The defective insulators may be destroyed.**
- 4.4.2 Use only those insulators which withstand the RTL as indicated in the tables above.
- 5.0 This supersedes the SMI No. TI/MI/0011 Rev "1" issued vide this office letter no.TI/OHE/INS/GENL/01 dated 25.1.2001.

**ENCLOSURE:** ETI/OHE/SK/611 (Sheet 1 of 2 and 2 of 2).



BOTH RAILS TO BE WELDED SUITABLY  
AT REQUIRED INTERVAL FOR RIGIDITY

JIG FOR ROUTINE MECHANICAL LOAD TEST FOR INSULATORS  
AT RE DEPOT'S.

**NOTES:-**

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. THE DISTANCE “X” SHOULD BE PREDETERMINED FOR CONDUCTING ROUTINE TENSILE LOAD TEST SO THAT STAY ARM, BRACKET TUBE AND 9-TONNE INSULATORS CAN BE TESTED IN THE SAME TESTING JIG.
3. BEFORE CONDUCTING ROUTINE TENSILE LOAD TEST, THE TESTING JIG SHOULD BE CALIBRATED WITH A GOOD DYNAMOMETER FOR VERIFICATION OF LOAD APPLIED ON THE INSULATOR. IF REQUIRED THE DEAD LOAD SHALL BE INCREASED / DECREASED.
4. SUITABLE FIXTURES ARE TO BE DEVELOPED AND USED FOR TESTING DIFFERENT TYPES OF INSULATORS.
5. 52 kG / 60 kG RAILS ARE TO BE USED IN FABRICATION OF JIG.

**ETI/OHE/SK/611  
(SHEET 2 OF 2)**