



Government of India,
Ministry of Railways
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पत्रांक: टीआई/पीएसआई/अर्थिंग/पॉलिसी/14

दिनांक: 26.02.2020

To,
The Principal Chief Electrical Engineer,

- (i) Central Railway, Station Building, Mumbai CST – 400 001.
- (ii) Eastern Railway, Fairlie Place, Kolkata-700 001.
- (iii) East Central Railway, Hajipur-844 101.
- (iv) East Coast Railway, Bhubaneshwar-751 023.
- (v) Northern Railway, Baroda House, New Delhi - 110 001.
- (vi) North Central Railway, Allahabad-211 015.
- (vii) North Eastern Railway, Gorakhpur-273 012.
- (viii) North Frontier Railway, Mailgaon - 781 011.
- (ix) North Western Railway, Jaipur – 302 017.
- (x) Southern Railway, Park Town, Chennai- 600 003.
- (xi) South Central Railway, Railnilayam, Secunderabad-500 371.
- (xii) South Eastern Railway, Garden Reach, Kolkata-700 043.
- (xiii) South East Central, Railway, Bilaspur-495 004.
- (xiv) South West Railway, DRM's Office, Hubli-580 028.
- (xv) Western Railway, Churchgate, Mumbai-400 020.
- (xvi) West Central Railway, Jabalpur- 482 001.
- (xvii) Konkan Railway, Belapur Bhavan, Sector-11, CBD Belapur, Navi Mumbai 400614.
- (xviii) CAO, CORE Allahabad-211001.

विषय: विशेष रखरखाव निर्देश (SMI) सं. TI / SMI / 0032 Rev.02.

(Special Maintenance Instruction (SMI) no. TI/SMI/0032 Rev.02)

संदर्भ: (i) This office letter no. TI/PSI/EARTHING/POLICY/14 dated 26.11.2019.

(ii) Railway Board letter no. 2013/RE/161/122 dated 30.09.2019.

The draft the SMI No. TI/SMI/0032 Rev.02 was circulated to Zonal Railways vide this office letter referred (i) above. Based on the comments received, Special Maintenance Instruction (SMI) no. TI/SMI/0032 Rev.02 (Provision of Buried Rail at Switching Posts with Conventional Earthing System) has been finalised by this office and same is enclosed herewith for necessary action please.

This is issued with approval of the competent authority.

आशीष
26.02.2020

(डा. आशीष अग्रवाल)

निदेशक टी आई - 3

क्रते महानिदेशक (टी आई)

संलग्नक: SMI No. TI/SMI/0032 Rev.02

प्रतिलिपि: ED/RE, Railway Board, Rail Bhavan, New Delhi – 110 001

TI/SMI/0032 Rev.02	Effective from 19.02.2020.	Special Maintenance Instruction for Setting up Earthing station at switching Post	Page 1 of 5
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**Government of India
Ministry of Railways**

SPECIAL MAINTENANCE INSTRUCTION No.

TI/SMI/0032 Rev- 02

For

SETTING UP EARTHING STATION AT SWITCHING

POSTS (SSP & SP)

WITH CONVENTIONAL EARTHING SYSTEM

**Issued By
Traction Installation Directorate
Research Designs & Standards Organisation
Lucknow – 226011.**

February, 2020

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1.0 INTRODUCTION

- 1.1 This SMI supersedes the SMI No. TI/SMI/0032 Rev.01 issued by RDSO vide letter no. TI/PSI/Earthing/Policy/14 dated 01.04.2014.
- 1.2 With advances in track technology the Rail is no longer at ground potential which has been the assumption of existing Earthing Code ETI/PSI/120 & ETI/OHE/71. The structures have been conventionally bonded to the Rail with belief that the structure would be grounded through the Rail. Whereas, now Rail sees earth through the structures many-a-times with increasing rail-formation insulation.
- 1.3 The immediate concerns which arise are the rising of Rail potentials, affect on the efficacy of existing protection scheme and safety of Rail vehicles. Thus, it is decided to create Earthing stations at a place near the Switching Posts (SP/SSP). Idea is to create a positive, strong and deliberate earth connection to improve system resilience.
- 1.4 The SMI No. TI/SMI/0031 Rev.01 was discussed in the 30th MSG (TRD) held at Mount Abu on 13th & 14th April 2018 and 31st MSG (TRD) held at Somnath on 08th & 09th November 2019. The group deliberated for the revision of SMI.

2.0 REFERRED DOCUMENTS

SN	Document	Description	Number
1.	Specification	Code for Bonding and Earthing for 25 kV, a.c., 50 Hz Single Phase Traction System.	ETI/OHE/71
2.	Specification	Code of Practice for Earthing of Power Supply Installations for 25 kv, ac, 50Hz, Single Phase traction System.	ETI/PSI/120
3.	Specification	Specification for Exothermic Welding (Connection for Bonding, Earthing /Grounding)	TI/SPC/OHE/EXOTHR MBOND/0100 (04/10)
4.	Specification	Specification for Stainless Steel fasteners for 25kV AC Traction Overhead equipment	TI/SPC/OHE/FASTNE RS/0120 rev.01
5.	Drawing	Earthing Station	ETI/OHE/P/7020
6.	Drawing	Typical Earthing Layout at Feeding Station	ETI/PSI/203
7.	Drawing	Typical return Current connection to Buried Rail at 132/25 kV Traction Sub Station	ETI/PSI/0212-1
8.	Drawing	Return Current Connection to the Sub Sectioning and Paralleling Post.	ETI/PSI/0201-1
9.	Drawing	Return Current Connection to the Sectioning and Paralleling Post.	ETI/PSI/0202-1

3.0 It may be noted that in conventional electrification which uses a running Rail for return circuit, one end of Transformer's secondary is connected to this Earthing system, thereby making full traction current flow through this system. It may be further noted that full load current would not necessarily take: Running Rail>Buried Rail>Transformer. Some current can as well get to the transformer from Earth Electrode>Earth Grid>Transformer.

4.0 Existing Arrangement for Earthing the Tracks

There are no direct earth connections except at the Feeding posts. The design philosophy assumes that the Rails are naturally at ground potential and the structures get earthed by connection to the Rails.

Present connection at Feeding Post has been described in RDSO Drawing No. ETI/PSI/203. The following are main components of the present Feeding Post Earthing Station:-

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- 4.1 **BURIED RAIL:** Acts as maintenance free Earth Bus.
- 4.2 **EARTHGRID:** Connects various ground Electrodes and reduces the possibility of higher Step Potential.
- 4.3 **EARTH ELECTRODES:** Couples the Buried Rail to parent earth and hence bringing down the Earth potential.

5.0 DESIGN OF THE EARTHING STATION

Two Earthing Stations near the Switching Station, one on either side of the UP and DN track, shall be provided. For multi track system [i.e. Block Sections having more than two tracks (UP & DN track)], separate Earthing Station for each track shall be provided.

5.1 GENERAL ARRANGEMENT

Preferably Rail or TRD mast (all type) of length more than 9 m shall be used to create an Earth station. The released Rails/TRD Masts should always be preferred. Two Earth Electrodes shall be provided at each end of the Buried Rail as per RDSO Drawing No. ETI/OHE/P/7020. Thus the Buried Rail would be configured as Earth Bus.

5.2 DESIGN

A trench, of size about 0.6 m x 'X' m, with a depth of about 1 m from the ground level shall be dug on the track side. ('X' should be more than 2 m of the length of the Rail/TRD mast used)

- 5.2.1 At a distance of about 1.5m ± 0.5 m, from either ends of the Buried Rail, two 19 mm Φ holes are drilled for connection to earth pits. 02 more holes at 1.5m ± 0.5 m from the above holes to be drilled for connection to track.
- 5.2.2 Two electrodes shall be provided as per RDSO Drawing No. ETI/OHE/P/7020 at a distance of 1.5m±1.0m on both ends. Earthing shall be provided as described in RDSO Drawing No. ETI/PSI/0212-1 and mentioned at page no. 4 & 5 of this SMI. GI flats are preferably to be used for earthing, in view of longer life, but in case of non-availability of GI Flats, standard MS Flats can be used after painting them with two coats of Aluminium paint. Subsequently the word GI Flat will mean both the above methods.

5.2.3 Preparation of Earth Bus (Buried Rail)

- 5.2.3.1 The Rail (this nomenclature includes masts as mentioned in Para 5.1), duly prepared, shall be lowered in to the trench.
- 5.2.3.2 The connection between the Buried Rail and Earth Electrodes of respective Earth Pits on both sides shall be done through 75 x 8 mm GI Flats, by using 20 mm Φ Stainless Steel bolts as mentioned at page no. 4&5 of this SMI.

5.2.4 Preparation of Running Rail

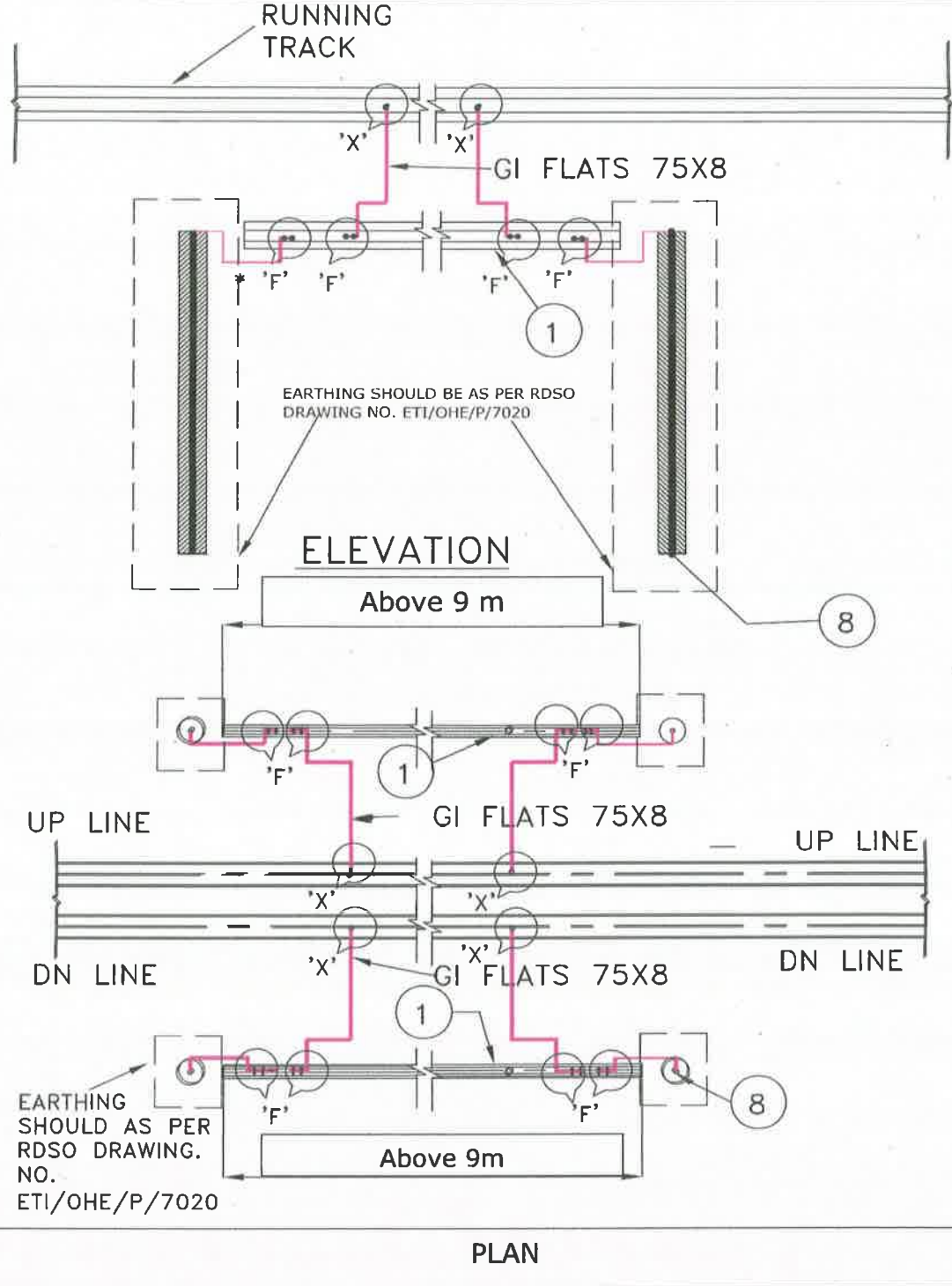
Holes are drilled on the web of running Rail and connection to be made as mentioned on page no. 4&5 of this SMI.

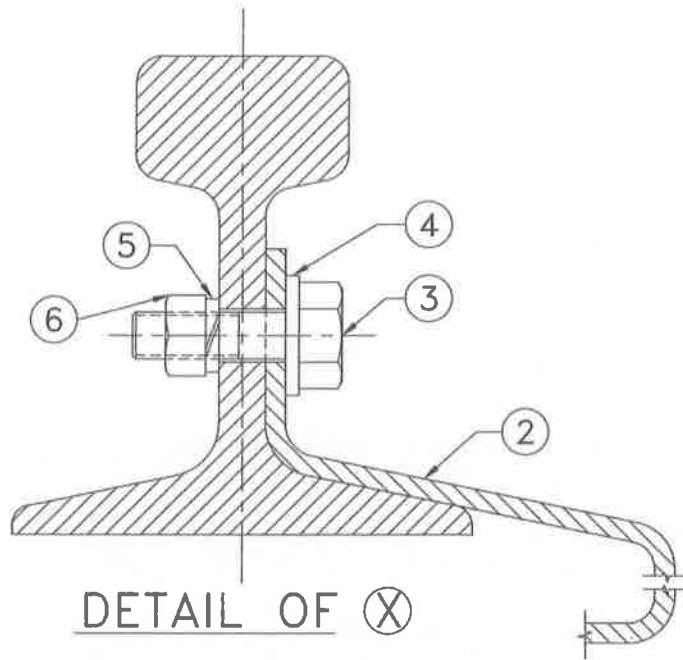
5.2.5 Connection between the Running Rail and Buried Rail

Connections between the Running Rail and the Buried Rail are made with two GI Flats of size 75 x 8 mm, connected with Buried Rail with 20 mm Stainless steel bolts, as per RDSO Drawing No. ETI/PSI/0212-1 and to the Running Rail with M-12 Bolt, as mentioned at page no. 4&5 of this SMI.

6.0 Connection arrangement of the Running Rail – Buried Rail – Earth Electrodes

* For detail of 'X' refer page no. 05 of this SMI.
* For detail of 'F' refer RDSO Drawing no. ETI/PSI/0212-1





7.0 The Earth electrode shall be made as per Drawing No. ETI/OHE/P/7020.

8.0 For Buried Rail Drawing No. ETI/PSI/0212-1 to be referred.

9.0 Schedule of materials:

Ref:	Description	Quantity
1.	Above 9 m long rails or TRD masts.	02 Nos.
2.	Galvanised Iron Flats of 75mm X8 mm	as required
3.	M-12 Bolts (Stainless steel)	04 Nos
4.	Plain washer	04 Nos
5.	Lock washer (Spring steel)	04 Nos
6.	Nuts	04 Nos
7.	M-20 Bolts (Stainless steel) (for connection of GI flat to buried rail)	16 Nos
8.	Earth electrode as per RDSO Drawing no. ETI/OHE/P/7020	04 Nos
