



सत्यमेव जयते

GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

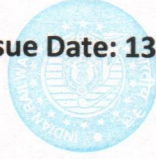
Technical Audit Report

Of

Maintenance of Sandwich Mounting at ELS/MGS

Report No.: RDSO/2017/EL/TAR/0014 Rev. '0'

Issue Date: 13.10.2017



Approved by	अमिप्रकाश 13.10.17
EDSE(Co-Ord)	Signature

Issued by
Electrical Directorate
Research, Designs and Standards Organisation
Manak Nagar, Lucknow-226011

Prepared by	Checked by	Issued by

Status of Revision

SN.	Date of Revision	Page No.	Revision	Reason for Revision
1.		All	0	First Issue



Prepared by	Checked by	Issued by
<i>[Signature]</i>	<i>C. L. [Signature]</i>	<i>[Signature]</i>

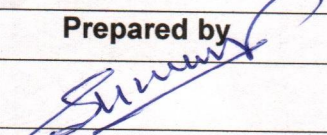

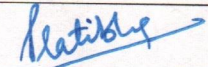
Technical Audit at ELS/MGS**Date: 03.07.2017****1. Availability of latest guidelines and procedures**

- During the visit it was observed that latest specification and instructions issued by RDSO was available at the technical section of shed, but concerned SSE was not aware of the amendment issued for SMI no. 186 which deals revised dimensions of sandwich unit and top and bottom end plates.

Recommendation

- All concerning staff should be made aware of latest SMI/MS/TC issued from RDSO. In this case following guidelines are important.

SN	Instruction No.	Details
1.	Special Maintenance Instruction No. RDSO/2017/EL/SMI/0312 (Rev '0') Dated 25.08.2017	Use of Dye Penetrant Testing (DPT) for crack detection of Traction Motor (TM) nose stay & lifting lugs to eliminate chances of falling of traction motor during service in EMUs/MEMUs/Metro Railway.
2.	Special Maintenance Instruction No. RDSO/2017/EL/SMI/0311 (Rev '0') Dated 25.08.2017.	Magnetic Particle Testing (MPT) of Traction motor (TM) nose stay in conventional locomotives/EMUs/MEMUs/Metro Railway, TM suspension holder support and motor support in WAG ₉ /WAP ₇ locomotives and traction motor support arm in WAP ₅ locomotives.
3.	Special Maintenance Instruction No. RDSO/2017/EL/SMI/0308 (Rev '0') Dated 28.06.2017. Railway Board's letter No. 2007/Elect(TRS)/441/8 pt. dated 03.02.2014 RDSO's letter No. EL/3.2.172 dated 13.09.2011.	During all major overhauling and repair of traction motors, proper DPT of welded joints of nose stay and lifting lugs shall be carried out to eliminate weld failures and any cracks.
5.	Special Maintenance Instruction No. ELRS/SMI/186 dated 15.05.1997 along with its amendment No. 2 dated 01.04.2014.	Instructions for bonded rubber sandwich mounting for nose suspension of traction motors.
6.	Technical Circular No. RDSO/2014/EL/ TC/0126, Rev.'0' dated 25.03.2014.	Instructions to maintain gap between traction motor bottom nose and bonded rubber sandwich mounting unit.
7.	Modification Sheet No. RDSO/2011/ELRS/ MS/0392, Rev.'0' dated 11.02.2011	Modification in traction motor nose suspension system for provision of additional L clamps and split pins to prevent falling of vertical nose pin of traction motor type HS 15250A/TAO 659.

Prepared by	Checked by	Issued by
		

SN	Instruction No.	Details
8.	Specification No. RDSO/2014/EL/SPEC/0115 Rev.'0' dated 22.08.2014	Specification for bonded rubber sandwich mounting for nose suspension of traction motor for electric locomotives.
9.	Technical Circular No. RDSO/2013/EL/TC/0123, Rev'0' dated 16.05.2013 along with its amendment No. 2 dated 16.05.2016.	Instructions for replacement of sandwich mounting assembly in POH.
10	Technical Circular No. ELRS/TC/0029 Rev.1 dated 15.7.2002.	Instructions for replacement of sandwich mounting assembly in IOH.
11	Technical Circular No. ELRS/TC/0031 Rev.1 dated 15.7.2002 along with its amendment No. 1 dated 28.06.2017.	Instructions for replacement of sandwich mounting assembly of WAP4 locomotives in every TOH schedule.

All these documents are issued to zonal railways and also available at RDSO website.

2. Procurement and storage of Sandwich mounting

- Sandwich mounting was being purchased as per old spec IRS: R49-75, instead of new spec no. RDSO/2014/EL/SPEC/0115 Rev. 0 dt. 22.08.14.
- 13 mm thick manganese steel liner was being used instead 6 mm as per SMI 186 amendment 1. Material was also not as per the SMI.
- Earlier annual average consumption of sandwich mounting unit at ELS/MGS was 150 nos. it has now been increased to 400 nos. and further being increased to 500 nos. to meet the requirement of replacement of sandwich mounting during TOH.
- Sandwich mounting unit was being stacked in the racks in non air conditioned atmosphere.



Fig.1: storage of sandwich mounting in ELS/MGS

Prepared by	Checked by	Issued by
<i>[Signature]</i>	<i>G. G. P.</i>	<i>[Signature]</i>

Recommendation:

- Sandwich mounting unit to be purchased as per the new spec. no. RDSO/2014/EL/SPEC/0115 Rev. 0 dated 22.08.2014. salient features of old vs. new spec. is as under:

SN.	Key point	Old Spec	New Spec
Rubber Properties			
a.	Compression set after 22 hrs. at $70 \pm 1^\circ \text{C}$	35 %	25 % (max)
b.	Ash content	Not defined	5 % (max)
c.	Specific gravity	Not defined	1.2 (max)
d.	Resistance to Ozone test (Quality retention rating)	Not defined	85 % (min)

- 6 mm liner as per SMI 186 amendment 1 should be used.
- Sandwich mounting unit should be stored in air conditioned room as it is a rubber item. Also in the store depot system should be there to ensure first in first out to avoid storage for a long time.

3. Maintenance

- ELS/MGS has developed a fixture as shown below to compress the sandwich mounting unit (SMU) unit for fitment in loco. With development of this fixture only one person can compress SMU easily.



Fig.2: fixture for pressing SMU for fitment in locomotive

- MS 392 is being followed for securing SMU vertical pins.

Prepared by	Checked by	Issued by
<i>[Signature]</i>	<i>G. L. F.</i>	<i>[Signature]</i>

- During major overhaul removed SMU of 2013 batch was planned to use it again in loco as its dimensions were just with in service limit.



Fig.3: Old removed SMU

- No record of SMU removed from loco is being maintained during major overhauling. Earlier it was being maintained since April' 2014.
- RDPT of TM and bogie lugs is being done during overhauling. Staff was aware of correct RDPT process that to clean the job and remove the paint before doing RDPT.

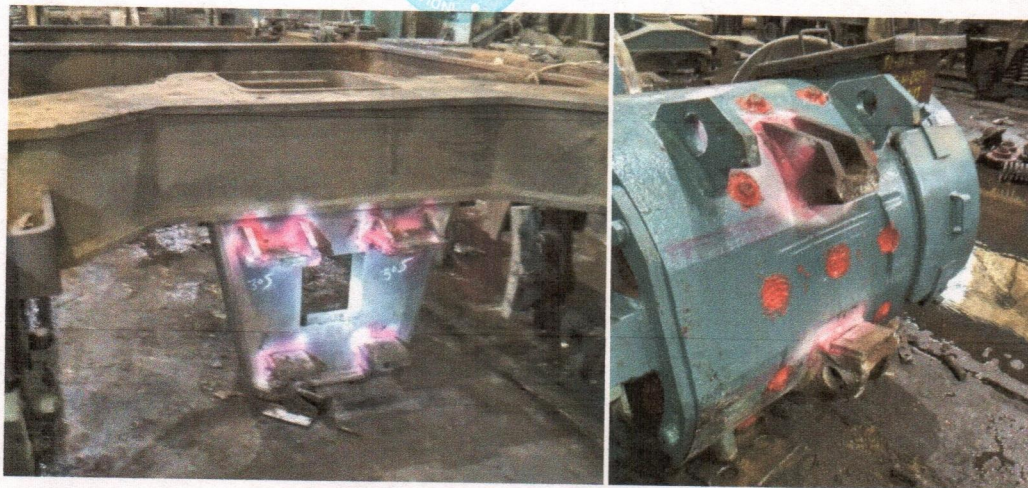


Fig.5: RDPT on TM nose stay and bogie lugs

- Welding of liner on the lugs was proper.

Prepared by	Checked by	Issued by
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

- Gap of TM lugs was being checked with go-no-go gauge. No such gauge was available for checking of gap of bogie lugs, it was being measured with vernier caliper.
- As per TC 126 during minor schedule gap between traction motor bottom nose and SMU is being checked and record is being maintained. Although the gap is not being measured in a proper way. It is being checked by finger tips and being recorded in ambiguous manner.
- ELS/MGS is checking cracks of TM nose/lugs by boroscope during minor inspection, which is a good practice.

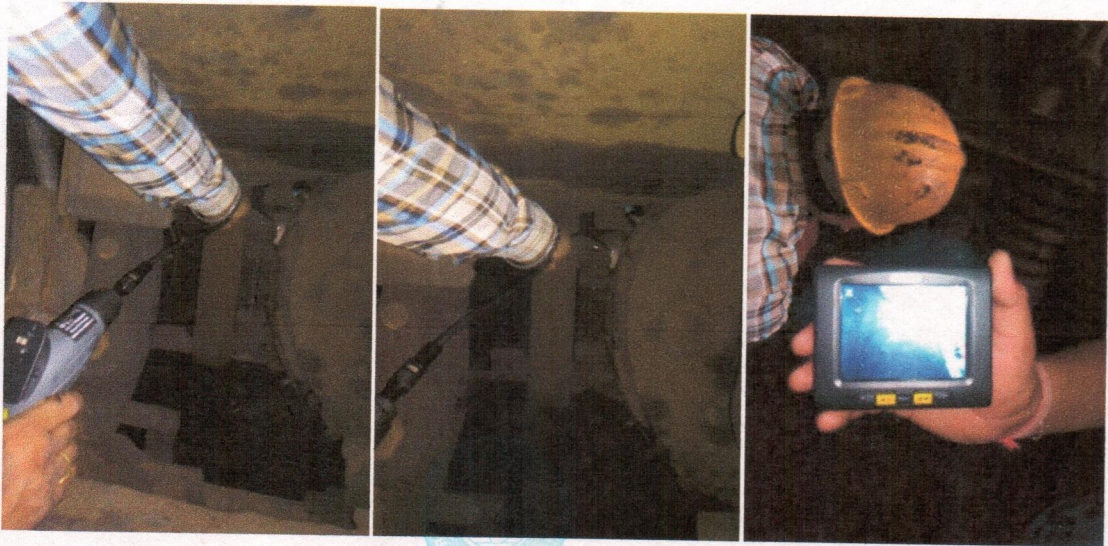


Fig. 6: Use of Boroscope for detection of crack

Recommendation:

- All electric loco sheds should develop similar type of fixture as in ELS/MGS for compression of SMU.
- If a serviceable SMU is being refitted, its dimension should be checked separately not with end blocks. It should not be at par of serviceable limit rather it should be at par of limits for new SMU.
- Proper record of SMU should be maintained. During overhauling TM wise complete record of removed SMU as well as new SMU being fitted in loco should be maintained.

Loco no.	Date	Schedule	TM1				TM2				TM3				TM4				TM5				TM6			
			Removed SMU		Fitted SMU		Removed SMU		Fitted SMU		Removed SMU		Fitted SMU		Removed SMU		Fitted SMU		Removed SMU		Fitted SMU		Removed SMU		Fitted SMU	
			Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg	Heig ht	mfg

Prepared by	Checked by	Issued by
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>

- Go-no-go gauge can also be developed for bogie lugs. These should be calibrated from time to time.
- An 'L' type go-no-go gauge can be developed for checking of gap between traction motor bottom nose and SMU or filler gauge can also be used.
- Other sheds may also purchase boroscope and check for TM nose/bogie lugs crack.



Prepared by	Checked by	Issued by
<i>[Signature]</i>	<i>G. L. F.</i>	<i>[Signature]</i>