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अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226011
Government of India - Ministry of Railways
Research, Designs & Standards Organization,
LUCKNOW - 226011

No. EL/11.5.5/5

Dated: 21.11.2007

Chief Electrical Engineer,

- Central Railway, 2nd floor, Parcel Office Building, Mumbai CST-400 001
- Northern Railway, Baroda House, New Delhi-110 001
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- South Central Railway, Rail Nilayam, Secunderabad-500 071
- Chittaranjan locomotives works, Chittaranjan -713 331 (WB)

SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/2007/EL/SMI/0247(Rev.0)

1.0 Title:

Failure improvement of Valve Set in Power Converter for 3-phase electric locomotives

2.0 Brief History:

Traction converter was designed and developed by Bombardier, Turgi, Switzerland in 1995/96 for 3-phase electric locomotives of Indian railways against GP-140 Contract. Initially the Power converters were delivered from Switzerland. After a Transfer of Technology to CLW and to other Indian TOT partners like BT/Vadodara, BHEL, NELCO and CGL, these converters were supplied by Indian TOT partners.

Vide reference Railway board's letter No. 2002/Elect(Dev)/440/18/2 dated 20.05.04, meeting were held along with TOT partners at Electric loco shed, Ghaziabad on 3rd & 4th Dec. 2004 and at Railway board, New Delhi on 10th Jan.2005 regarding the performance of Power converter, Auxiliary converter and Control electronics for 3-phase electric locomotives and the issue of increased failure rate of Valve Sets both supplied by Indian TOT partners as well as Bombardier Switzerland was discussed. In this regard a report on GTO failure investigation have been submitted by M/s Bombardier in May 2006.

3.0 Object:

To reduce failure rate of V/Sets of Power Converter for 3-phase electric locomotives.

4.0 Instruction:

As per Report, the following components also lead to consequential failures of GTO devices:-

- i) Gate Cathode cable
- ii) Gate Unit
- iii) ASC/NSC controller card
- iv) Fiber optic cards
- v) Fiber optic cables

These conditions of failures are referred as internal conditions. To avoid failures due to these, the following maintenance practices shall be adopted at Shed level:-

- i) Valve Set shall not be checked by multi meter. It should be checked by a meter having current and voltage source as per following procedure:
 - (a) Apply 1 Amp current between gate and cathode of GTO, measured voltage drop between gate and cathode. For healthy Valve set it should be 0.5 to 0.7 volts.
 - (b) Apply 10 volts in reverse polarity between-gate and cathode. For healthy Valve set leakage current should be less than 50 milli amperes.
- ii) The correct handling of Gate Cathode cable is very important while removing / inserting the valve sets. Twisting of these cables may result in intermittent no connection while its operation in the locomotive.
- iii) Testing / checking of suspected Gate Units with gate unit tester (Guset) and not by Multimeter.
- iv) Proper handling of cards by skilled persons with ESD protection. In this reference, RDSO's Technical Circular No. ELRS/TC/0091, Rev.'0' for handling and cleaning of Printed Circuit Board (PCB) dtd. 16.02.2006 shall be adopted at shed level.
- v) Fibre optic cables are sensitive to mechanical damages. During maintenance of converter, extreme care should be taken while removing / inserting gate unit & valve set. While handling the fiber optic cables, its connectors should not be forced as it can also damage the cable, which in turn results in failures of valve sets.
- vi) Fiber optic cables shall also be tested by RIFOCS meters and not by torch light. The proper testing of fiber optic cables will reduce the possibility of valve set failures.

5.0 Application:

WAP5, WAP7 and WAG9 types electric locomotives.

6.0 Agency of Implementation:

All sheds holding WAP5, WAP7 and WAG9 Electric locomotives and Electric Loco Workshop/Bhusawal.

7.0 Periodicity of Implementation:

- i) During valve set failure investigation and replacement in locomotives.
- ii) During IOH and POH.

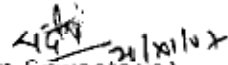
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Encl: Nil


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