



सत्यमेव जयते

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**


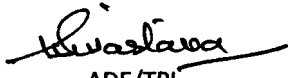

**FUNCTIONAL REQUIREMENT SPECIFICATION (FRS)
FOR REPAIR OF VALVE SETS OF GTO BASED TRACTION
CONVERTERS OF 3-PHASE ELECTRIC LOCOMOTIVES Type WAP5,
WAP7&WAG9**

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Approved by	ओम प्रकाश 23.9.15
EDSE(Co-Ord)	Signature

Issued by

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

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FUNCTIONAL REQUIREMENT SPECIFICATION (FRS) FOR REPAIR OF VALVE SETS OF GTO BASED TRACTION CONVERTERS OF 3-PHASE ELECTRIC LOCOMOTIVES TYPE WAP5, WAP7&WAG9

1.0. General:

- 1.1** Indian Railways imported 22 WAG9 locomotives and 11 WAP5 locomotives in 1997-98 from M/s. ABB, Switzerland. Later on, CLW started the manufacturing of these locomotives by procuring Power Converter, Auxiliary Converter & Control Electronics from ABB, Switzerland. These equipments were indigenized later on by M/s. BT, Vadodara, M/s. NELCO, M/s. BHEL and M/s. CGL through transfer of technology. This Functional Requirement Specification (FRS) is issued to serve as a essential guideline to repair of valve sets of traction converter for 3-phase electric locomotives. The firm should satisfy themselves about having complied with the technical requirements and other infrastructure.

2.0 Background

Each locomotive is equipped with 02 (two) traction converters (SR-1 & SR-2). Valve set is a vital part of traction converter (SR) which houses GTOs, Diodes and Snubber circuit components. One traction converter consists of 04 (four) valve sets. Each locomotive consists of 08 (eight) valve sets.

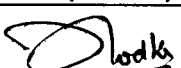
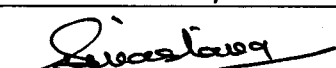
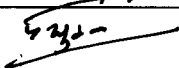
- 2.1** Due to defect in GTOs or due to defect in other components of valve set, sometimes the complete valve set is required to be opened and repair is required to be done. Presently valve sets are being repaired from the TOT partners. This FRS has been prepared so that other firms can also take up the work of repairing of valve sets of traction converters of three phase locomotives on similar lines.

3.0. Scope:

This specification covers the repair of valve sets (Identification of failed components in valve set, repairing /replacement of defective components) and testing of valve sets.

4.0. Compliance of RDSO's STR:

The potential bidder must give clause wise compliance of RDSO's STR for repairing of valve sets of traction converters of three phase locomotives.

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5.0. Technical:

For technical details regarding repair of valve sets e.g. Valve set constructional details, details of components, repair procedure of valve set, opening of valve set assembly, procedure for replacement of faulty GTO/diodes in the stack, must change items for valve set, procurement of items, assembly of valve set etc. please refer RDSO Special maintenance Instruction No. SMI no RDSO/2010/EL/SMI/0265 (Rev-0)

6.0. Testing:

For details regarding testing to be carried out on repaired Valve sets e.g. Testing of GTO's, testing of diodes, Measurement of various test values between various components of Valve set, details regarding Oil pressure and leakage test, insulation test, megger test, HV test etc. Please refer RDSO Special maintenance Instruction No. SMI no. RDSO/2010/EL/SMI/0265(Rev-0).

7.0. Test protocol for repaired Valve Set:


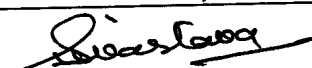
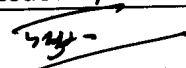
Firm shall submit the test protocol for testing the repaired valve set to RDSO for approval. The testing shall be carried out by inspection official as per approved test protocol.

8.0. QAP and Test Schedules :

Before offering prototype repaired unit for testing, final QAP and test schedules shall be submitted by the successful bidder to RDSO for approval

9.0. Methodology of development:

- 9.1. Repaired valve sets shall be tested as per approved test protocol;
- 9.2. After successful tests on prototype units of valve set, one loco set quantity, shall be cleared for fitment trial in locomotive;
- 9.3. Successful fitment trial shall be followed by field trial on 1 loco set quantity for 6 months in actual service;
- 9.4. After Successful field trial for 6 months, firm shall be approved for repair of valve sets for traction converters fitted in WAG9/WAP7/WAP5 locomotives;
- 9.5. Test protocol for prototype tests, field trials, shall be jointly decided in consultation with RDSO

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