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सत्यमेव
जयते

भारत सरकार – रेल मंत्रालय
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EL/3.2.182 Dated: 10.06.2010

SPECIAL MAINTENANCE INSTRUCTION No. RDSO/2010/ EL/SMI/0262, Rev. '0',

1. **TITLE:**
Detection of rotor bar crack and stator defect for traction motor type 6 FRA 6068 used on WAG9/WAP7 class of locomotives.

2. **BRIEF HISTORY:**

The performance of the traction motors used in WAG9 class of locomotives had been cause of concern. Rotor Bar crack in the squirrel cage rotors of three phase traction motors has been a cause of concern for which RDSO has developed two schemes with an expected life of 18 years against an existing life of three to four years. Although Rotors with these two schemes are under manufacturing, but there are roughly 1900 traction motors are in service .The crack rotor bar after getting uprooting in service gets damage the stator winding, also. At times, traction motor failure leads to valve set failure also. The matter has been discussed in MSG and it was decided to develop a procedure of detecting crack in rotor bars in service to avoid consequential damage to stators and failure of valve sets.

3. **SCOPE:**

3.1. To avoid the traction motor failure on line and to avoid the consequential damages of stator and valve set due to rotors bar crack, it has been decided to standardize a method for in situ detection of crack rotor bars and stator defect i.e. without removing the traction motor from locomotive .

3.2. Electric Loco Shed ,Ajni started measurement of inductance in between phases at SR terminals, i.e. inductance between UV,VW and UW (hereafter termed as L_{UV},L_{VW} and L_{UW} respectively). The data of nos. of cases has been studied by RDSO in detail. Based on the field data , a threshold of difference of these three values of inductances [i.e. (L_{UV} ~ L_{VW}), (L_{VW} ~ L_{UW}) and(L_{UW} ~ L_{UV})] has been established . It has been observed that a small variation of 0.005 mH between readings of inductance when measured at SR terminal indicate a problem in either stator or rotor.

3.3. By adopting this method, a number of premature failures have been detected by the shed.

3.4. The measurement of Inductance is to be done whenever any of the following messages is logged in DDS.

3.4.1. ASC1/2: 0081 PS Fault storage CGP
3.4.2. SLG1/2: 0022 Motor temperature above limit.
3.4.3. SLG1/2 : 0024 Temperature difference motor bogie > limit

4. METHOD OF INDUCTANCE MEASUREMENT AND ANALYSIS:

4.1. Measure the inductance L_{UV},L_{VW} and L_{UW} respectively at SR terminals with digital LCR meter .

4.2. Compare the values of (L_{UV} ~ L_{VW}), (L_{VW} ~ L_{UW}) & (L_{UW} ~ L_{UV}) and if the is variation is less than 0.005 milli Henry (5 micro Henry), the locomotive can be allowed in service.
4.3. If this variation is equal or greater than 0.005 milli Henry (5 micro Henry) , it is an indicative of a problem in either stators or rotors of any of the three traction motors.
4.4. Open the traction motor connections from junction box.
4.5. In order to weed out defective traction motor (TM) measure the Inductance of in between phases of individual TM , hereafter , called L_{TUV}, L_{TVW} and L_{TUW} terminals.
4.6. Compare the values of (L_{TUV} ~ L_{TVW}), (L_{TVW} ~ L_{TUW}) & (L_{TUW} ~ L_{TUV}) and if the variation is equal or less than 0.015 milli Henry(15 micro Henry), allow the traction motor in service and repeat measurement in next schedule ,if there is once again fault messages as given in Para 3.4.

4.7. If this variation is greater than 0.015 milli Henry (15 micro Henry), it indicates that there is problem either in stator or rotor.

4.8. Dismantle this traction motor and carefully examine both rotor and stator visually for their defects.

5. M & P REQUIRED

Four and half digit LCR meter .

6. SURPLUS MATERIAL

Nil

7. APPLICATION TO:

Traction motor type 6FRA 6068 used on WAG9/WAP7class of locomotives.

8. **PERIODICITY FOR MEASUREMENT.**
During AOH or whenever there is any of three fault messages as given in para 3.4.

9. **AGENCY OF IMPLEMENTATION:**

9.1. Electric loco sheds homing WAP7/WAG9 locomotives and POH shops carrying the schedules.
9.2. Workshops/Sheds carrying out POH/repair of these traction motors.
9.3. It can also be used for any other 3-phase motors by establishing the variations in inductances of three windings of motors based through experience.

Encl: NIL

(GANESH)
for Director General/Elect.