Government of India
Ministry of Railways
Research Designs & Standards Organisation

No.EL/3.2.70/J-3

Manaknagar, Lucknow-226011
Date: Dec., 1983

SPECIAL MAINTENANCE INSTRUCTION
No. RDSO/EL-RS/SMI/111.

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Title: Special instruction regarding change of Two speed winding of exhauster motor (MPV) from 6 pole and 4 pole, enamelled wire winding, to Single speed 6 pole, double glass covered enamelled copper wire winding.

1.0 Object

The original design of exhauster motor is for two speeds (1000 RPM & 1500 RPM). User Railways have been rewinding exhauster motors to single speed (1000 RPM) in Loco Sheds & Shops. When motors are rewound to single speed, it releases some space in slot which can possibly be used to improve reliability of these motors. It is possible to use higher cross-section of copper conductor with enamelled double glass covering to achieve some benefit of the available space in its slots.

2.0 References:

(i) Record note of discussion and instruction in Kancharapara Rly. Workshops on 19.7.82; (Part II);

(ii) Instruction on:

"Rewinding of Exhauster motors in single speed (1000 RPM syn. speed) with double glass covered enamelled winding wires", vide EL/3.2.70 dt. 3.8.82.

3.0 Instructions:

(A) Rewind all driving motors for exhausters, as below into single speed, 6 pole winding with double glass enamelled copper conductor of 16 SWG:

(i.0) Motor Type: SOD 14. 46.F2, BBL make, driving VL-30 Type, SIM exhausters.

(i.a) Winding Data: Conductor 16 SWG, 20 turns/coil; Coil group/phase=6; No. of parallel conductor/coil=3; 6 pole winding single layer mesh.

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(ii.0) Motor Type: IRAD-164-1, Siemens make, driving 250RE type Northey Exhauster.

(ii.a) Winding data: Conductor size 16 s.w.g., 7 turns per coil; coil group/phase=6, coils per coil group=3, number of parallel conductors per coil or per winding = 4, Type of winding double layer concentric.

(iii) No. of parallel conductors and size of conductors have been changed. As far as other data are concerned for the 6 pole winding, these are unchanged.

(B) Conduct the test as follows:

(i) Connect the two types of motors (a) wound with enamel covered and (b) wound with double glass covered enamelled copper conductor to respective exhausters. The exhausters shall be provided with half inch leak hole and suitable for creating a vacuum of at least 560 m.m. W.G.

(ii) Measure the initial resistance of the winding (cold) by V/I method. The voltage applied to the winding may be suitably selected so as to ensure that current does not exceed 50% of the motor, continuous current rating.

(iii) Record ambient temperature at the time of measuring cold resistance (t_1°C).

(iv) Run the motor at 380V balanced for 3½ hrs, and record voltage and current. At the end of 3½ hrs run, reduce the motor voltage to 290V and run the motor for one hour. At the end of one hour, stop the motor and record the hot resistance by V/I method, of the motor. Record ambient temp. at the time of measuring hot resistance (t_3°C). This measurement should preferably be made within 30 seconds of the motor being disconnected from the supply. The method of calculation of temperature rise for motor windings is given as below:-

$$t_2 = \frac{R_{hot}}{R_{cold}} (234.5 + t_1) - 234.5 ;$$

temp. rise of hot winding = $t_2 - t_3$;

Where; t_2 = Absolute temp. attained by the winding,

R_{hot} = Hot resistance of the winding measured after 4½ hrs. of heat run test (after one hr. heat run at 290V) at t_3°C.

R_{cold} = Cold resistance of winding at t_1°C.

t_1 = Amb. temp. while measuring cold resistance of winding.

4.0 Type of locos requiring this modification:

WAG4, WAG4B, WCG2, WAM4, WCAM1, WAP1 and other locos using these motors-driven exhausters.

5.0 Agency to implement:

Rewinding shops and Sheds having rewinding facilities.

6.0 Periodicity:-

Whenever failures on motors wound with enamelled winding wires.

7.0 Instruction Drawing:-

Nil.

8.0 Distribution:-

As per mailing list.

Encl: Mailing list.

(N V Chandurkar)
for Director General (Elec)