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No. EL/3.2.182

Date: 12.06.2017

Chief Electrical Engineers,

1. Central Railway, Mumbai CST-400001
2. Eastern Railway, Fairlie Place, Kolkata- 700 001
3. East Coast Railway, Chandrashekharapur, Bhubaneswar-751 016
4. Northern Railway, Baroda House, New Delhi-110 001
5. North Eastern Railway, Gorakhpur-273 001
6. North Central Railway, Hasting Road, Allahabad-211 001
7. Southern Railway, Park Town, Chennai-600 003
8. North East Frontier Railway, Maligaon, Guwahati-781 011
9. North Western Railway, Jaipur- 302 006
10. South Central Railway, Rail Nilayam, Secunderabad-500 071
11. South Eastern Railway, Garden Reach, Kolkata-700 043
12. South East Central Railway, Bilaspur-495004
13. South Western Railway, Hubli (Karnataka)
14. Western Railway, Churchgate, Mumbai-400 020
15. West Central Railway, Jabalpur-482001
16. East Central Railway, Hazipur-844101 (Bihar)
17. Chittaranjan Locomotive Works, Chittaranjan- 713 331

Modification Sheet No. RDSO/2017/EL/MS/ 0460 (Rev '0') Dated 12.06.2017

1. **Title:**
Modification in drawing of bearing cap NDE to achieve adequate lateral thrust in Traction motor (TM) assembly of 6FRA6068 TM in WAG9/ WAP7 class of locomotives.
2. **Object:**
To modify drawing of bearing cap NDE to achieve adequate lateral thrust in TM assembly of 6FRA6068 TM in WAG9/ WAP7 class of locomotives.
3. **Existing arrangement with cross references of respective design document :**
3.1. Background:
3.1.1. ELS/GZB had reported 33 cases of non-drive end (NDE) bearing failures due to rotation of bearing in the housing of end shield in 2015-16 & 2016-17 (Up to Dec.)

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3.1.2. ELS/LGD had informed that it was facing similar problem. ELS/LGD had started ensuring the availability of lateral thrust by ensuring the required clearance between outer face of end shield and inner face of bearing cap NDE, and since 2012 there are no NDE bearing failures of 6FRA-6068 TMs in LGD Shed.

3.1.3. RDSO had examined the issue and it is observed that as per drawings, to ensure lateral thrust on outer racer of NDE bearing, there must be a nominal clearance of 0.5 mm between outer face of end shield and inner face of bearing cap NDE

3.1.4. Calculations as shown below had been carried out to consider the effect of tolerances of various components on this clearance:

SN	Description	Drawing Number	Nominal Value in mm	Max limit in mm	Min. Limit in mm
A	Depth of End Frame Housing bearing seating	Drg. No. 0TWD.096.003 Alt.9	61+0/-0.2	61.00	60.80
B	Inner Labyrinth NDE on End Frame	Drg.4TWD.096.031 Alt.4	5.0±0.05	5.05	4.95
C	Step of NDE Bearing Cap pressing the Outer racer	Drg. No. 4TWD.096.032 Alt. 6	9.5*	9.70	9.30
D	Width of NDE outer bearing racer	NJ 320 M/s FAG.	47+0/-0.2	47.00	46.80

*The tolerance for Dim 9.5 is taken from IS:2102 (Part-1):1993 as 9.5 ± 0.2 for medium tolerance class.

The Range of Clearance between outer face of end shield and inner face of bearing cap NDE = (B+C+D)-A

Min. Range of Clearance = $(4.95+9.30+46.80)-61.00 = 0.05$ mm

Max. Range of Clearance = $(5.05+9.70+47)-60.80 = 0.95$ mm

3.1.5. It is observed that, as per existing drawings, clearance between outer face of end shield and inner face of bearing cap NDE is 0.5 ± 0.45 mm. When the clearance is on lower side (or practically zero), adequate lateral thrust on outer racer of NDE bearing cannot be ensured.

3.1.6. To ensure the lateral thrust, positive clearance between outer face of end shield and inner face of bearing cap NDE needs to be ensured. For achieving this, dimension of step of bearing cap NDE is changed from 9.5 mm to $9.5 +0.2/-0$ mm in drawing No. 3TWD.096.032 Alt. 7.

3.1.7. With this modification, clearance between outer face of end shield and inner face of bearing cap NDE will change from existing 0.5 ± 0.45 mm to $0.5 +0.45/-0.25$ mm.

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3.2.Existing drawing:

Bearing Cap NDE as per drawing No. 3TWD.096.032 Alt. 6.

4. Modified Instructions :-

- 4.1. Description of kit of labyrinths for TM type 6FRA6068 shall be modified to include modified drawing of Bearing Cap NDE i.e. Drawing Number 3TWD.096.032 Alt. 7 for future procurement.
- 4.2. During the new assembly of Traction motors, Bearing Cap NDE as per Drawing No. 3TWD.096.032 Alt'7' to be provided.
- 4.3. To weed out the existing Traction Motors in service with inadequate lateral thrust, the clearance between outer face of end shield and inner face of bearing cap NDE shall be checked once during scheduled/unscheduled visits of locomotives. If the clearance is less than 0.25 mm, then the existing bearing cap NDE will be removed and bearing cap NDE as per drawing no. 3TWD.096.032 Alt. 7 shall be provided. Condition of Neoprene sealing ring provided on bearing cap NDE shall also be checked and replaced if required.
- 4.4. When the bearing cap NDE is replaced without complete dismantling of Traction motor, due care and precautions must be taken by the shed to ensure proper fitment, tightness of bolts etc..
- 4.5. After provision of bearing cap NDE as per drawing no. 3TWD.096.032 Alt. 7, range of clearance between outer face of end shield and inner face of bearing cap NDE will be from 0.25 to 0.95 mm. This clearance needs to be ensured and recorded during assembly of traction motors.

5. Application to class of Locomotives:

WAP7/WAG9/WAG9H class of locomotives.

6. Material Required:

Bearing Cap NDE as per drawing No. 3TWD.096.032 Alt '7'.

7. Material Rendered Surplus:

Bearing Cap NDE as per drawing No. 3TWD.096.032 Alt '6'

8. References:

- 8.1 Sr.DEE/TRS/GZB letter no. 230-Elect/TRS/GZB/P-5/T-8 dated 28.01.2017
- 8.2 Sr. DEE/TRS/LGD letter no. C/E.221/ELS/LGD/Tech/15B dated 27.02.2017
- 8.3 RDSO's letter no. EL/3.2.182 dated 17.04.2017
- 8.4 CLW's letter no. CLW/TM/18059 dated 10.05.2017
- 8.5 RDSO's letter no. EL/3.2.182 dated 15.05.2017.
- 8.6 CLW's letter no. CLW/TM/18059 dated 05.06.2017

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9. **Modification Drawing:**

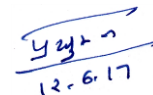
CLW Drawing No. 3TWD.096.032 Alt '7'.

10. **Agency of Implementation:-**

CLW, Workshops carrying out POH of Electric locomotives, all Electric Loco Sheds and TM manufacturers.

Encl: Above modified drawing

Encl: CLW Drawing No. 3TWD.096.032 Alt '7'.

Handwritten signature in blue ink, appearing to read 'P. K. Saraswat' with a date '12.6.17' written below it.

(P. K. Saraswat)
for Director General/Electrical

