Government of India

Ministry of Railways
Research, Designs & Standards Organisation
Manak Nagar, Lucknow - 226 011

No. EL/3.2.172 Dated 31.03.1994.

Special Maintenance instructions No.RDSO/ELRS/SMI/160

1. **Title :** Measurement of backlash of traction gears.

2. **Application :** All AC Electric Locomotives fitted with Traction Motor type TAO-659 and HS-1050Er/HS 15250A.

3. **Objective :**

The measurement of backlash of traction gears is important to ensure correct gear and pinion centre distance as well as profile of gear and pinion teeth. This measurement will ensure proper fitment and thus the life of gear and pinion. No national/international standard laying down the procedure for measurement of backlash of traction gear are available although BS-235 of 1987 and JB-B1763 indicate the limits for backlash.

In this SMI a practical procedure to measure the gear backlash is detailed for proper maintenance practice.

4. **Procedure :-**

4.1 Run out the motorised bogie from the loco.

4.2 Drain out the gear case compound and remove gear case assembly

4.3 Remove the Traction Motor and axle wheel unit from bogie.

4.4 Assemble the axle wheel unit with the motor on a suitable stand with axle up and motor nose down. The stand will facilitate convenience in measurement.

4.5 Clean the teeth of gear and pinion by any suitable cleaning agent.

4.6 The measurement of backlash can be done by two methods.

4.6.1 **By using filler guage :**

4.6.1.1 Align the gear and pinion teeth on the axis, connecting the centres of gear and pinion.

4.6.1.2 Measure the clearance between the teeth and groove on both sides of the teeth. Add these two measurements to find the backlash.

4.6.2 By using dial gauge :

4.6.2.1 Fix the magnetic base of dial gauge at the suitable location on pinion and shield of Traction Motor with the pointer of dial gauge touching the pinion tooth on its profile vertically.

4.6.2.2 Rotate the pinion with the help of a crew bar till its teeth touch one side of the gear.

4.6.2.3 Set the dial gauge to '8'

4.6.2.4 Now rotate the pinion in the other direction with the minimum force required (such that gear does not move) till it touches other side of the gear.

4.6.2.5 Measure the movement of the dial gauge which is backlash.

4.7 The same set of motor and wheel set shall be maintained.

4.8 The measurement of backlash can also be made with Traction Motor assembled on loco. For such measurement, loco should be placed on a pit and gear case oil drained out by removing bottom gear case, 3-4 teeth of gear and pinion each visible from bottom to be cleaned with any suitable clearing agent.

4.8.1 The measurement of the backlash in this case would be convenient with dial guage.

4.8.2 Measure backlash as per method explained in 4.6.2.1 to 4.6.2.5

5. Recommended values of the backlash for the new motor type TAO 659 & HS15250 A are 0.3 mm (dia) and 0.7 mm (max).

5.1 However, in HS15250A Traction Motors maximum and minimum machining tolerances between the gear centres (+0.5 mm and + 0.0 mm) and hence max. backlash of 1.2 mm be considered acceptable.

5.2 The backlash would also increase with the wear of gear or pinion. The wear limits K value are indicated in annexure-1 of maintenance instruction No.MP-MI-154/93 (Instruction for checking Traction Motors gears of electric locomotives). Hence if the backlash in service is found more, the K value of the gear/pinion is to be checked.

6. **Instrument required :** Magnetic dial guage with least count of 0.01mm.

5. **<u>Schedule of Implementation :</u>**

During Ic for assembled bogies & during assembly of motor and wheel set on bogie.

8. **<u>Agency of Implementation :</u>**

- All Electric Loco Sheds/POH shops
- CLW/Chittaranjan

9. **<u>Distribution :</u>** As per enclosed list.

(G.R. Agarwal)
for Director General (Elect)