ESR 0242

INSTALLATION OF TRACTION MOTORS ONTO WHEELSETS

Version 1.0
Issued June 2010

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Document control

<table>
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<tr>
<th>Revision</th>
<th>Date</th>
<th>Summary of change</th>
</tr>
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<tbody>
<tr>
<td>(RSS 0242) 1.0</td>
<td>August 2007</td>
<td>Based on TRS 1934 &amp; TRS 1939</td>
</tr>
<tr>
<td>(ESR 0242) 1.0</td>
<td>June 2010</td>
<td>Reformatted &amp; renumbered</td>
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Summary of changes from previous version

<table>
<thead>
<tr>
<th>Summary of change</th>
<th>Section</th>
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<td>NOTE – If the final document is small enough for the ‘Contents’ and ‘Document control’ to fit on one page remove the page break between the existing pages 2 and 3. HOWEVER if the ‘Document control’ page carries over to a second page separate pages must be used for ‘Contents’ and ‘Document control’</td>
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</tbody>
</table>
Contents

1 Scope..................................................................................................................................................4
2 Pre assembly .....................................................................................................................................4
3 Suspension bearings ........................................................................................................................4
  3.1 Qualification of reuse bearings .................................................................................................4
4 Pre-installation of wicks ...................................................................................................................4
5 Suspension bearing bore ...................................................................................................................5
6 Final assembly...................................................................................................................................5
7 Lateral clearance ...............................................................................................................................5
8 Diametrical clearance ........................................................................................................................6
9 Backlash.............................................................................................................................................6
10 Meshing inspection............................................................................................................................6
11 Fitting of wicks and oil.....................................................................................................................6
12 Fitting gearcase and seals .................................................................................................................6
  12.1 Felt seals ...................................................................................................................................6
  12.2 Torque values ...........................................................................................................................7
13 Bench testing .....................................................................................................................................7
  13.1 Rotation .....................................................................................................................................7
  13.2 Bearing temperature measurement ..........................................................................................7
  13.3 Earth brush inspection ..............................................................................................................8
  13.4 Wick inspection .........................................................................................................................8
  13.5 Oil ..............................................................................................................................................8
14 Lubricants and sealants ...................................................................................................................8
  14.1 Lubricants ...................................................................................................................................8
  14.2 Adhesive ....................................................................................................................................8
  14.3 References ................................................................................................................................9
15 Referenced standards.......................................................................................................................9
  15.1 RailCorp standards ...................................................................................................................9
  15.2 Drawings ................................................................................................................................9
  15.3 Australian standards ................................................................................................................9
  15.4 Maintenance instructions ...........................................................................................................9
1 Scope
This standard details the requirements for the installation of traction motors onto wheelsets.

2 Pre assembly
The suspension journal of the axle shall be examined for obvious damage and rust.

Clean and examine bearing tunnel of the traction motor, for obvious damage. Ensure key is in position and check for weld splatter.

The only acceptable method for final surface restoration in all cases is by burnished rolling. If axle is rusty or slightly scored do not attempt to restore the surface using an abrasive.

3 Suspension bearings
For assembly of motors at overhaul of bogies only new suspension bearings shall be used.

3.1 Qualification of reuse bearings
Note:- Do not use bearings in which:

- The wear pattern extends beyond the window.
- There is evidence of babbitt shelling, overheating, or fatigue cracks.
- The flange thickness do not comply with those indicated in Table 1.

<table>
<thead>
<tr>
<th>Traction motor type</th>
<th>Flange thickness mm</th>
<th>Available gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>253,254,761,731</td>
<td>18.3</td>
<td>3176279</td>
</tr>
</tbody>
</table>

Renew glazed or damaged felts on bearings.

If it is necessary to reuse bearings always ensure the best available bearing is fitted on the pinion side of the motor as it is the most heavily loaded, ensuring there is no groove worn in the traction motor felt sealing face.

4 Pre-installation of wicks
With the bearing and bearing cap fitted, the wick should be installed using 2 bolts fitted diagonally and tightened, but not required to be torqued up, check travel of wick to ensure:

- No binding within window.
- At least 4 mm wick protrusion past the bearing surface to ensure axle contact.

When wick is fully compressed (by hand) the wick face should be at least 2 mm below the bearing surface.

Mark wicks so that they can be finally installed in the same cap.
5  **Suspension bearing bore**

Check suspension bearing bore assembly in accordance with ESR 0544.

6  **Final assembly**

Undo traction motor suspension bolts to allow bearings and caps to be removed.

Place window half bearings vertically on a clean dry surface adjacent to applicable journal.

Fit temporary bearings retainers to frame.

Oil bearings surfaces with clean suspension journal bearing oil.

Lift traction motor with solid half bearings in place and position on axle ensuring pinion meshes with gearwheel on axle.

Remove temporary bearing retainers.

Place window half bearing on axle and chock in place with wooden wedges and fit cap, install dust shield where applicable - fit caps.

Fit bearing cap bolts and hardened flat washers - use loctite-262. Torque to specifications as shown in Table 2.

Fit locking wire.

<table>
<thead>
<tr>
<th>Traction motor type</th>
<th>Packing</th>
<th>Cap bolt torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>253, 254, 761</td>
<td>no shim required</td>
<td>540 – 610 N.m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(400-450 ft.lbs)</td>
</tr>
</tbody>
</table>

**Table 2**

7  **Lateral clearance**

Lever traction motor to gear side and check lateral clearance maximum values shown in Table 3.

<table>
<thead>
<tr>
<th>Traction motor type</th>
<th>Min lateral clearance NEW</th>
<th>Max lateral clearance USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>253, 254, 752, 731,761</td>
<td>Total of 1.6 mm</td>
<td>Total of  8 mm</td>
</tr>
</tbody>
</table>

**Table 3**
8 Diametrical clearance
Check bearing diametrical lift clearance at each end of the motor with dial indicator. Results should not be reduced by more than 0.25 mm over diametrical checks carried out as indicated in ESR 0544.

9 Backlash
Check for pinion to gear backlash using dial indicator. Some backlash must be present and there is no upper limit.

10 Meshing inspection.
Ensure that the teeth on the gear and pinion mesh correctly. Check that any steps on the teeth, if present do not interfere with the other teeth.

11 Fitting of wicks and oil
Wicks shall be fitted and suspension bearing oil added in accordance with ESR 0245.

12 Fitting gearcase and seals

12.1 Felt seals
Fit rubber axle seal to non-gear side bearing assembly and secure with band. Ensure sealing lip is in contact with axle.

Fit axle dust shield and secure with set screws and spring washers, where applicable.
Liberally coat or soak felt seals with oil and fit to gearcase (if necessary cut ends of seal to give 4 mm overlap top and bottom).

Seal perimeter of dust shield with RTV sealant.

Apply correct quantity of traction motor gear lubricant into bottom half of gearcase in accordance with ESR 0246.

Fit gearcase ensuring seals are correctly fitted, i.e. sealing lip in contact with axle, seal labyrinth with silicon sealant. Torque bolts and set screws using Loctite-222 to values shown in Table 5.

### 12.2 Torque values

<table>
<thead>
<tr>
<th>Traction motor type</th>
<th>Gearcase bolts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Joint bolts</td>
</tr>
<tr>
<td>253, 254, 761, 731</td>
<td>400-450 ft.lbs</td>
</tr>
<tr>
<td></td>
<td>540-610Nm</td>
</tr>
</tbody>
</table>

Table 5

### 13 Bench testing

After the traction motors have been installed onto wheelsets the traction motors must be tested as detailed below. This test allows for the initial bedding in of the suspension bearings and checking for problems before field service.

#### 13.1 Rotation

Connect the traction motor leads to a suitable rated power supply. Increase the voltage until the armature rotates.

#### 13.2 Bearing temperature measurement

The wheelset assembly shall be run for 2 hours at 300 RPM in the clockwise direction then 2 hours counter-clockwise.

Throughout the test check that there is no indication of abnormal heat in the bearings.
Bearings to be checked include suspension bearings, axlebox bearings and traction motor bearings. Measurements shall be taken in an area close to the outer race on the outside of the housing or frame. Temperature shall not exceed 35°C above ambient.

Check for any abnormal bearing noise, gear noise or vibration during rotation.

Vibration may be measured in accordance with AS 2625.

13.3 Earth brush inspection
Contact condition of the earth brush surface to the axle to be more than 60%.

13.4 Wick inspection
Remove and inspect the suspension bearing wick in accordance with ESR 0245.

If any wicks have abnormal contaminants the cause of this should be identified and corrected.

13.5 Oil
Drain and replenish oil in accordance with ESR 0245.

14 Lubricants and sealants

14.1 Lubricants

<table>
<thead>
<tr>
<th>Item</th>
<th>Sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust covers</td>
<td>Oil resistant silicon RTV 732 white</td>
</tr>
<tr>
<td>Gear case</td>
<td>Oil resistant silicon RTV 732 white</td>
</tr>
<tr>
<td>Seal between tunnel and motor</td>
<td>Compound silicon rubber black</td>
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</tbody>
</table>

14.2 Adhesive

<table>
<thead>
<tr>
<th>Item</th>
<th>Adhesive</th>
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<tbody>
<tr>
<td>Keep bolts</td>
<td>Loctite 262</td>
</tr>
<tr>
<td>Gear case bolts</td>
<td>Loctite 222</td>
</tr>
<tr>
<td>Pinion seal</td>
<td>Contact cement</td>
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<tr>
<td>Rubber seals</td>
<td>Loctite 495</td>
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14.3 References

<table>
<thead>
<tr>
<th>Publication</th>
<th>Motor Type</th>
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<tbody>
<tr>
<td>GEI 85256</td>
<td>GE 731</td>
</tr>
<tr>
<td>MI-31102</td>
<td>GE 761</td>
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</tbody>
</table>

15 Referenced standards

15.1 RailCorp standards
- ESR 0245 Inspection & installation of suspension bearing wick and oil.
- ESR 0246 Traction motor gearcase lubricant levels
- ESR 0544 Overhaul of traction motor suspension bearing tunnel

15.2 Drawings
- AEG 3176279 Axle bearing CE & PE 253 railway motor

15.3 Australian standards
- AS 2625 Rotating & reciprocating machinery – mechanical vibration

15.4 Maintenance instructions
- MI 31102
- GEI 85256