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Sub: Technical Circular No. RDSO/2011/EL/TC0107 on Special Checks/Precautions to be taken during assembly of Wheel Set with Motor Suspension Tube of TM3701BY/BX (Kolkata Metro Project) for Trouble Free Service

Ref : (1) Director/PE & Metro's note no. EL/MRS/SPEC/1.1 , dt.10.02.2011
(2) This office note even no. dt. 04.03.2011

A Technical Circular no. RDSO/2011/TC/EL/0107 , on **Special Checks/Precautions to be taken during assembly of Wheel Set with Motor Suspension Tube of TM3701BY/BX (Kolkata Metro Project) for Trouble Free Service** has been prepared in consultation with BHEL, Bhopal and Bearing Manufacturers , which has been approved by the competent authority.

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ICF may please be asked to follow the same for manufacturing of wheel sets with MSUs .

DSE/TM

DSE/PE & Metro

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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

TECHNICAL CIRCULAR
ON
SPECIAL CHECKS/PRECAUTIONS TO BE TAKEN DURING ASSEMBLY OF WHEEL SET WITH MOTOR SUSPENSION TUBE OF TM3701BY/BX (KOLKATA METRO PROJECT) FOR TROUBLE FREE SERVICE

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Research, Designs and Standards Organisation
Manak Nagar, Lucknow-226011

SPECIAL CHECKS/PRECAUTIONS TO BE TAKEN DURING ASSEMBLY OF WHEEL SET WITH MOTOR SUSPENSION TUBE OF TM3701BY/BX (KOLKATA METRO PROJECT) FOR TROUBLE FREE SERVICE

1. Scope:

Assembly of MSU with wheel set is critical in nature and needs precise assembly components besides strict process control and observing critical clearances. Not observing any of these aspects while assembly of MSU with wheel sets has led seizure of wheel sets and can create unsafe train operation. Maintenance manuals on various types of rolling stocks have already given detail procedure of assembly and dis-assembly of wheel sets. In spite of having such detail procedures, there have been quality related issues in manufacturing wheel sets with MSUs. This technical circular dwells upon special checks/precautions including DOs and DON'Ts to be observed during assembly of wheel sets with MSU.

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2. Axle Bearing and Bearing Assembly Components Inspection

2.1. Clean thoroughly the suspension tube, making sure that all holes are free from dirt and sward and tighten the bolt to the gear wheel.

2.2. Clean thoroughly end covers, abutment piece, adjustment washer and bearing housing.

2.3. Before proceeding with the bearing installation, all the critical dimensions of axles should be checked under uniform conditions of temperature to make sure that the bearings can be applied without difficulty. All the dimensions of axles shall be as per drawings/specifications (BHEL Drg no. 04391531106 Rev'0' for MSU).

2.4. Axles should be checked on the bearing seat diameters, shoulder lengths and radii with proper gauges to determine that finished axle dimensions are within prescribed tolerances.

2.5. Micrometers used to measure the bearing seat diameters of axles should be calibrated from NABL accredited labs.

2.6. Micrometers and axle should be at room temperature. Axle diameters should not be checked while the axles are heated due to machining.

2.7. Axle bearing seat diameters, shoulders, and radii should have a smooth machined and rolled, or ground finish, and must be free from sharp corners, burrs, nicks, tool marks, scratches, or corrosion.

2.8. Axle bearing seat diameters should be concentric with the wheel seat diameters. This must be checked preferably on 3-D CMM and in case of non-availability of 3-D CMM , the same can be done on CNC lathe.

2.9. Axle journals should be protected if there is a possibility of damage or deformation resulting from mis-handling or uneven pressures being applied to the axle ends. Proper handling of axle during transportation is essential to avoid its bending.

2.10. Axles that have become magnetized must be demagnetized before bearings are mounted.

2.11. Check bearing seating diameters of the suspension tube and Bearing Housing labyrinths bores, etc. Ensure that they are within drawing dimensions (BHEL Drg no. 04391531106 Rev'0' for MSU).

2.12. Check the bore of abutment piece. Check all the machined surfaces of End Covers, Bearing Housing and Abutment pieces are free from any burr.

2.13. Check End Cover GWE seating surface of the suspension tube. Keep End Cover GWE over suspension tube at its position before assembly. Ensure that it is seating freely.

3. <u>Instruction/Checks during the assembly of Motor Suspension Unit Bearings</u>

3.1. <u>Do's</u>

3.1.1. Electric ovens or electrically heated oil baths, with thermostatic control, can be used for heating of bearing components.

3.1.2. Use drivers and sleeves for proper assembly of bearing components so that damage to these can be prevented.

3.1.3. Complete wheel sets must be protected against the entry of water or foreign material into the bearing housing.
For short term storage, the wheel sets should be kept in a covered building .Machined surfaces should be coated with suitable rust preventive oil.
If the wheel sets are stored outside, the tube should be turned so that the open portion is on the lower sided and wedged in this position. The assembly shall be covered with waterproof sheet for further protection . The machined surfaces should be coated with suitable rust preventive oil. **The same protection is required for transporting the wheel from one station to another.**

3.1.4. After assembly listen for any abnormal noise from the MSU on rotation.

3.1.5. Check the bearing for abnormally high temperature, by touching the outside of bearing housing of suspension tube.

3.1.6. Ensure that no bolts are loose and all bolts are tightened to specified torque.

3.1.7. Check the M30 bolts, which connect the tube with the magnet frame for proper tightening with torque wrench. If found loose tighten it to specified torque.(Refer maintenance manual Kolkata Metro issued by BHEL, Bhopal).

3.1.8. Check for proper sealant application between the joint of magnet frame and the tube. If the sealant is missing or insufficient, apply sealant (Kt-45-RTV or equivalent).

3.1.9. Before disking, checks axial endplay of the MSU should be within 0.05mm to 0.25mm.To maintain this use step size adjustment washers.

3.1.10. During disking, take out the adjustment washer, ensure that disc presses abutment piece and it makes positive contact with abutment piece.

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3.1.11. Now measure width of gap at three positions between bearing housing and the MSU tube. Taking an average of the three measurements and the adjustment washer of thickness of measured value shall be provided . The thickness of adjustment washer shall be such that axial end play shall be from 0.05mm to 0.25mm.

3.1.12. Fit two halves of adjustment washer refit cover bolts and once again tighten to clamp the cup holder, the split adjustment washer, cover & the tube together.

3.1.13. It is possible that, during the previous operations, the road wheel end cone assembly may have been moved out of position and thereby disturbed the lateral clearance in the bearings. This can be checked by displacing the tube laterally in both directions. The lateral movement should be checked by use of a dial indicator. The thickness of the adjustment washer should be modified where necessary to maintain lateral clearance within specified limits (axial endplay of 0.05mm to 0.25mm. The parallelism of the correct adjustment washer should be within 0.04mm.)

3.1.14. When press fitting gear side wheel disc, making sure the disc hub does not touch the gear hub. Press fitting gear side wheel disc after roadside wheel disc has been pressed in position will help to ensure correct length to match the rail gauge.

3.1.15. Check for sufficient grease by rocking the MSU tube with force . If the MSU rocks for more than four times, this indicate that the MSU has either less grease or the radial clearance is less in the labyrinth bore of suspension tube.

3.1.16. Grease nipple may be fitted if standard push-on grease connectors are used for lubrication but it is easier for the initial filling to be by an adaptor screwed into the tapped holes with the grease nipples fitted afterwards.

3.1.17. Grease must be stored and handled as per RDSO's TC No. 104 on storage & handling of lubricant/greases used in Electric Locomotives / MEMUS/EMUS

3.2. Don'ts

3.2.1. Don't forget to tighten all loose bolts by torque wrench at correct value.

3.2.2. Don't weld adjustment washers as this will cause failure of the bearings due to electric arcing from welding and also may cause loss of lateral play.

3.2.3. Don't forget to apply sealant (KE-45-RTV or its equivalent) in the slit of the two halves of the adjustment washers on the OD.

3.2.4. Don't forget to apply only dry air through pneumatic pump so that water does not enter the bearings along with the grease.

3.2.5. Don't forget to apply sealant (KE-45-RTV or its equivalent) in the joints between MSU and motor to avoid water and dirt entry into the bearings. Apply sealant according to maintenance manual Kolkata Metro issued by BHEL, Bhopal.

3.2.6. Don't forget to check that the hub of roadside wheel has definitely touched the abutment piece, during disking.

3.2.7. Don't allow the gear side wheel hub to touch gear hub during disking.

3.2.8. Don't forget to check and ensure specified lateral play of each MSU.

3.2.9. Don't forget to rock the MSU to ascertain noise, lack of grease, and excess/less lateral play/less radial clearance of labyrinth bore .