



भारत सरकार - रेल मंत्रालय
अनुसंधान अभियंता और मानक संगठन
लखनऊ - 226 011
EPBX (0522) 2451200
Fax : 0522 - 2452581

Government of India-Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226 011
DID (0522) 2450115
DID (0522) 2465310



No. EL/1.3.10/3

Date: 24.04.2019

<p>Principal Chief Electrical Engineer,</p> <ol style="list-style-type: none"> Central Railway, Mumbai, CST-400 001. East Central Railway, Hazipur-844 101. East Coast Railway, Chandrashekharpur, Bhubaneshwar-751 017. Eastern Railway, Fairlie Place, Calcutta-700 001. North Central Railway, Block-A, Subedarganj, Allahabad-211 033. Northern Railway, Baroda House, New Delhi-110 001. North Western Railway, Jaipur- 302 006 North Eastern Railway, Gorakhpur-273001 North East Frontier Railway, Maligaon, Guwahati-781011 South Central Railway, Secunderabad-500 071. South East Central Railway, Bilaspur-495 004. South Eastern Railway, Garden Reach, Kolkata-700 043. Southern Railway, Park Town, Chennai-600 003. South Western Railway, Hubli- 580020 West Central Railway, Jabalpur-482 001. Western Railway, Churchgate, Mumbai-400 020 Chittaranjan Locomotive Works, Chittaranjan-713 331 Diesel Locomotive Works, Varanasi-221 004. 	<p>प्रमुख विद्युत् अभियंता</p> <ol style="list-style-type: none"> मध्य रेलवे, मुम्बई सीएसटी -400 001 पूर्व मध्य रेलवे, हाजीपुर-844 101 पूर्व तटीय रेलवे, चन्द्रशेखरपुर, भुवनेश्वर-751 017 पूर्व रेलवे, फेयर्ली प्लेस, कोलकाता-700 001 उत्तर मध्य रेलवे, ब्लॉक ए-2, सुबेदारगंज इलाहाबाद - 211 033 उत्तर रेलवे, बड़ौदा हाऊस, नई दिल्ली-110 001 उत्तर पश्चिम रेलवे जयपुर- 302006 उत्तर पूर्व रेलवे गोरखपुर- 273001 उत्तर पूर्व फ्रेन्टीयर रेलवे मालीगॉव गुवाहाटी-781011 दक्षिण मध्य रेलवे, रेल निलायम, सिकंदराबाद-500 371 दक्षिण पूर्व मध्य रेलवे, बिलासपुर - 495 004 दक्षिण पूर्व रेलवे, गार्डेनरीच, कोलकाता-700 043 दक्षिण रेलवे, पार्क टाउन, चेन्नई-600 003 दक्षिण पश्चिम रेलवे हुबली-580020 पश्चिम मध्य रेलवे, जबलपुर-482 001 पश्चिम रेलवे, चर्चगेट, मुम्बई- 400 020 चित्तरंजन रेल इंजन कारखाना, चित्तरंजन - 713 331 डीजल रेल इंजन कारखाना, वाराणसी-221004
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TECHNICAL CIRCULAR No. RDSO/2019/EL/TC/0151 (Rev '0') dated 24.04.2019

1. TITLE :

Technical Circular for measurement of 'C' Clearance in MSU assembly of 6FRA-6068 Traction motors in WAG9/WAP7 class Locomotives.

2. BACKGROUND:

- RDSO had issued the Modification Sheet No. RDSO/2017/EL/MS/0456 (Rev '0') dated 09.01.2017 for 'Modification in drawing of Supporting ring to achieve adequate 'C' Clearance in MSU assembly of 6FRA-6068 TM in WAG9/WAP7 class of locomotives'.
- Central Railway vide letter number L.253.AC.17 dated 17.01.2019 had informed that even after following MS 0456 Rev '0', 'C' clearance is measured as zero.

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3. Definition of 'C' Clearance :

'C' Clearance is defined as distance between Suspension tube and Supporting ring. Range of 'C' clearance was specified as 0.1 to 0.7 mm in ABB ' Maintenance and Repair Manual' document no. 3EHW 411416.

After implementation of Modification sheet No. RDSO/2017/EL/MS/0456 (Rev '0') dated 09.01.2017, range of 'C' clearance is from 0.1 to 0.9 mm.

4. Procedure for measurement of 'C' Clearance defined in manuals :

4.1 It is observed that different manuals/ABB documents gives different sequence for measurement of 'C' clearance as given below:

4.1.1 Maintenance & Repair Manual document No. 3EHW 411416, Chapter 2.06-page 27 of 36: It gives following instructions related to measurement of 'C' clearance:

- (i) *"Apply Thermocup 1200, or equivalent, paste to the socket head bolts (2), then install the bolts (2) with washers (3) through the supporting ring (4) into the suspension tube (1).*
- (ii) *Torque the socket head bolts (2) around supporting ring (4) in an alternating cross pattern $M_A = 80 \text{ Nm}$.*
- (iii) *After torquing the bolts (2), check the gap between the supporting ring (4) and suspension tube (1).": distance 'C' = 0.1 to 0.7 mm*

Thus as per Maintenance and Repair Manual document No. 3EHW 411416, 'C' Clearance is to be measured after tightened the supporting ring with socket head bolts with specified torque.

4.1.2 ADtranz Wheel set Assembly Manual, step 4, page number 20 of 54 :- It gives following instructions related to 'C Clearance measurement:

- (i) *"Install the supporting ring (Item 2) onto the end of the suspension tube.*
- (ii) *Apply Loctite 242 to the M12X30 Cap screws (Item 50) and along with the 12 Ø conical washers (Item 62), screws these into the suspension tube with an Allen key until firm.*
- (iii) *Check the gap between the suspension tube and the supporting wing with feeler gauge. The gap 'C' should be between 0.7 mm & 0.1 mm.*
- (iv) *This will ensure that the supporting ring clamps the outer racer. Tension the M12 screws in a cross pattern to 80 Nm."*

Thus as per Wheel set assembly manual, 'C' clearance is to be measured before tighten the supporting ring with socket head screws bolts with specified torque.

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4.1.3 TOT document 'Drive 15AN21R1 Instruction for assembly & disassembly' document No. AEB 452 511 page No. 6 of 16 : - It gives following instructions related to 'C' clearance measurement :

- (i) "After the tube has cooled down, put on the holding ring item 2; then oil the cylindrical rollers, using item 80 Optimol RMO only.
- (ii) Check the gap between item 2 and 1 0.45 +0.25/-0.65 mm
- (iii) And fasten item 2 with item 50,62 and 85; apply proper torque $T_A = 80 \text{ Nm}$ "

Thus, as per TOT document 'Drive 15AN21R1 Instruction for assembly & disassembly' document No. AEB 452 511, 'C' Clearance is measured before tightening the supporting ring with specified torque.

4.1.4 There is variation in the above documents on the issue whether 'C' Clearance has to be measured before tightening the socket head screws or after tightening the socket head screws with specified torque.

5. Trials done on measurement of 'C' Clearance

- (i) To study the effect of tightening the socket head screws with specified torque of 80 Nm on measured value of 'C' Clearance, joint measurement were carried out by RDSO at CLW along with CLW and POH Shop BSL supervisors.
- (ii) It is observed that, if 'C' Clearance is measured before applying specified torque of 80 Nm, 'C' clearance is obtained in range of 0.4 to 0.5 mm which is within limits as per MS-0456
- (iii) However after tightening the supporting ring with specified torque of 80 Nm, 'C' Clearance is observed as zero.

6. It is observed that total thickness of Supporting ring is 16 mm only. It is likely that after applying 80 Nm torque it tilts towards suspension tube face and gap between supporting ring and suspension tube become zero. However as per Modification Sheet No. RDSO/2017/EL/MS/0456 (Rev '0') dated 09.01.2017, theoretical value of 'C' clearance is from 0.1 to 0.9 mm.

7. As 'C' Clearance is measured as 'zero' after application of prescribed torque, it is likely due to tilting of supporting ring with application of torque.

8. Actual value of 'C' Clearance is measured before application of prescribed torque of 80 Nm as specified in document No. AEB 452511, 'Drive 15AN21R1- Instructions for assembly and disassembly' and ADtranz 'Wheelset Assembly Manual'.

9. Recommended Procedure for measurement of 'C' Clearance :

Following procedure is recommended for measurement of 'C' Clearance :

- (i) After the Suspension tube has cooled down (after DE Bearing fitment), install the modified supporting ring onto the end of the suspension tube.

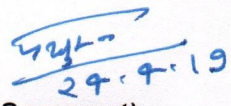
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- (ii) Apply prescribed thread locker compound to the M12X30 Socket head screws along with conical washers
- (iii) Screws these into the suspension tube with an Allen key until firm in a cross pattern. Torque will not be applied in this position.
- (iv) Check the gap between the suspension tube and the modified supporting ring ('C' Clearance) with feeler gauge. The gap Clearance 'C' should be between 0.1 mm to 0.9 mm.
- (v) Then tighten the M12 socket head screws in a cross pattern with 80Nm torque.

10. Agency of Implementation :

Production Units and Workshops carrying out assembly of MSU and wheel set equipped with 6FRA-6068 Traction motor

11. This Technical Circular is to be read with Modification Sheet No. RDSO/2017/EL/MS/0456 (Rev '0') dated 09.01.2017


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