

भारत सरकार – रेल मंत्रालय  
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Government of India - Ministry of Railways  
Research, Designs & Standards Organization,  
LUCKNOW - 226011



No. EL/3.1.35/2 (TMS)

Date: 29.07.2019

**Principal Chief Electrical Engineer,**


1. Central Railway, Mumbai, CST-400 001.
2. East Central Railway, Hazipur-844 101.
3. East Coast Railway, Chandrashekharpur, Bhubaneswar-751 016.
4. Eastern Railway, Fairlie Place, Calcutta-700 001.
5. North Central Railway, Block-A, Subedarganj, Allahabad- 211 033.
6. Northern Railway, Baroda House, New Delhi-110 001.
7. North Western Railway, Jaipur- 302 006
8. North Eastern Railway, Gorakhpur-273001
9. North East Frontier Railway, Maligaon, Guwahati-781011
10. South Central Railway, Secunderabad-500 071.
11. South East Central Railway, Bilaspur-495 004.
12. South Eastern Railway, Garden Reach, Kolkata-700 043.
13. Southern Railway, Park Town, Chennai-600 003.
14. South Western Railway, Hubli- 580020
15. West Central Railway, Jabalpur-482 001.
16. Western Railway, Churchgate, Mumbai-400 020
17. Chittaranjan Locomotive Works, Chittaranjan-713 331
18. Diesel Locomotive Works, Varanasi-221 004
19. Dy. Chief Engineer, Diesel Loco Modernization works (DMW),  
Focal Point, Patiyala, Punjab – 147 003

**Sub:** Minutes of the workshop cum meeting on reliability issues of motor supports fitted in bogies of WAP7/WAG9/WAG9H three phase Electric Locomotives.

**Ref:** Railway Board letter No. 2007/Elect (TRS)/441/8 Pt. dated 15.07.2019.

Enclosed please find Minutes of the workshop cum meeting held at ELS/GZB on 25.07.2019 on subject issue.

This is for your kind information and necessary action please.

  
(Girraj Kishore)  
DDSE/Mech  
for Director General/ Electrical

**Encl:** Copy of minutes of workshop cum meeting

**Copy to:**

1. The Secretary (Traction), Railway Board, New Delhi-110 001- (Kind Attn: Sri A. K. Goswami, DEE(RS) /Railway Board): for kind information please.

2.

i) M/s Ved Sassemeccanica (India) Pvt. Ltd., D-18/1, Panki Industrial Area, Site – 1, Kanpur-208 222

i) Ashika Commercial Pvt. Ltd., Plot No-F 48-50; RIICO Industrial Area; Phase -I; Silora; NH-79; Kishangarh; Rajasthan-305802

ii) Anup Malleables Ltd., G.T.Road, Kandra, PO.Bhitia, (Near Kandra, Dak Bangalow) Govindpur, Dhanbad-828109

For  
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3. **N.O.O**

Secretary to DG/RDSO: for kind information of DG/RDSO.



(Girraj Kishore)

DDSE/Mech

for Director General/ Electrical

**Minutes of the workshop cum meeting held at ELS/GZB on 25.07.2019 on reliability issue of motor supports fitted in bogies of WAP7/WAG9/WAG9H Electric Locomotives**

**Present:**

<b>RDSO (S/Shri)</b>	<b>Railway (S/Shri)</b>	<b>Firm (S/shri)</b>
O. P. Kesari, PEDSE	Mohit Chandra, CELE/NR	R. N Tripathi, MD/M/s Ved
Girraj Kishore, DDSE/Mech.	M.P.Singh, Sr. DEE/RS/GZB	Sunil Garg, Dir./Tech/M/s Anup
U. B. Yadav, SSE/D/Elect.	Kamal Kant Rastogi, DEE/RS/GZB	Bojpal Singh, Production Manager/M/s Ashika
Rajesh Singh Yadav, SSRE	Rahul Pachauri, Sr. DEE/TKD	Bhimsen Rajput, Engg/M/s BT
Sikandar Singh, SSE/D/Elect.	Rahul Agrawal, SEE/CLW	
	Gurudas Mandal, SSE/Drg/CLW	
	L. K. Kanchan, SSE/RS/TKD	
	Imran Ali, SSE/RS/GZB	
	G. C Srivastava, SSE/RS/GZB	
	Manish Kumar, SSE/RS/GZB	
	Rajesh Kumar, SSE/NR/HQ	

A meeting was held at ELS/GZB on 25.07.2019 with representatives of Electric loco sheds & Firms on reliability issue of motor supports in bogie of WAP7/WAG9/WAG9H Electric Locomotives. Object of meeting was to evaluate adequacy or otherwise of design of safety sling as per RDSO SMI No. RDSO/2011/EL/SMI/0269 Rev. '1' dated 16.03.2016 as well as to examine the feasibility of auto switching of concerned traction motor in bogie at the instant of motor support breakage in view of Railway Board letter No. 2007/Elect(TRS)/441/8 Pt. dated 15.07.2019. During the meeting following points were discussed:

1. At the outset, PEDSE welcomed all the participants in the meeting and stressed the need to ensure early completion of provision of modified motor support as specified in modification sheet no. MS-443 Rev. '0' issued by RDSO for all three positions of motor support. While carrying out the work of provision of modified motor supports OEMs and Zonal Railways were requested to ensure strict compliance of procedure specified by RDSO.

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2. Progress of provision of modified support was reviewed. Zonal Railways were requested to complete the modification work on top priority. Following is the position of contract awarded to OEMs by Zonal Railways:

**Table-1**

Firm's Name	Loco Shed	Bogie ordered Quantity (Position)		Bogie completed		Bogie Due		Status
		1,2	3	1,2	3	1,2	3	
M/s Anup	DLW, Varansi	63		63		0		Completed  @ Contract for TM1 & 2 only PDC-15.08.19
	BHEL/JHS	20		0		0		
	BIA	73		73		0		
	TATA	40		40		0		
	KYN@	21	-	21		0		
	TKD	116		103		13		
M/s Ashika	AQ	242	-	151	-	91		Contract for pivot support '3' to be done
	ER	30		18		12		PDC-15.08.19
	BSL	57		6		51		PDC-15.08.19
M/s VED	TATA	-	21	-	21	-	0	Completed
	LGD	214	14	214	14	0	0	
	RPM	50	67	50	67	0	0	
	VSKP	12	22	12	22	0	0	
	GZB	143		70		73		PDC-18.08.19
	GMO	198		158		40		PDC-15.08.19

*C. H. L.*

Similarly, position for the Zonal Railways as received is given in Table-2.

**Table-2**

**Status of un-modified motor support in WAP7 & WAG9/9H three phase locomotives**

Position on: 08.07.2019

Rly	Shed	TM location	WAP7	WAG9H	Total no. of bogies	Balance to be modified	PDC
CR	AQ	1,2	28	214	242	72	Dec'19
		3	30	255	285	285	
	BSL	1,2	0	6	6	6	
		3	0	21	21	21	
	KYN	1,2	0	0	0	Nil	
		3	0	96	96	96	
ECR	GMO	1,2	0	198	198	58	Dec'19
		3	0	49	49	0	
NR	GZB	1,2	143	0	143	64	Dec'19
		3	159	0	159	73	
SCR	LGD	1,2	68	164	232	0	NA
		3	84	206	290	240	Dec.' 19
	KZJ	1,2	0	0	0	Nil	
		3	0	102	102	9	
SER	TATA	1,2	0	0	0	Nil	Dec.'19
		3	0	49	49	49	
WCR	TKD	1,2	39	77	116	7	Oct'19
		3	47	89	136	7	

**Note:** Following sheds have already modified motor support in all locations of bogies.

HWH, WAT, LDH, CNB, BRC, ED, BNDM, SRC, ET, NKJ, BIA, RPM

3. Zonal Railways were requested to check the profile of modified motor support with the profile gauge so as to ensure no bogie goes in service with incorrect profile. OEMs were requested to supply template for measuring the profile as discussed in the meeting.
4. It has been also noted that some of the locos were not provided with modified motor support during POH work. Zonal Railways were requested to ensure provision of modified motor support during POH. Necessary contract may be placed well in advance by POH shops for this purpose based on the allotment of 3-phase loco POH work by Railway Board.
5. Adequacy of strength of safety slings was also deliberated in detail. Complete load calculation on safety sling in case of braking of motor support assuming 30g(for bogie mounted) and 100g (for axle mounted) shock load as per IEC 61373:2010 is given in Table-3.

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Table-3

## Calculation of forces on motor support

Parameters	Symbol, unit	Analysis - Iteration 1	Analysis - Iteration 2
Motor Weight	W, kN	(2150kg) 21.0915kN	(2150kg) 21.0915kN
Half Motor Weight	W/2, kN	10.55	10.55
Gravity shock load due to motor wight	g	<b>30.00</b>	<b>100.00</b>
Distance of Torque Arm from TM center	r1, mm	513.19	513.19
Distance of TM center from Rail level	R, mm	546.00	546.00
Tractive Force	Ftr, kN	325.00	325.00
Tractive Force per motor	Ftr/3, kN	108.33	108.33
Torque Eqv. Force	F, kN	115.26	115.26
Torque Eqv. Half Symmetrical Force	F/2, kN	57.63	57.63
Half Symm. Motor Weight	W/4, kN	158.19	527.29
<b>Total Vertical Force on motor support</b>	<b>F/2+W/4, kN</b>	<b>215.82</b>	<b>584.92</b>

There were 4 combinations of load cases (as described in picture below) for each Iterations.

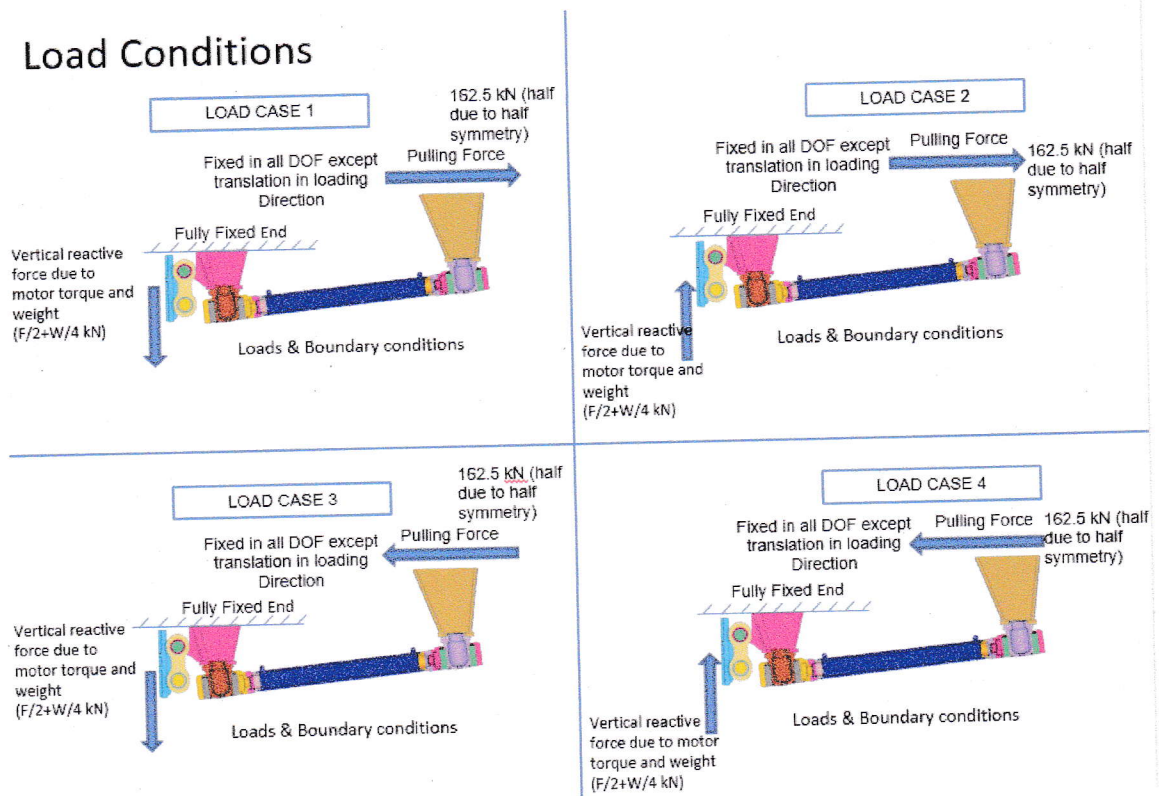
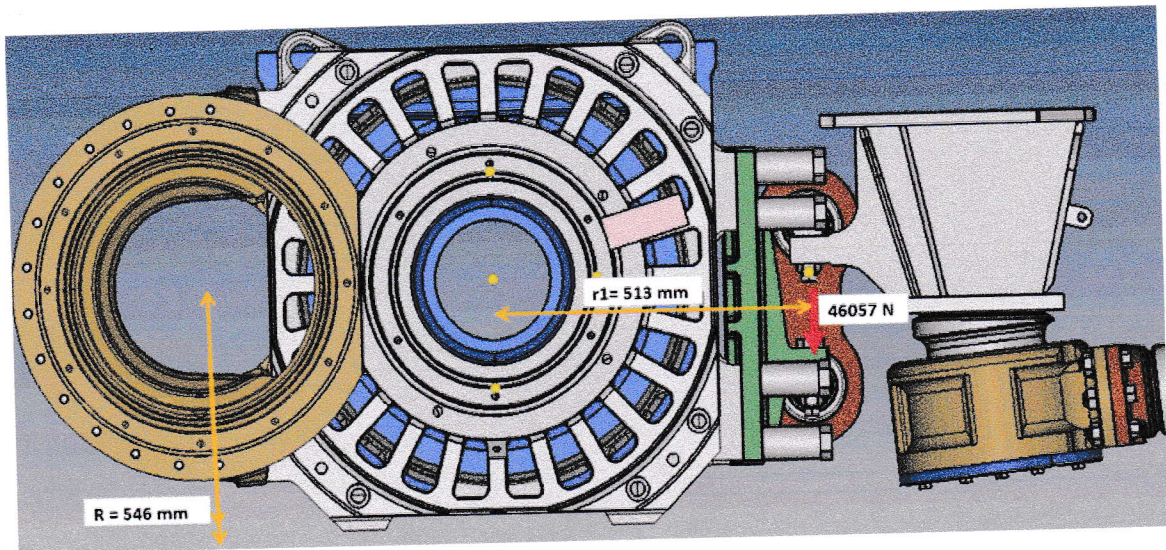


Figure 1: Different load cases

*G. H.*





**Figure 2: Arrangement of motor support with respect to motor/MSU**

6. From the above selection, safety sling shall be as under –

1	Force on motor support	
	With 30g shock load	With 100g shock load
	216kN (21.68T)	585kN (58.71T)
2	Safety sling requirement as per IS 2266:2002 (1770 grade, steel core, & 6XV25 construction)	
	Diameter = 19mm Minimum length requirement (as per IS 2762:2009): 19X70=1330mm(1.33m)	Diameter = 32mm Minimum length requirement (as per IS 2762:2009): 32X70=2240mm(2.24m)
3	Safety sling as per SMI 269 Rev. 1	
	Diameter	12mm
	Length for TM1,2,5&6	1510+3mm
	Length for TM3 & 4	1810+3mm

From the above, it is noted that provision of 32mm dia sling is not feasible since it will require a length of minimum 2.24m where requirement is only for 1810mm (max.). However, 19mm sling is feasible but it will only cater the requirement of 30g shock load which is prescribed for bogie mounted equipment as per IEC.

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7. All the participants were unanimous that such a heavy cross-section of safety slings are impractical and will not serve the purpose. However, alternate idea of providing suitable brackets on bogie and motor support plate as exists in WAG12 class of loco under trial was discussed.
8. All the OEMs and participants visited shop floor and provision of bracket was examined by detailed inspection of bogie placed on a pit line. It was noted that it is feasible to provide 'D' bracket on bogie transom and 'L' type bracket on traction motor mounting plate. In normal position, there will be a gap between 'D' and 'L' bracket. In case of breakage of traction motor support, motor will rest on 'L' bracket and prevent it falling on track.
9. For provision of this arrangement as mentioned above, following action plan decided:
  - (i) Submission of drawing of proposed arrangement by OEMs within a fortnight to RDSO and CLW.
  - (ii) Provision of proposed arrangement in one loco by OEMs at ELS/GZB (by M/s Ved), ELS/TKD (by M/s Anup) and ELS/AQ (by M/s Ashika) within a month. This work shall be carried out along with the motor support modification works which OEMs are already carrying out in these nominated sheds.
10. Based on satisfactory fitment and trial on these three locos, decision for its regular adoption shall be taken in consultation with Railway Board/CLW.
11. After provision of above arrangement, a suitable switch may be provided to give alarm to loco pilot for needful action. In present system, provision of sensing the motor support breakage is not practically feasible.
12. Safety device of WAP5 loco was also inspected. It is rubbing with bogie frame and causing damage. It should be slightly shifted as discussed on shop floor. RDSO will issue necessary advice in change of dimension of bolt in consultation with the firms supplying the safety device for WAP5.

