



भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प 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/1.2.9.1

Dated: 17.07.2017

Chief Electrical Engineer,
All Zonal Railways & CLW

Sub: Minutes of Performance Review Meeting of 180 KVA
Static Converter held RDSO on 11.07.2017

The minutes of review of performance meeting of 180 KVA Static Inverter held at RDSO on 11.07.2017 is enclosed herewith for kind information.

17/7/2017

(Aseem Kumar)

for Director General/Elect.

Encl: As above

Copy to:

1. Secretary (Elect.), Railway Board, Rail Bhawan, New Delhi- 110 001
- Kind attention: **Sri A. K. Goswami DEE/RS/Railway Board**
 2. M/s. Autometers Alliance Ltd., C-63, Sector - 57, Noida - 201 307
 3. M/s. Siemens Ltd., Industry Sector, Mobility Division, I MO RS IS, 5th Floor, R&D Centre Building, Kalwa, Thane, Mumbai - 400 601
 4. M/s. Medha Servo Drive Pvt. Ltd, P-4/5B, IDA Nacharam, Hyderabad - 76
 5. M/s. Hind Rectifier, Lake Road, Bhandup (W), MUMBAI - 400 0785.
 6. M/s.ABB Limited, Survey No 88/3, 88/4. Basavanhalli Kasaba Hobli, Nelamangala Taluk, Bangalore 562 123.
- for kind information and necessary action please. /

(Aseem Kumar)

for Director General/Elect

Encl: As above

Minutes of Performance Review Meeting of 180 kVA Static Converter held at RDSO on 11.07.2017

Present: As per list enclosed.

1. Performance review meeting of 180KVA Static inverter was held at RDSO on 11.07.2017. Firm wise analysis of failures and progress of implementation of modification plans were discussed during the meeting.

At the outset EDSE (Co-ordination) welcomed all the delegates from railways and participants of the firms. He expressed his concern about failures of SIV of all the suppliers which are adversely affecting the train operations. Zonal railways and OEMs were advised to ensure AMC of SIV at the earliest to address maintenance issues and obsolescence.

2. Discussion and action to be taken by firms/ Railways are as under:

(A) Performance review.

1.0 AAL make SIV

SN	Items	Action to be taken by firm & Railways
1.1	MCU Card: Sudden voltage changes across QCON relay contact which leads to sticking up of QCON relay contact, hence MCU failures are there.	<ol style="list-style-type: none">1. Firm stated that they have provided RC damping network across Q-CON relay in all the units.2. Modifications of replacing higher rating Reed relay with 2 Amps & 5 lacs operations is complete..3. Firm has been advised to repair failed cards and give warranty of minimum 02 years from date of its commissioning. Shed may process repair of cards with OEM.
1.2	Cooling Fans: Reasons of cooling fan failure were mainly due to bearing failures, loose fitment in Aluminum housing and burning of motor winding	<ol style="list-style-type: none">1. Design of Fan has been modified and validated in field trials. (Havells make). No failures of modified cooling fan have been reported. Railways are advised to use modified (Havells make) cooling fan.2. RDSO also issued modification sheet no RDSO/2016/EL/MS/0449 Rev 0 dated 30.03.2016.3. Firm has advised that bearing of cooling fan of ZIEHL-ABEGG is to be replaced in 18 months.4. ELS/CNB stated that Shed they are replacing cooling fan bearing periodically with imported bearing (SKF bearing with C-3 clearance) and now



		no further failures of cooling fan bearings are there.
1.3	ZCT: Cable of AC choke was passing just beneath the ZCT leading to erratic operation of ZCT due to variation. Also, mechanical stresses developed on the core of ZCT.	1. Firm has replaced 100 defective units. Railways are replacing ZCTs of DEESYS make of Korea by M/s. Broycee Control of England. Zonal railways reported that no failures of ZCT of M/s. Broycee Control of England. There is reduction in failures of ZCT's.
1.4	GDU card: GDU card of inverter and battery charger are failing. The failures are due to less capacitance value of capacitors of GDU cards decrease in winding resistance & voltage range of Pulse transformer .	1. ELS/BZA identified that GDU card the winding resistance of pulse transformer is 0.2 to 0.3 Ω . And voltage range of pulse is + 16 V to -11V ($\pm 1V$). If the winding resistance and voltage range of pulse varies then pulse transformer is to be replaced. 2. Firm stated that the decreasing of winding resistance and voltage range of pulse transformer is not the root cause of GDU cards failure. The main cause of failures is due to deterioration of capacitance value of about 22 capacitors of GDU cards which leads to failures of pulse transformer and IGBT. Railways are advised to get these cards repaired for replacement of capacitors after a service period of 06 years.
1.5	DCCT: There were frequent failures of Battery Charger and chopper CT. All failures were of ABB make CTs. Failures are due to defective batch.	1 Firm had replaced defective 130 no.'s. Firm has agreed to replace defective lot of CTs. Railways were requested to get replaced defective lot of ABB make CT from firm.

2.0 Siemens make SIV

SN	Item	Decisions/ Target
2.1	Indigenized Battery charger: Indigenized Battery charger failed due to failure of rectifier module due to Diode getting open circuit.	1. Firm has to modify rectifier section in their Indigenized Battery charger. 2. Amongst 286 units 276 units has been modified by the firm. Remaining units (04 no LDH, 03 MGS, 01 TATA & 01 in BKSC) to be modified by 31.07.2017.

2.2	Cooling fan The cooling fan of M/s Siemens failed due to bearing failures and Jam. Firm stated that the major failure of cooling fan bearing is due to either improper mounting of cooling fan or improper maintenance.	1. Firm has advised that the bearing of cooling fan is to be replaced after a service period 4.5 years. 2. RDSO has issued guideline vide letter no EL/1.2.9.1 dated 29.04.2016 to replace bearing as per OEM recommendation and also follow the guideline as issued by RDSO.
2.3	Inverter The failures of inverter module are repetitive due to various reasons like component failures, IGBT failure etc. There are two cases of warranty failures of Inverter in Loco no 28726 and loco no 27263 of ELS/AQ and ELS/BSL respectively.	1. Firm stated the causes of failures along with action plan are to be submitted to RDSO. Firm also stated that no clear trend has been noticed for inverter failures.
2.4	Problem in setting of RTC Railways reported that there is a problem for setting of RTC in Siemens make SIV.	1. It is being advised to firm to conduct a training for adjusting of RTC in loco sheds, so that Loco sheds can adjust RTC as per need. The training scheduled is to be submitted to RDSO within a week

3.0 Medha Servo Drive make SIV

SN	Item	Decisions/ Target
3.1	TDC-IF Card: The tripping of SIV occurred due to sensing over voltage of OHE though OHE voltage was below specified limit.	1. The limit of OHE sensor of SIV is being increased from 500 ms to 1 sec. by software modification and also average time increased from 200ms to 500ms. As the performance is satisfactory therefore, software modification is to be implemented in all units by 31.08.2017.
3.2	Failures in dv/dt capacitor : The failures of dv/dt capacitors are new trends of failures. Firm has been asked to submit the investigation report.	1. Firm stated that the failures of dv/dt capacitors are after service period of 4 to 5 years. Firm also stated that 20% deterioration in capacitance value is acceptable. If capacitance value is less than 20% of specified value, then it requires replacement. 2. Firm has been asked to submit the data sheet of capacitors.

12

4.0 Hind make SIV

SN	Item	Decisions/ Target
4.1	QCON timer card : Initially wiring of delay timer was tapped from secondary of Auto transformer at 415 \pm 5% V but the voltage spikes use to melt the fuses sometimes.	1. The firm has advised that they will change the wiring of delay timer from primary of an additional transformer at 415 /110 V since at low voltage spikes will be less and they will use 110 V timers. 2. Firm has modified 70 units. Railways reported satisfactory performance so far. RDSO has advised firm to modify all the units (310 nos) within 03 months.
4.2	Crow Bar Thyristor: The problem was unwanted firing pulse to crow bar thyristor due to throw off compressor load. Hence input fuse melt and sometimes thyristor gets damaged due to huge energy dissipation which is stored in DC link. For protection of DC link over voltage an energy absorption unit has been introduced.	1 Firm has introduced energy absorption unit in 15 locos (06 no ET, 01 CNB, 02 JHS, 03 in BL, 01 in NKJ, 01 in KYN & 01 in KZJ), which reduces the excess energy generated due to unwanted firing of crow bar thyristor and thereby preventing the melting of fuse. 2. Railways reported satisfactory performance so far. RDSO advised firm to implement in all the units (310 nos) within 03 months time. Also advised in first phase the implementation of EAU is to be done in ELS/CNB within 15 days.
4.3	Snubber capacitor: The capacitance value (0.47 mF) of Snubber capacitor is deteriorating after a service period of 3 to 4 years of service to 0.5 nano farad.	1. The snubber capacitors are Oil filled and are to be replaced by dry type. 2. Rlys are requested to check the value of capacitors during maintenance in the range of 0.47mf \pm 10 % of specified value and replace it if required. Replacement may also be done after a service of 06 years of life.
4.4	Control card: There are failures of Control Cards A 704 (Chopper) & A 703 (Inverter).	1. Firm sent the failed control cards to M/s. Transtanik/ Germany for investigation. It was reported by the firm that diode (VD-9) and PLD (Programmable logic device) of SCR board damaged and these were replaced by the firm. 2. On further study by M/s. Transtanik/ Germany stated that the probable causes of failures of diode (VD-9) and PLD (Programmable logic device) of SCR board are due to ESD handling.

4.5	Cooling Fan : The basic problem is bearing failure. All the bearing failures are after a service period of 4 years.	Zonal railways are advised to replace bearing as per OEM recommendation.
------------	---	--

5.0 ABB make SIV

SN	Item	Decisions/ Target
5.1	Cooling fan: Mainly there are failures due to jamming of bearings.	<ol style="list-style-type: none"> 1. Firm stated that the cooling fan bearings are failing after a service life of 04 years and advised that they are to be replaced after a service period of 04 years. 2. Railways reported that cooling fan of power module side is failing with 04 to 05 years. 3. Firm is advised to demonstrate the process of cooling fan bearing replacement in ELS/ BIA.

(B) Common points

a)	Zonal Railways are advised to monitor the performance of the SIV and assist firm to implement the modification. The status of modification is to be send to RDSO periodically.
b)	Auxiliary motor failures: – The comparative analysis of failures of auxiliary motors, in Arno locomotive vis-a vis in SIV locomotive may be furnished for last three years as per format appended in annexure.
c)	RDSO has issued SMI on AMC viz. RDSO/2016/EL/SMI/0291 Rev 0 dated 21.06.2016. All firms have been advised to adopt AMC of SIV. All Zonal railways are advised to insist OEM for AMCs.

Meting concluded with vote of thanks.



List of Participants

SN	Name (S/Shri)	Designation	Railway
1.	O.P. Kesari	EDSE (Co)	RDSO
2.	Aseem Kumar	DSE (PS & SC)	RDSO
3.	Anurag Kr Gupta	Sr. DEE/TRS/CNB	NCR
4.	Atul Kumar	Sr. DEE/TRS/BNDM	SER
5.	Kaushalesh Singh	Sr. DEE/TRS/BIA	SECR
6.	Pradeep Rathore	Dy. CEE/Loco/SCR	SCR
7.	Hemant Jindal	DEE/TRS/KALYAN	CR
8.	Nikhil Singh	DEE/TRS/BSL	CR
9.	Deepak Singh	DEE/TRS/ASN	ER
10.	Aditya Legha	DEE/TRS/ET	WCR
11.	Ramesh Ch. Meena	ADEE/TRS/BL	WR
12.	Ashish Kr Maddhesiya	SEE/D/CON	CLW
13.	A.N.Singh	SSE/TRS/AQ	CR
14.	Madhure Pande	SSE/TRS/JHS	NCR
15.	Shiv Sankar Pal	SSE/TRS/BSL	CR
16.	K.Nag	SSE/TRS/KALYAN	CR
17.	Saurabh Arya	SSE/TRS/CNB	NCR
18.	S.S. Srivastava	SSE/TRS/BL	WR
19.	Dharmendra Kumar	SSE/TRS/BSL	CR
20.	N.K.Saxena	SSE/TM/KALYAN	CR
21.	Sanjay Deshmukh	SSE/TRS/AQ	CR
22.	Tanmoy Pal	SSE/TRS/HWH	ER
23.	L.B.Chakraborty	SSE/TRS/BNDM	SER
24.	Pawan Chandiriya	SSE/TRS/ET	WCR
25.	Akther Alami	Product (Head)	AAL
26.	Ankut Tiwari	Account Head	AAL
27.	Sumit Wahi	Account Head	AAL
28.	Manu Garg	Manager/ Service	Siemens
29.	V.K.L. Swamy	Product Engr / Medha	Medha Servo Drive
30.	Vikash Jha	Marketing/Engg Medha	Medha Servo Drive
31.	Rajeeb Kr Chauhan	AGM (Service)	Hind Rectifier
32.	Deepak Aher	Manager service	Hind Rectifier
33.	Mohit Sharma	Service	ABB



Annexure

Format for auxiliary motors arising in SIV fitted vis-a vis ARNO fitted locomotive

Year	Railway / Shed	SIV fitted locomotive				ARNO fitted locomotive			
		Loco holding with SIV	Population of Aux. motor with SIV fitted loco	Failures of Aux. motor in SIV fitted loco	FRPCPY	Loco holding with ARNO	Population of Aux. motor in ARNO fitted loco	Failures of Aux. motor with ARNO fitted loco	FRPCPY
14-15									
15-16									
16-17									