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सत्यमेवजयते

भारतसरकार–रेलमंत्रालय
अनुसंधानअभिकल्पऔरमानकसंगठन
लखनऊ– 226011
Govt. of India - Ministry of Railways
Research, Designs & Standards Organization,
LUCKNOW - 226011

No. EL/11.5.5/21 Date: 03-05-2019

Principal Chief Electrical Engineer,

- Central Railway, HQs Office, 2nd floor, Parcel Office Bldg., Mumbai-400 001
- East Central Railway, Hajipur (Bihar)-844 101
- Eastern Railway, Fairlie Place, Kolkata – 700 001
- East Coast Railway, Railway Complex, Bhuvneshwar – 751 023
- Northern Railway, Baroda House, New Delhi-110 001
- North Central Railway, Allahabad – 211 001
- South East Central Railway, Bilaspur-495 004
- South Central Railway, HQs Office, Rail Nilayam, Secunderabad-500 071
- South Eastern Railway, Garden Reach, Kolkata- 700 043
- Southern Railway, Park Town, Chennai – 600 003
- West Central Railway, HQs Office, Opp. Indira Market, Jabalpur-482 001
- Western Railway, Churchgate, Mumbai – 4000 020
- Diesel Locomotive Works, Varanasi – 221004.

Sub: Minutes of meeting held at RDSO, Lucknow on 25.04.2019 with M/s BTIPL make of IGBT based traction converter (SR) & Auxiliary converter (BUR) of 3-phase locomotives.

A meeting on reliability issues of M/s BTIPL make IGBT based traction converter and auxiliary converter was held with the RDSO and M/s BTIPL on 25.04.2019 at RDSO, Lucknow.

A MOM as above has been issued and same is being enclosed herewith for kind information and necessary action please.

Suresh 3/5/19

(Suresh Kumar)
For Director General (Elect.)

Encl: As above

Copy to:

1. **Secretary (Elec. Engg./RS), Railway Board, Rail Bhawan, New Delhi-110 001.**For kind information. (Kind Attn.: Shri A.K. Goswami, DEE/RS)
2. **CEE, Chittaranjan Locomotive Works, Chittaranjan – 713 331(WB):** for kind information please
3. **M/s. BTIPL,** ERDA Road, Maneja, Vadodara-390 013

Suresh 3/5/19

(Suresh Kumar)
For Director General (Elect.)

Encl: As above

Minutes of performance review meeting of M/s BTIPL make Propulsion Equipments of IGBT based 3-Phase locomotives held at RDSO on 25-04-2019

Members Present:

RDSO	1.	Shri O. P. Kesari, PEDSE.
	2.	" Suresh Kumar, DSE/TPS.
	3.	" Shailendra K. Deo, SSE/TPS.
	4.	" Ran Vijay, JE/TPS
M/s BTIPL	5.	" C. Ramanujam, Director, Business Development
	6.	" Ashok Agrawal, Customer Support, IR Project

The meeting was convened to review the issues raised in last reliability meeting held in ELS/HWH on 14/15.02.2019. The detailed deliberations done during the meeting are as under:

1. M/s BTIPL make Traction converters:

The details regarding existing software version and next software version after completion of trial version are given below.

Line Converter IGBT Current	**Variant 1**		**Variant 2**			
	1200 Amp (MICAS)		**1500 Amp (MICAS)**		**1500 Amp (TCN)**	
Type of Loco	**Previous SW Version**	**Current SW version**	**Previous SW Version**	**Current SW version**	**Previous SW Version**	**Current SW version**
WAG 9	317T02BT (37 locos)	318T01BT (63 locos)	317T02BT (39 locos)	318T01BT (59 locos)	--	418T01BT (87 locos)
WAP 7	217T02BT (12 locos)	218T01BT (18 locos)	217T02BT (13 locos)	218T01BT (30 locos)	--	418T01BT (46 locos)
WAP 5	--	--	--	118T01BT (1 locos)	--	--

2. Performance of M/s. BTIPL make Traction Converter (IGBT)

Table-1: Cause wise failure details

SN	Cause of Failure	No. of failures				
		2016-17	2017-18	2018-19		
				(Apr-Jun)	(Jul-Sept)	(Oct-Dec)
1	Power Module	25	35	15	19	13
2	Software Malfunctioning	28	44	17	12	21
3	GDU/DCU card	7	22	2	8	6
4	Cooling blower	10	17	3	1	1
5	Others	8	37	19	23	32
	Total Failures	78	155	56	63	73
	Total Population	108	231	246	271	349
	FRPCPY	72	67	91	93	84

3. Following deliberation done to improve the reliability of M/s BTIL make Traction converters:

SN	Item/Issue	Details	Decision
1.	Failures of Power Modules	1. Release of new SW version 218T01BT & 318T01BT that limits the max allowed current when the coolant flow is suboptimal during the ramp up of the aux. converter. 2. Further, M/s BTIPL has proposed to replace a pipe in the converter cooling circuit in their propulsion versions that has an orifice of 18mm diameter with one that uses a larger orifice with 21.5mm diameter to increase the coolant flow rate from 176 LPM to 237 LPM. • RDSO has given approval to replace the cooling circuit with increased orifice of 21.5 mm in 25 locomotives vide letter no. EL/11.5.5/1/IGBT dtd. 12.02.2019. • BTIPL has intimated that after the above modification, the failures of IGBTs shall reduce considerably.	1. Modified Software version 218T01BT & 318T01BT installed 170 locomotives. Balance – 52 locos PDC - 15.05.2019. 2. Cooling circuit of 26 locomotives has been modified. M/s BTIPL may carry out modification in locos having 1500 Amps IGBT modules in 10 locos each at ELS/AQ, HWH, TKD & LGD. Performance feedback of the same shall be taken from ELS and further decision will be taken.
2.	Main power OFF due to 'FLG-1 time out DC link circuit charge'	BTIPL has stated that this issue has been addressed in new SW version 218T01BT & 318T01BT.	Modified Software version 218T01BT & 318T01BT installed 170 locomotives. Balance – 52 locos PDC - 15.05.2019. Performance under watch.
3.	DC link overvoltage during regeneration.	• Railways have reported that the issue of 'DC link overvoltage' has been increased and there was burning smell from MUB resistors. • M/s BTIPL stated that during regeneration, OHE is not accepting the regenerative voltage and current. Hence, there is more power dissipation in MUB resistors causing smell. • BTIPL was requested to study if the rating of MUB resistor can be increased.	M/s BTIPL stated that problem generates during regeneration only because the line is not receptive to regenerated energy. It has been intimated to BTIPL that this problem is not reported in any other make therefore need further detailed studies. BTIPL has been asked to study the DDS of a few locos of ELS/HWH. PDC – 15.05.2019.
4.	Logging of spurious messages	**ELS/BRC reported following spurious messages:** • CON1: 311 Trac. Mot.2 Temp. Implausible. CON1/2: PSU for DCUM implausible.	M/s BTIPL has stated that these messages are triggered if disturbance in battery circuit. Problem is outside the converter.

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SN	Item/Issue	Details	Decision
		• "CON1:204 A627 PSU for DCUM3 implausible", "CON1:203 A625 PSU for DCUM2 implausible", "CON1:202 A623 PSU for DCUM1 implausible", "CON1:201 A621 PSU for PCUL implausible" • TM2 Bogie-1 isolate without any failure message • Con1 M2 pulsing not started • DCUM1 or cabling faulty • DCUM3 or cabling faulty- Bogie 1 got isolated • Main power got off without any message • Bogie isolated due to following messages • CON2: comm. Loss to DCUM1, DCUM2, DCUM3 & DCUL. • CON2: PSU OFF relay feedback fault. • Dist. Redundant VCI2 • Dist. Comm. CON2 VCI • VCI2 : Amp2 isolate Above spurious messages come during cab changing. These messages do not come online.	This problem never appears on main line. M/S BTIPL has been advised to jointly study with ELS/BRC. Focus may be given to the fact if this issue is loco specific. PDC – 15.05.2019.
5.	Corruption of wheel diameter due to software problem.	As per M/s BT, the wheel diameter data is being stored in Non-Volatile memory which gets corrupted very easily. M/s BTIPL shall move this data to internal memory of DCU cards. Based on the outcome, decision for final cut-in shall be taken.	M/s BTIPL has informed that solution has been implemented in modified software package version 419W01BT and same has been installed in loco no. 30718 at ELS/LGD. ELS/LGD to keep close watch on the performance.
6.	Catenary voltage out of limits.	The propulsion software has been drawn as per old MICAS software. The changes related to OHE voltage limit need to be implemented.	M/s BTIPL informed that problem has been addressed modified software package version 419W01BT installed in loco no. 30718 at ELS/LGD.
7.	Main power off	CCUO: 0231-UPRIM Sensing Ckt Flt SPIF1 logged and subsequently main power off.	M/s BTIPL has informed that software parameters has been corrected and performance is under watch. Data logger has also been added. Software has been implemented in 30718/LGD for field trial. This loco has software including all the modification.

SN	Item/Issue	Details	Decision
			Regular approval will be given after satisfactory performance feedback from Railways. PDC – 15.05.2019.
8.	Relevant variables always are missing in DDS data.	In DDS environment data, relevant variables always are missing. i.e. in error log pertaining to OHE voltage, OHE voltage field is missing and same in the case with other error messages. M/s BTIPL has stated that they are investigating the cause.	M/s BTIPL has stated that environment data has been implemented in current software version. Railways may report if issues still observed.
9.	Other issues in propulsion system	Following are the issues faced by ELS/HWH in BTIPL make propulsion system: (i) Motors are getting isolated frequently with message 'speed sensor single channel faulty & M1/M2/M3 switching command feedback failure. (ii) Messages are being logged, 'L: Pantograph bouncing' then all BUR remains idle or in recovery stage which leads sensing 'low coolant pressure' by both traction converters. (iii) During self-testing sometimes Traction bogie getting isolated without any message. (iv) Protective shut down due to 'MVB pull wire from other DCU active'. (v) TMs are getting isolated without sufficient back ground data in DDS.	**M/s BTIPL remarks:** (i) Several cases due to hardware (wiring, crimping, Grease between sensor and Tooth wheel ring). Also modified software package version 419W01BT tuned and installed in loco no. 30718 at ELS/LGD. (ii) Solution identified. Modification proposal will be submitted by 10.05.2019. Problems (iii), (iv) & (v) have been addressed in modified software package version 419W01BT.
10.	Other Issues	Following other issues have been noticed in Propulsion system. 1. Sometimes even in shed during loco checking suddenly VCB tripped, PT got down & after some time PT got raised by itself & following disturbance messages logged. CCUO:0198- Catenary Voltage out of	**M/s BTIPL remarks:** 1. Problem has been addressed in modified software package version 419W01BT.

SN	Item/Issue	Details	Decision
		Limits. CCUO:0183-Power reduction line voltage L: Power limitation 1 active (PLine) L: Pantograph bouncing	
		2. In Aux. Converter, data most of the time no fault is getting logged.	2. All messages available now in diagnostics (same as MICAS system).
		3. Traction converter is getting isolated without any message and with message 'L charging resistor too hot'.	3. "L charging resistor too hot" message appears during testing at shed due to frequent traction /braking cycles leading to trigger of potential heating of pre-charge resistor. Not a line problem
		4. When any fault occurs DDS is showing only the latest instant of fault occurrence and older ones are storing as counts. So Loco Pilot (LP) is unable to check the sequence of fault occurrence.	4. Pop-up messages available at HMI for identify the failure to LP and count of the messages to identify the message. Sequence wise detail of events is possible to view by maintenance staff.

4. Performance of M/s. BTIL make TCN VCU

SN	Issue/Item	Details	Decision
1.	Shunting mode message is logging only for the first instant.	These issues have been reported by ELS/RPM.	M/s BTIPL has stated that all reported issue under validation and same will be submitted by 10.05.2019
2.	Traction not allowed with applied brakes. Messages logging even at throttle '0' position.		
3.	Shunting speed is available up to 20 kmph but usually it is 15 kmph.		M/s BTIPL has stated that the software limits the speed to 15 kmph. This is as per existing MICAS software logic. M/s BTIPL validate the same at ELS/RPM and joint note will be submitted to RDSO.
4.	Filter contactors are not operated when node is shifted from 596 to 590. Also when throttle is 0 but speed is not 0, loco shows node 590.		M/s BTIPL has compared their make propulsion logic to MICAS VCU and found same logic in both. Railways may confirm by protocolling the signals related to operation of filer contactors.

3/5/19
(DSE/TPS)