



सत्यमेव जयते

भारत सरकार
रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

अनुसंधान अभिकल्प एवं मानक संगठन

RESEARCH DESIGNS AND STANDARDS ORGANISATION
MINISTRY OF RAILWAYS

भारतीय रेल के अतियधिक ऊंचाई वाले ऊधमपुर – बरमुल्ला रेल लिंक एवं ऋषिकेश – कर्णप्रयाग सेक्शन के लिये संशोधन शीट

MODIFICATION SHEET FOR
HIGH ALTITUDE OPERATION OF LHB ROLLING STOCK IN USBRL AND RKSH-KNPG
SECTION OF INDIAN RAILWAYS

आर.डी.एस.ओ. / पी.ई. / एम एस / एसी / 0088.2022(परिषोधन.0)

Modification Sheet no. RDSO/PE/MS/AC/0088-2022 (Rev. 0)

S. No.	Date of amendment	Revision	Reason

अनुमोदित
APPROVED

प्रधान कार्यकारी निदेशक / पी० एस० एवं ई० एम० य०
PED/PS&EMU

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**RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW-226011
Modification sheet no RDSO/PE/MS/AC/0088-2022(Rev-0)**

1.0 TITLE:

1.1 Modification Sheet for High Altitude Operation of LHB Rolling Stock in Udhampur-Srinagar- Baramulla Rail Link (USBRL) and Rishikesh - Karnaprayag (RKSH-KNPG) Section of Indian Railways.

2.0 OBJECT:

2.1 This Modification Sheet is issued for necessary modifications required in the Roof Mounted AC Package Unit and Switch Board Cabinets of AC coaches for operation of LHB Rolling Stock in High altitude section viz. USBRL and RKSH-KNPG Section of Indian Railways.

3.0 BRIEF DESCRIPTION

3.1 At present the Roof Mounted AC package unit (RMPU) is deemed fit for -4 to 57deg C temperature and 1200m altitude above sea level operation. As per decision it was found that -8 deg C is the minimum ambient temperature of operation of LHB AC coaches in USBRL and RKSH-KNPG Section of Indian Railways.

3.2 The existing Switch Board Cabinet (SBC) as per RDSO specification no. RDSO/PE/SPEC/AC/0184-2015 (Rev.1) is fit for operation in USBRL and RKSH-KNPG Section of Indian Railways.

4.0 MODIFICATION TO BE CARRIED OUT:

4.1 Replacement of Heater Assembly of RMPU:

As per the new minimum ambient temperature of -8 deg C, the heater assembly of existing LHB RMPU as per RDSO specification no. RDSO/PE/SPEC/AC/0061-2005 (Rev.1) needs to be replaced to 7.5 kW (based on the heat load calculation as per Annexure A) from existing 6 kW. The existing independent coils (of 400 Watt) of heater assembly are arranged in Delta formation of 5 nos. between two phases each. The existing coils needs to be replaced with 500 watt individual heater coils of same number and pattern.

4.2 Replacement of Heater MCBs in the SBC:

The increased heat load shall also require the replacement of existing protection MCBs of heater circuit. In existing circuit based on the heat load, the S1F08 and S1F14 MCBs for over current and short circuit protection of heater coil are of 16 A/ 3P/ 415 V. Now, as per the heat load calculation as per Annexure A, the new heat load is 14.94 kW (approx 15 kW i.e. 7.5 kW for each RMPU). Further, the rating of existing MCBs to be increased to 20 A from 16 A.

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4.3 Replacement of bellow duct of RMPU:

The fresh, supply and return air bellow duct of RMPU for those LHB coaches having Cotton Canvas bellow duct as per RDSO specification No. RDSO/PE/SPEC/AC/0136-2009 (Rev.0) should be replaced to bellow duct made of meta aramid/ para aramid fabric with silicon rubber coating on both sides as per RDSO specification no. RDSO/PE/SPEC/AC/0197-2020 (Rev.0).

5.0 APPLICATION:

The supply air duct of LHB RMPU as per specification no. RDSO/PE/SPEC/AC/0061-2005 (Rev.1) and LHB Switch Board Cabinets of LHB EOG AC coaches as per RDSO specification no. RDSO/PE/SPEC/AC/0184-2015 (Rev.1), Switch Board Cabinets of LHB EOG AC coaches as per RDSO specification no. RDSO/PE/SPEC/AC/0200-2020 (Rev.0) and Switch board cabinets for LHB AC Pantry Coaches as per RCF specification no. EDTS 0134.

6.0 MATERIALS REQUIRED:

The materials required to be purchased from RDSO approved sources as given below:

S.N	Gr	Item Code	Description	Qty in each coach	Drawing/Catalogue no.	Make	Place of Installation
1	-	-	Three phase stainless steel heater element (500 Watt each coil)	2	-	RDSO approved Sources.	-
2	33	F12 F18	MCB for Heater 1& 2 with auxiliary contact block Thermal release range (Rated Current: 20 A) Breaking Capacity: 10kA Pole: 3 P Rated Voltage : 415 V AC	2	SB203M-C20	ABB	S1F01 S1F02
					A9N3P20C+ A9N26924	Schneider	
					BB30200C+AUX BZA11006	L&T	
					5SL43207RC+5ST3 010	Siemens	
					FAZ-C20/3	Eaton	
3	-	-	Fresh, supply and return air bellow duct made of meta aramid/ para aramid fabric with silicon rubber coating on both sides as per RDSO specification no. RDSO/PE/SPEC/AC/0197-2020 (Rev.0)- (if required as per clause 4.3)	-	-	RDSO approved Sources.	-
			Fresh air bellow duct	4 Nos.			
			Supply air bellow duct	2 Nos.			
			Return air bellow duct	4 Nos.			

Note: * Part number shall require prior approval of RDSO. In the above list addition/deletion of materials will only be after prior approval of RDSO.

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7.0 AGENCY FOR IMPLEMENTATION

All Zonal Railways and Workshops of Indian Railways.

8.0 DISTRIBUTION LIST

As per list enclosed

9.0 ENCLOSURES

Heat load calculation as per Annexure A

FINAL DRAFT

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ANNEXURE A**CALCULATION FOR HEATER CAPACITY IN 3T AC COACH**

	CONDITION	AMBIENT	-8 DEG.C	
		INSIDE COACH	21 DEG.C	
1	AREA OF SIDE WALL IN SQ.METER			44.89
2	AREA OF GLASS WINDOW IN ONE SIDE WALL IN SQ. METER			6.732
3	NET AREA OF SIDE WALL			38.158
4	AREA OF ROOF IN SQ. METER			53.298
5	AREA OF INNER PARTITION WALL IN SQ METER			8.378
6	AREA OF FLOOR IN SQ METER			50.5
7	NOS. OF PASSENGERS			72
	CONDITIONS			
	AMBIENT TEMPERATURE IN DEG.C		-8	
	INSIDE TEMPERATURE IN DEG.C		21	Temp. diff. 29
	FRESH AIR REQUIRED PER PERSON IN CB. METER PER MIN.		0.25	
	SPECIFIC VOLUME OF AIR IN CUB METER PER KG		0.8	
	SENSIBLE HEAT LOSS IN KCAL PER HOUR			
	SIDE WALL			1361.096
	ROOF			1004.667
	FLOOR			1054.44
	INNER PARTITION WALL			195.7939
	GLASS WINDOW			757.4846
	TOTAL HEAT LOSS BY CONDUCTION			4373.482
	HEAT LOSS DUE TO FRESH AIR			9396
	HEAT LOSS DUE TO FRES AIR=(Total volume of air x sp. Heat of air x temp. Diff.)/sp. Volume of air (nos of pass x fresh air per per per min x 60 x temp diff x sp heat of air/sp volume of air) sp heat of air is 0.24 k cal/m ³ /kg/°C			
	HEAT LOSS FROM 50 PERCENTAGE OCCUPANCY			2088
	TOTAL HEAT LOAD FROM CONDITIONED COMPARTMENT IN K CAL/HR			11681.48
	ADD 10% HEAT LOSS FOR INFILTRATION			12849.63
	KW RATING OF HEATER			14.94143

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DISTRIBUTION LIST

CHIEF ELECTRICAL ENGINEER:	
1	Northern Railway, Baroda House, New Delhi – 110 001.
2	Central Railway, II Floor, Parcel office, CST Mumbai – 400 001.
3	Eastern Railway, Fairlie Place, Kolkata – 700 001.
4	South Eastern Railway, Garden Reach, Kolkata – 700 043
5	Southern Railway, Park Town, Chennai – 600 003.
6	Western Railway, Church gate, Mumbai – 400 020.
7	South Central Railway, Rail Nilayam, Secunderabad – 500 371.
8	East Central Railway, Dighi Distt- Vaishali, Hajipur Bihar- 844 101.
9	North Central Railway, North Central Railway, Block A, Subedarganj, Allahabad-211033.
10	South Western Railway, 1 st Floor, DRM Office, Hubli 580 020
11	South East Central Railway, Bilaspur.495004
12	North East Frontier Railway, Maligaon, Guwahati - 781001
13	North Eastern Railway, Gorakhpur – 273001
14	North Western Railway, Jaipur – 302006
15	West Central Railway, Jabalpur – 482001
16	East Coast Railway, Bhuvneshwar, Orissa – 751016
17	Konkan Railway, Belapur Bhavan, Sector-11, Belapur, Mumbai - 400614
18	Metro Railway, 33 /1 J.L. Nehru road, Kolkata- 700071
19	Integral coach factory, Perambur, Chennai - 600038
20	Rail Coach Factory, Kapurthala (Punjab) – 144 602
21	Modern Rail Coach Factory, Lalganj, Raebareli(UP)-229120
CHIEF WORKS MANAGER:	
1	Matunga Workshop, Central Railway, Mumbai - 400 019.
2	Liluah Workshop, Eastern Railway, Howrah
3	C&W Workshop, Northern Railway, Alambagh, Lucknow-226 05
4	C & W Workshop, N. Rly., Jagdhari – 135 002
5	Mechanical Workshop, NER, Gorakhpur – 273 012
6	Carriage Workshop, Southern Railway, Perambur, Ayanavaram, Chennai – 600023.
7	SCR, Lallagudda Workshop, Lallaguda, Secunderabad - 500017
8	Carriage Workshop, Western Railway, Lower Parel, Mumbai-400013
9	CRWS, W. C. Railway, Nishatpura, Bhopal-462010
10	Carriage Workshop, NW Rly., Ajmer - 305001
11	Carriage Repair Workshop, Gadag Road, SWR, Hubli – 580 020
12	Carriage Workshop, S.W. Railway, Mysore Vishwanath.
13	Carriage Workshop, SE Rly., Kharagpur - 721301
14	New Bongaigaon, Railway Workshop, Dangtal, Distt. Bongaigaon, Assam-783380
15	Carriage and Wagon Workshop, N. C. Rly., Jhansi – 248003
16	Carriage and Wagon Workshop, WC Rly., Kota - 324002
17	Carriage and Wagon Workshop, Eastern Rly., Liluha - 711204
18	Carriage and Wagon Workshop, W. Rly., Pratap Nagar, Vadodara - 390004
19	Carriage and Wagon Workshop, N Rly., Amritsar - 143001
20	Central Workshop, Golden rock, S. Rly., Trichi - 620004
1	Director, IRIEEN, Nasik Road (Maharashtra). - 422101
2	Senior Professor (Elect.), Railway Staff College, Lalbaug, Vadodara. - 390004
3	Director, IRCAMTECH, Maharajpur, Gwalior – 474 020.

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