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Dated 27/01/2009
13/04/09

No. EL/3.2.9/1

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TECHNICAL CIRCULAR NO. RDSO/2009/EL/TC/0098, Rev.'0' Dated 27/01/2009

Sub: Upgradation of BA Panel of 25 kV AC conventional Electric Locomotive
Ref: Discussions held in CELE's conference

1.0 Brief Background:

- 1.1 In conventional electric locomotives, the traction control equipments like motor & shunting contactors, reversers, inductive shunts, traction change over switch (CTF), shunting resistances (RS) and some other relays meters etc are mounted on panels (BA panels). Presently, the BA panels of different dimensions containing different equipments with various lay outs are in service depending upon the type of locomotives. These changes have taken place over a period of time with the introduction of DBR, 3 stage and 4 stage shunting and the evaluation of modular design of locomotives i.e. bifurcation of rectifiers with optimised cable layout. The various lay out arrangement of BA panels in locomotives are summarised below -

SN	Layout of BA panels	Dimensions (L x W) (mm)	Type of locos	Remarks
1	BA1 & BA2	1500 x 670	WAM4, Older version of WAG5, WAP1 & some of WAP4	There is neither provision nor space provided for CTF & other items for DBR. Single stage shunting notch. This is non-modular locomotive.
2	BA1 &	2000 x 650	WAM4, majority of	In these locos, the CTF & other

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	BA2	(BA1) and 2900 x 650 (BA2)	WAG5, WAP1 & some of WAP4 and few WAG7	items for DBR were not provided but there is a space available. This is non-modular locomotive. Single stage and /or 3 stage shunting notches are there.
3	BA1, BA2 & BA3	1950 x 670 (BA1 & BA2) 1000 x 670 (BA3)	Almost all the WAG7, majority of WAP4 and some WAG5	There is a provision of all the items required for DBR and 3 stage shunting. These locos are of modular design.
4	BA1, BA2 & BA3	2100 x 660 (BA1 & BA2) 1000 x 630 (BA3)	WAG7 & WAP4 being manufactured	Current production of locos is being done as per this arrangement. There is a provision of 4 stage shunting notch i.e. 24 nos shunting contactors and DBR.

2.0 Scope of work for upgradation of BA panels:

There is a need to upgrade as well as rehabilitate the existing BA panels of locomotives suitable for provision of DBR as well as upgradation of the capacity of equipments of BA panels. Since the line contactors, reversers/CTF are of older design of 1000 Amp capacity in most of the BA panels as given in SN 1 to 3. Also, 3 stage or 4 stage shunting is required to be provided in WAM4 & WAG5 class of locomotives. However, the basic design and layout of BA panels in modular and non-modular locomotives should remain unchanged as the complete layout of the power cable, foundation of equipments, rectifier units will have to be changed. In view of the above and present requirement, a broad scope of work for upgradation and rehabilitation of BA panel to be undertaken by Zonal Railways for existing locomotives is defined and given below –

2.1 Locomotives with BA panels layout as per SN 1 & 2 as above:

The BA panels layout are in two parts only and locomotive design is also non-modular. In this type of locomotives the conversion of conventional BA panels to the compact size BA panels should be done. The work can be carried out as per RDSO's specification no. ELRS/SPEC/BaP/0036 (Rev '0') – July'05 issued vide RDSO's letter no. EL/3.2.9/1 dt 8-7-05. This specification covers the reduction of size in the BA1 & BA2 panel as 1960 x 610 and 2500 x 610 mm respectively. Also, the upgradation of line contactors and reversers from 1000 Amp to 1500 Amp, provision of 3 stage shunting notches, equipments of DBR (CTF, C145 etc) can be undertaken. However the cam type reverser and CTF as per RDSO specification RDSO/2009/EL/SPEC/0090 Rev'0' issued in January 2009 shall be used.

2.2 Locomotives with BA panels layout as per SN 3 as above:

The upgradation and rehabilitation of the equipments should be done along with the provision of 3 stage and/or 4 stage shunting notches of the BA panels. These BA panels can be used in modular design all types of locomotives with the provision of

DBR. The detailed scope of work for upgradation and rehabilitation of such BA panels can be divided into following 3 categories –

- a) **Must change items:** The complete replacement of the insulating items, cables, rubber items, cable sockets etc will be replaced irrespective of the condition. Also, the pneumatic pipe lines, fittings and bus bars as per requirement shall be replaced and provided as new.
- b) **Serviceable materials to be retained:** Railways should use serviceable items which need not to be either taken as new nor need upgradation or rehabilitation. These items are all type relays (QD, Q20, QF, QE), shunts (ammeter, QF), CTs, inductive shunts, switches (HQOP, RQOP etc) and shunting resistance (RS). Railways may supply these items to the contractor if the work is carrying out by the outside agencies.
- c) **Items for upgradation/rehabilitation:** The following items should be taken up for upgradation/rehabilitation as per the latest CLW/RDSO's specification and drawings.
 - i) **Motor contactor:** The upgradation of line contactor from 1000 amp to 1500 Amp should be done. If the contactors are already upgraded the same can be taken up for overhauling and replacement of items like fixed and mobile tips, arc-chute, insulating items and fasteners. Railway may decide according to the availability of the upgraded motor contactors with them.
 - ii) **Shunting contactors:** The shunting contactors can be taken up for overhauling and replacement of fixed and mobile tips, arc-chute, insulating items and fasteners. Railways may also supply overhauled/new shunting contactors if additional shunting contactors are required for provision of 3 stage/4 stage shunting notches.
 - iii) **Reversers (J1 & J2) & Traction change over switches (CTF1, 2 & 3):** The presently used drum type reversers/CTF can be replaced with the cam type reversers/CTF as per RDSO's specification no. RDSO/2009/EL/SPEC/0090 Rev '0' issued in January 2009. As per the specification, there are large numbers of items which are common for the existing drum type and cam type reversers. The serviceable parts can be used. The cam type reversers/CTF can be fitted in the same space and location of the existing reverser with the change of bus bars and one centrally located flexible connection. The details of the bus bars are given in the RDSO's specification for the cam type reverser/CTF for one to one fitment of reverser in BA panels as guidelines. Moreover the fitment of CTF can also be done on similar lines except minor variations in the shape of busbars.
 - iv) **C145 contactors:** This can either be used as it is or after overhauling and replacement of insulating items, fasteners and contact tips.

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3.0 Current references:

S. No.	Items	CLW's /RDSO's Specification	CLW's/RDSO's Drawings
1	CTF 1 & 2	4TTS.101.005(A).Alt-5	1TWD.103.001.Alt.6
2	CTF 3	4TTS.101.001(A).Alt-5	1TWD.103.028.Alt.6
3	Reverser (J1 & J2)	4TTS.101.005 Alt. 5	1TWD.103.008.Alt.6
4	Motor Contactor (MC)	4TES.110.001.Alt-1	0TWD.112.001.Alt.12 4TWD.112.043.Alt.4

5	Shunting Contactor (SC)	4TES.111.003.Alt-Nil	1TWD.111.111.Alt.10 4TWD.111.034.Alt.1
6	C - 145	4TTS.113.001.Alt-Nil	1TWD.113.039.Alt.4 4TWD.113.061.Alt.2
7	Cam type reverser/CTF	RDSO spec RDSO/2009/EL/SPEC/ 0090 Rev '0'	RDSO drg. No. SKEL-4754, SHEET no. 1 to12
8	Bus Bars for fitment of Reverser (RAB-T3) in the existing BA panels	RDSO spec RDSO/2009/EL/SPEC/ 0090 Rev '0'	RDSO Drg. No. SKEL-4756 SHEET no. 1 to 9

4.0 The work should be done from RDSO/CLW's approved sources. During upgradation/rehabilitation, the spares & items required must be procured from RDSO/CLW's approved sources only.

5.0 The individual testing of major equipments/items shall be done as specified in the relevant specification and records are to be maintained.

Encl: Nil


for Director General/Electrical