

**Government of India
Ministry of Railways
Research, Designs & Standards Organisation
Manak Nagar, Lucknow - 226 011**

No. EL/3.2.30

Dated : 20.5.1991

MODIFICATION SHEET NO. RDSO/WAM4/161

Replacement of cast iron transition resistances (RGR) by stainless steel transition resistances in tap changer Type No. 32 of M/s HBB make.

1. OBJECT

- 1.1** Railways have reported a large number of cases of overheating / melting /burning of cast iron (CI) resistances (RGR). Investigations have revealed that these failures are primarily due to shorting of the grids as a result of vibrations encountered in service as well as deformation due to overheating. RDSO, vide Modification Sheet No. RDSO/WAM-4/152 have already implemented staggering of the grids to overcome the above. Though this modification has arrested the problem to a certain extent, it has not been possible to completely eliminate the same.
- 1.2** Service trials have been conducted on locomotives homed at Ghaziabad, Tatanagar and Kanpur Electric Loco Sheds using stainless steel (SS) RGR and no adverse reports have been received regarding their performance. Tests to evaluate the thermal capabilities of the stainless steel RGR vis-a-vis cast iron RGR under identical loading conditions were also carried out jointly by Ghaziabad Electric Loco Shed, RDSO and the Manufacturers. These have also been satisfactory.
- 1.3** M/s ABB/Switzerland and M/s GANZ/Hungary have already switched over to the use of stainless steel RGR grids in their tap changers.
- 1.4** It has therefore been decided to use stainless steel RGR in place of cast iron RGR.
- 1.5** The use of stainless steel RGR has definite advantages over the use of cast iron RGR as under :-
- (a) High melting point as compared to cast iron grids;
 - (b) Improved mechanical strength to withstand vibrations and shock in service and also accidental mishandling;
 - (c) High alumina ceramic insulators and bushes used in stainless steel RGR in place of problematic mecanite tubes;
 - (d) Casting defects eliminated as stainless steel grids formed from sheets;
 - (e) In case of tap changer sticking between notches, the stainless steel RGR grids open circuit, but do not melt and fall;
 - (f) Stainless RGR is light in weight.

2. WORK TO BE CARRIED OUT

Replace the existing CI RGR with stainless steel RGR.

3. APPLICATION TO CLASS OF LOCOMOTIVES

All electric locomotives fitted with No. 32 tap changers.

4. Material required :

4.1 Brief technical specification of the stainless steel RGR.

4.1.1 The grids used in the stainless steel RGR should be punched from prime quality cold rolled stainless steel sheets Grade AISI 304.

4.1.2 **Chemical composition :**

Ni	:	8 to 12 %
Cr.	:	17 to 20 %
C	:	0.08% Max.
Mn	:	2.0% Max.
S	:	0.03% Max.
P	:	0.045% Max.

4.1.3 **Electrical parameters .**

- Resistance : $1.61 \pm 10\%$
- Current rating : Continuous 77A.
Temperature rise should be within 300°C .
Short time 165 A RMS.
Three consecutive cycles
each cycle of duration
12 sec. ON. 30 sec. OFF.
Temperature rise should be within 140°C .
- High Voltage withstand : 3 KV, 50 Hz. for 1 minute.
 - between element and mounting rod
 - between mounting rod and mounting bracket.

4.2 Construction

- (1) The grids shall be punched from cold rolled SS sheet Grade AISI 304 at least 1.2 mm thick and maximum 230 mm. wide.
- (2) The minimum intergrid spacing shall be 12 mm.
- (3) The intergrid connection of each section shall be through spot welded SS links. The spot welding shall be done by a precision spot welding machine pneumatically operated and having a timer and electronic control.
- (4) The total assembly of grids shall consist of 6 to 8 sections (with welded links). These sections shall be bolted to each other by using spring washer/check nut and the current shall flow through copper spacers.
- (5) The intergrid connections shall be through two parallel paths.
- (6) All hardwares used shall be of high tensile steel.
- (7) The grid shall be sturdy and suitable stiffeners shall be provided.
- (8) The grids shall be mounted on four ceramic insulating rods.
- (9) The mounting rods and the grids shall be insulated by High Alumina/Steotite Interlocking Bushes.
- (10) The secondary insulation between the mounting rod and the bracket shall be through round glazed porcelain insulators and Hylam Tube.
- (11) The end terminals shall be of copper suitably connected with the end grids and supported on the mounting rods.
- (12) Interchangeability shall be possible with existing CI grid resistor assembly without any modification.
- (13) Overall general arrangement and broad details of SS grid RGR shall be as per RDSO SK EL 4031.

4.3 Manufacturer : M/s Lachhman Electronics,
11-B, Jaipur Estate,
Nizamuddin East,
New Delhi - 110 013.

5. MATERIAL RENDERED SURPLUS

Existing CI RGR.

6. Reference :

- (i) Item 3 (Page 3) of the Minutes of the meeting held between Railways and M/s HBB in July, 1989 and circulated vide. RDSO letter No. EL/3.2.30 dated 28.8.1989.
- (ii) Item 4 (page 1) of the Minutes of the meeting held between M/s ABB Engineers and RDSO in March, 1990.

7. Modification Drawing Number :

RDSO SK EL 4031

8. Agency of implementation :

- Electric Loco Sheds and POH shops for existing AC locomotives.
- CLW for AC locos under production.
- M/s ABB on new supply of tap changer.

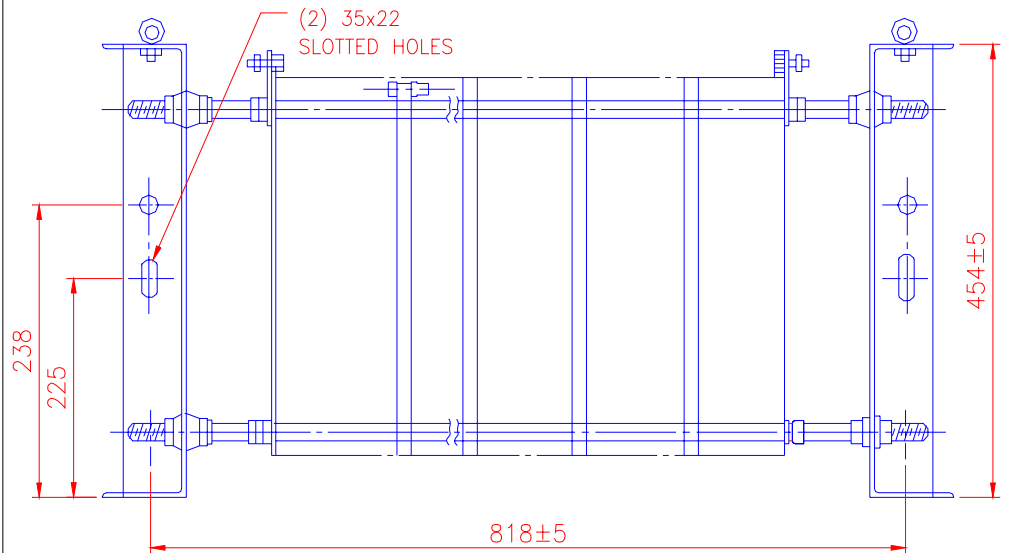
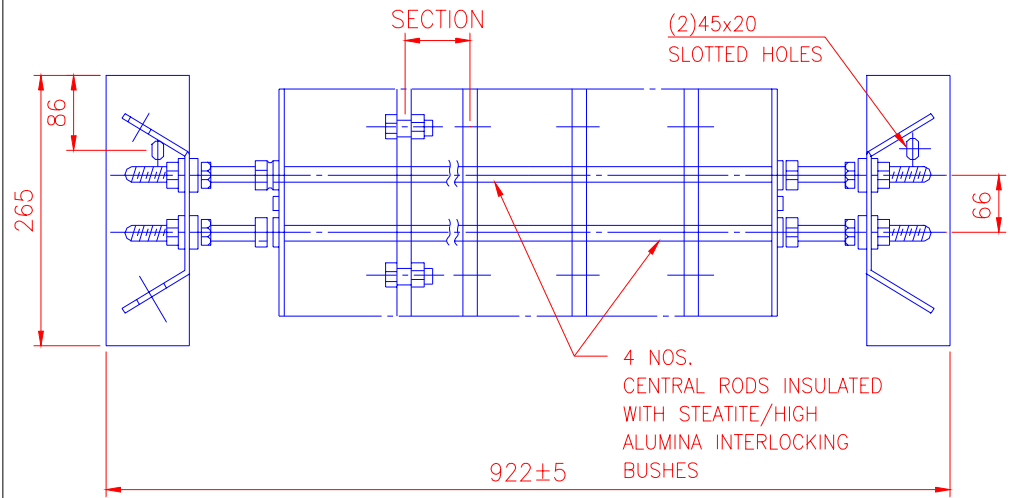
9. Distribution :

As per mailing list attached.



(Arun Srivastava)
for Director General/Elec.

Encl : Modification
Drawing SK EL 4031



EL/AOCZ/20 9/93

REF:—

SCALE:—

APPROVED:—

FOR D.G.

GENERAL ARRANGEMENT OF TRANSITION
RESISTANCE FOR TAP CHANGER

No.32

RDSO.ELEC.DTE.

SK EL-4031

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