

Traction Installation

Recent Achievements

High Rise OHE

With a view to meet the requirements of satisfactory current collection under high rise overhead lines of the proposed Dedicated Freight Corridors (DFC) of Indian Railway, RDSO has developed reliable and maintenance friendly High Reach pantograph to provide satisfactory current collection at varying heights ranging from 4.58 meter to 7.6 meter under all weather conditions, at operating speeds up to 160 kmph. The pantograph uses state-of-the-art technology (air springs in lieu of mechanical coil spring) for its raising and lowering, thereby ensuring improved dynamic behaviour during current collection. The pantograph will be suitable for working on DFC as well as under the existing OHE.



A trial was successfully conducted from 07.07.2008 to 09.07.2008 on Jakhapura - Tomka section of East Coast Railway by running train hauled by Electric Locomotive fitted with High Reach Pantograph under 7.45 mtrs. high OHE. Although the pantograph is designed for a speed of 100 km/h, the trial could be conducted upto 70km/h only in view of many speed restrictions in the section. Successful completion of the trial has established suitability in running of Electric Locomotive hauled train under high rise OHE for movement of double stack container in proposed Dedicated Freight Corridor. RDSO has developed two sources for this item using the state-of-the-art technology for conventional as well as three phase electric locomotives also. A few units have been put under field trial in locomotive of SCR.



2.2 Report on codal life of TRD assets – All the items of OHE & PSI are not presently covered in the list of codal life issued by Railway Board from time to time. It was decided in 27th MSG to form a committee to recommend the codal life for all OHE & PSI items. Report has been prepared and submitted to Board for approval.

2.3 Revision of feeder protection module specifications:

A revised specification No TI/SPC/PSI/ PROTCT/ 5070 for feeder protection module have been issued by RDSO. The relay module has been developed by both the approved vendors and type testing of same has also been completed for one vendor & is in progress for other as per revised specification.



Revised setting guidelines for numerical type feeder protection module and Delta-I relays were also finalized and circulated to Zonal Railways.

2.4 Development of new generation protection relays for Mumbai sub-urban for MRVC

The development of new generation microprocessor based numerical protection relays was done for MRVC as per RDSO specification no. TI/SPC/PSI/PROTCT/4050. The prototype tests on relays and panels have been completed and for first time EMI and

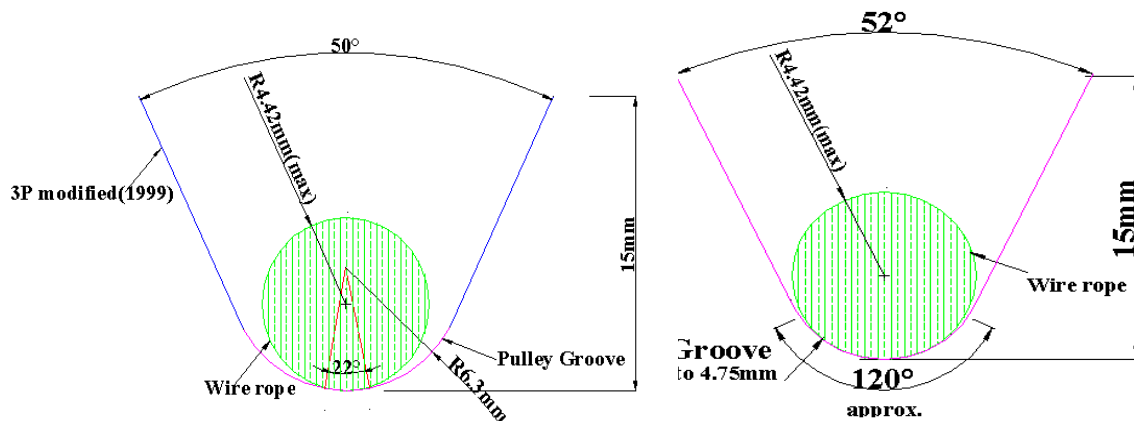


EMC tests as per IEC specifications have been carried out on all the numerical relays. The new features that will be available on IR for the first time will be, microprocessor based numerical protection modules for transformer protection, reverse power flow relays, extensive communication & memory usage on all relays, synchro-check relays and bus bar protection scheme apart from parallel operation of TSS in sub-urban areas.

The relays and panels are presently under commissioning at all the traction sub stations between CCG-VR section of Mumbai.

2.5 Developed specification of Stainless Steel Wire Rope & ATD (pulley) to improve reliability

27.7% of the total OHE failures pertain to Stainless Steel Wire Rope & ATD. RDSO conducted detailed study of standards pertaining to ATDs & practices being adopted by DMRC & Foreign Railways and found that pulley groove radius of ATDs used on IR is nearly 50% more than groove radius i.e. much higher than the value being adopted else where. Accordingly, RDSO revised specification & drawing of 3-pulley ATD by modifying the pulley groove profile.



Besides, SS wire rope of different compositions were subjected to endurance tests & based upon outcome of tests, revised specification of SS wire rope have been issued. Endurance tests were carried out with ATD and wire rope manufactured as per RDSO revised specification and the results indicates improvement in service life of wire rope by more than 4-times.

2.6 Power Quality aspects to 25 kV Traction supply

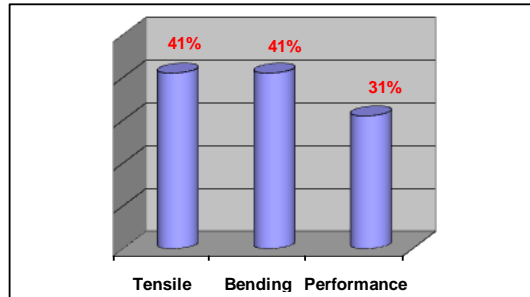
The electricity Act 2003 which has been introduced recently has specified the obligation for licensees as per Section 79(i) Para (h) & (i) that Central Commission has to specify and enforce the standards with respect to quality, continuity and reliability of services by licensees as specified by the grid code having regard to grid standards. Finally a report on monitoring of power quality parameters has been circulated to Railways.

2.7 Revised specification of porcelain insulator to improve reliability

To address the problem of insulator failures, RDSO has conducted in house study based on the failure analysis, Laboratory test results of RDSO and study conducted by IT/BHU and CPRI/Bangalore. RDSO has further discussed and deliberated the various aspects and issues with CORE, Railways and manufacturers and accordingly has revised the specification for porcelain insulator and same has been issued vide this office letter

No.TI/OHE/INS/GENL/07. Insulator manufactured as per revised specification is expected to improve the reliability of insulators manifold.

Prototype tests on revised specification were carried out in 2008 & results are very encouraging, The % improvement in the mechanical properties may be seen from the following graph:



1600 mm creepage path composite insulator

2.8 Development of Insulator for very heavy polluted Zones

Very high creepage distance i.e. 31 mm/kV insulators for use in polluted zones have been approved for manufacture. Prototype testing of two vendors has been successfully completed and the insulator are under field trail..

2.9 Development of 30 MVA transformers

30MVA, ONAN transformer with on load tap changer traction transformer has been developed by AREVA & EMCO. RDSO has carried out Prototype tests successfully. Both type of transformers have been dispatched to Mumbai for commissioning.



2.10 Development of Motorized Isolators

RDSO has developed & issued the specifications for 25 kV motorized isolators in Aug, 2006. These motorized isolators can be used in OHE at stations, yards and sidings as well as at TSS/SSP/SP & are expected to give the flexibility in operation for loading/ unloading in sidings as well as quicker isolation in case of faults.



2.11 Power line crossings (revision of SOD)

RDSO has proposed modification for power line crossing due to increase in the height of double stack containers. The same has been approved and issued by Railway Board.

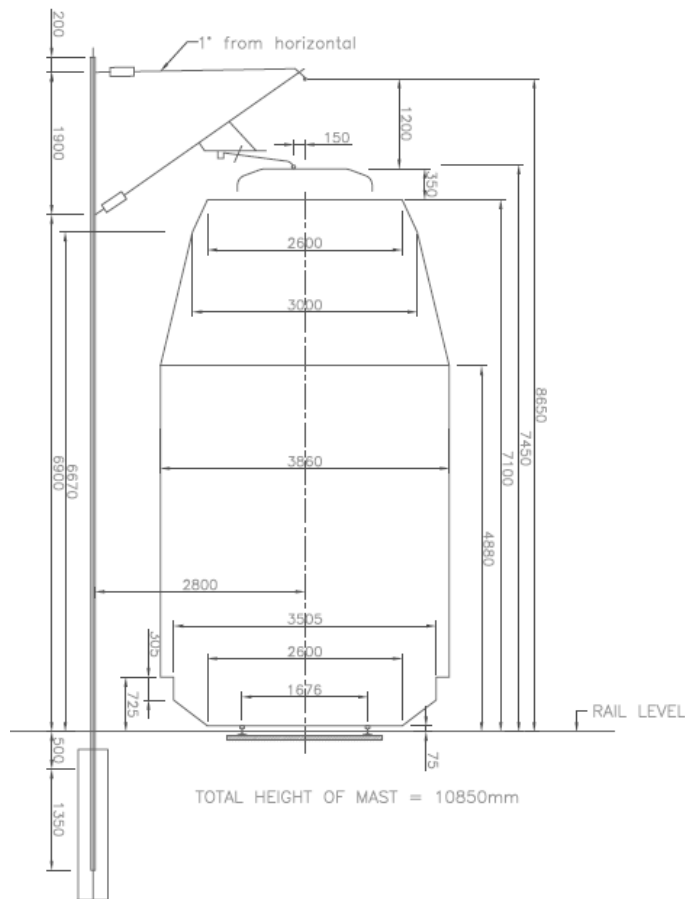
2.12 Design of 40 meter portal

RDSO has finalized design of 40 meter R type special portal for Mumbai area to facilitate ac-dc conversion.

2.13 Development of PS class CT & PT for Mumbai area

5P class CT/PT are used by Indian Railways for 25kV a.c. traction system. However, considering higher fault level and requirement of high accuracy to make the criterion set for fault discrimination in Mumbai sub-urban area, RDSO developed PS class CT/PTs and completed type testing for 25 kV, 110 kV PS class PT&CT for protection of Mumbai area.

2.14 Design of OHE for dedicated Freight Corridors (Double stack container with stock height 6810mm) have been prepared with 7.45m contact wire height



NOTES:- ALL DIMENSIONS ARE IN mm
UNLESS OTHER WISE SHOWN

3.0 Other milestones

3.1 Mechanized Vehicles for Electrification:

RDSO has prepared following specifications to facilitate mechanized Electrification works

- a. Wiring Train
- b. Auger Vehicle
- c. Mast Erection Machine

3.2 Revised specifications for 4-wheeler & 8-wheeler tower wagon issued to Zonal Railways.: The specification for 4-wheeler & 8-wheeler tower wagon with hydraulic transmission & mounting of under slung engine has been issued & circulated to Railways.

3.3 SCADA system specification for Mumbai area with integration of numerical relays with SCADA.

RDSO has finalized the specification amendment no.1 (7/09) to RDSO specification no. TI/SPC/RCC/SCADA/1080(9/08) issued on 21.7.2009. for SCADA systems for 25 kV single phase 50 Hz a.c. traction power supply system for Mumbai Area. After approval of Railway Board, the specification has been issued to Central and Western Railways.

3.4 Corrosion Resistant Paint System

Based upon the RDSO's specification, Board has approved trial of corrosion resistant paint system. Scheme for its trials has been finalized and circulated to concerned Railways.

3.5 132/220 kV Underground Cable for transmission line

The specification has been approved by Board for provision of EHV cables in lieu of overhead transmission lines.

3.6 Relay testing kit for testing of electromagnetic/static/ microprocessor based numerical relays used for 25kV, ac, 50 Hz, single phase Traction system on Indian Railway. Specification has been issued to all railways after approval of Board.

3.7 Gas type ATD

For critical locations where sufficient room is not available for counter weight installation, Gas Type ATD is proposed to be used as a trial as decided during the 27th MSG TRD meeting. RDSO framed specification for this ATD & same has been sent to Eastern Railway in Sept 2008 after approval of Railway Board for conducting trial. Procurement action is being taken by ER.

3.8 Control relay panel with all numerical relay

RDSO has prepared specification for Control & Relay Panel for 25 kV a.c. TSS incorporating numerical type protection relays and issued it to RDSO's approved manufacturers of Control & Relay panels and relays for development of the same.

M/s ASHIDA, Thane has completed the development and type tested successfully and approved as per the new specification.



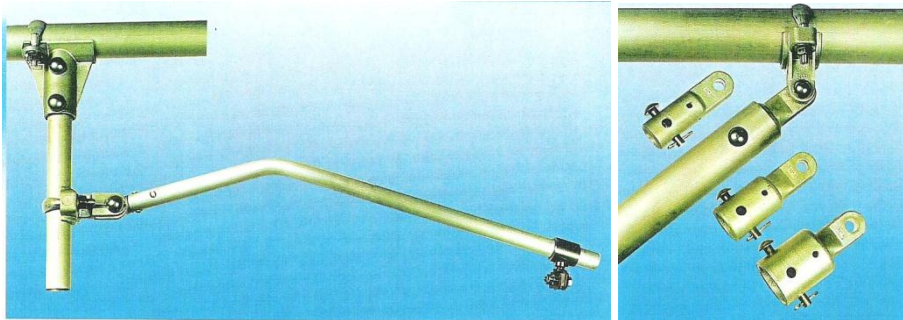
The development of such type of C&R panel by M/s ALIND, TVC is under progress

3.9 Modular cantilever system

Specification has been prepared and sent to Northern Railways after Board's approval for conducting trials

The advantages are:

- Modular system
- All kinds of support
- For both high load and light weight support
- Compatibility with existing products



3.10 8 Wheeler Diesel Electric Tower Wagon

Specification has been approved and circulated to Zonal Railways.

4.0 Reports/General/Maintenance related guidelines issued in recent past:

4.1 The directorate has prepared report No TI/Report/00075 (09/2008) titled as 'Mechanization of Railway Electrification and Maintenance work' under direction from Railway Board to study the scope for mechanization in Indian Railway Electrification and maintenance areas. The report highlights various mechanization techniques being adopted by the Railways abroad and the equipment that are available for the construction and maintenance.



It covers the following areas:-

- Mechanization of foundation laying process including the changes in foundation design required.
- Mechanization in wiring and post wiring activities
- Mechanization requirement in maintenance of running OHE
- Identification of machinery (e.g. Rail-cum-Road vehicle, self propelled wiring train) required for mechanization of works in RE & maintenance of OHE for reduction in time.

4.2 Report on High Density Routes

The blue print for upgradation of High Density Routes to achieve the freight targets of 1100 MT in XI plan has been prepared. It identifies 7 routes which may need upgradation or provision/ augmentation of traction power supply or OHE. To address the issue RDSO has prepared a report detailing guidelines for augmentation.

4.3 Guidelines for parallel operation of transformers and its protection

RDSO has prepared guideline for paralleling of transformer and protection scheme to facilitate augmenting of existing power supply.

4.4 Report on the metering practices on ac traction over IR.

RDSO has issued final Report no. TI/REPORT/PSI/00075 (07/08) on “25 KV Traction Metering Practices on Indian Railways” to IR.

4.5 A report No.TI/REPORT/OHE/00070 on “failures analysis of 25 kV solid core porcelain insulators” has been prepared and circulated to all Zonal Railways.

4.6 Use of minimum 1050mm creepage insulators for traction application

4.7 Bird guard for transmission line

4.8 Anti climbing device for traction mast

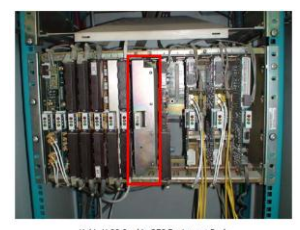
4.9 SMI for pre installation test of porcelain & composite insulator

4.10 Use of 11kV anti fog disc insulator for transmission line

5.0 Important works in progress

5.1 High speed data transfer communication system for SCADA

The trials of the 9600 bps data transfer speed was undertaken by RDSO to improve the present communication speed of 600/1200 bps. The trials have



Hokla V.28 Card In OFC Equipment Rack

now been completed and the trial system of 3 RTU's is working satisfactorily since 28-01-09 at Ambala Division. Instruction for increasing data transfer speed of traction SCADA system issued to CEE/CR on 22.10.09 for implementation on one complete SCADA system.

5.3 Guidelines for OHE arrangements in electrified sidings for smooth loading & unloading

There is an urgent need felt by Railways for top loading in electrified sidings, which is presently a constraint. Though, certain models are being adopted by Zonal Railways, but there are no standardized and obstruction free loading arrangement under OHE. RDSO took up the project and studied the schemes suitable for such applications. Schemes duly approved by Railway Board has been sent to Zonal Railways vide guidelines No.TI/MI/0043 (01/2009) dated 28.01.2009.

5.4 Condition monitoring of lightening arresters (LAs)

RDSO associated in conducting third harmonic resistive current measurements on lighting arrestors (LA) to assess the health of the LAs organized by North Central Railway, Allahabad division. The measurements were recorded by PGCIL team at Dadri GSS.



5.5 Development of 5 pulley ATD

For the specific requirement of Central Railway for Mumbai area, where in it has been decided to go in for regulated OHE on new lines, RDSO has developed specification & drawings for 5 pulley ATD for the first time, after collecting details from Central Railway. The proposal has been discussed in Board and comments on the query of Board regarding effect of ATD on foundation & mast size have been sent to Board. Approval is awaited through Rly Board.

5.6 Development of stranded galvanized wire as a replacement of guy rod as a Anti-theft measure

To solve the problem of theft of guy rod, stranded galvanized wire as a replacement of guy rod is being developed as an antitheft measure. Specification has been framed and circulated by RDSO. Sample based upon the draft specification were sent to ECR and ER have been stated by the Rlys that there was no problem in fitment of wire and performance in initial three moths has been satisfactory.
