



## **ELECTRICAL DEPARTMENT**

- I. Electrical Department on Konkan Railway is headed by the Chief Electrical Engineer (CEE) who is assisted by two Deputy Chief Electrical Engineers and one Senior Electrical Engineer at the Corporate Office. Main functions of the Corporate Office are:
- Laying down the policies and guidelines for safe and efficient working of the organization.
  - To oversee budget allocation and its proper expenditure with a view to minimize unproductive expenditure.
  - Liaison with other Zonal Railways for punctual and safe running of the trains.
  - Arranging Training for Officers, Supervisors and staff.
  - Fostering Culture of innovations and modifications for achieving higher efficiency in operation.
  - Chief Electrical Engineer, Central Railway is the Electrical Inspector to Govt. of India (EIG) for Konkan Railway. Scrutiny of all proposal requiring EIG's sanction / permission and to put up the same to EIG for sanction.

In addition to above, CEE is entrusted with Udhampur Srinagar Baramulla Rail Link (USBRL) project for which he is assisted by one Chief Electrical Engineer (Project), three Deputy Chief Electrical Engineers, one Senior Electrical Engineer and one Assistant Electrical Engineer. Further, CEE is also entrusted with Railway Electrification work on Konkan Railway route for which he is assisted by one Chief Electrical Engineer (RE), one Deputy Chief Electrical Engineer, one senior Electrical Engineer and one Assistant Electrical Engineer.

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## **II. PASSENGER SERVICES (TRAIN LIGHTING AND AIR CONDITIONING):**

For passenger service operation, Konkan Railway has a holding of 177 coaches which includes both AC & Non AC coaches. Two Mail / Express trains (Mumbai CST - Madgaon Konkan Kanya Express, Mumbai CST Madgaon Mandavi Express) and two passenger trains (Madgaon-Sawantwadi-Diva and Madgaon-Ratnagiri-Dadar) are maintained at Madgaon station. In addition to this, secondary maintenance of Goa Sampark Kranti Express, Madgaon Ernakulam Express and Madgaon H.Nizamuddin Rajdhani Express is done at Madgaon. Maintenance is carried out both during day and night time.

Electrical Complaints, if any, in the “through trains” passing Konkan Railway jurisdiction are attended by staff at Ratnagiri and Madgaon stations.

## **III. PASSENGER AMENITIES :**

An Escalator has been provided at Ratnagiri, Kankavali, Madgaon and Udupi stations. A passenger lift and Travelator (walk along) has also been provided at Ratnagiri station as a measure of Passenger Amenity.

## **IV. TRAINING :**

The bed rock of the organization is a large number of technicians. For enhancing their technical and communication skills and to prepare them for taking up higher responsibilities, a special training module named as Gyan Sagar (e-Learning) has been designed for them covering all subjects with special emphasis on local work requirements. Training is provided ‘in-

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house'; wherein Konkan Railway executives share their experience and skills and teach them a few subjects.

Training course for the supervisory as well as artisan staff are regularly arranged at Konkan Rail Academy (KRA), the training institute of Konkan Railway.

## **V. MULTI-TASKING :**

Konkan Railway is following the practice of multi-skilling for optimum utilization of human resource through technological innovations in order to achieve the mission of providing service with excellence. This had also earned appreciation for the Corporation from the World Bank. Multi-skilling and efficient management practices with emphasis on cost-reduction measures will continue to be the guiding tenets of the Corporation.

In Electrical Department, technicians are trained to handle all varieties of tasks like maintenance of electrical assets, maintenance of train lighting and Air-conditioned coaches and maintenance and operation of the tunnel ventilation system.

## **VI. SPECIAL FEATURES :**

### **a. LIGHTING IN TUNNELS :**

On Konkan Railway route lighting arrangement is provided in tunnels longer than 500 meter. Shorter tunnels with curvature are also being provided with lighting arrangement in order to improve visibility.

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Specially designed light fittings for tunnel applications are provided on the tunnel walls at the interval of 12.5 meter. Lights provided over trolley refuge are kept permanently “ON”. In emergency all lights can be switched “ON”. Power socket outlets are provided inside the trolley refuges approximately at every 100 meter for flood light fittings and other small portable tools required for working inside the tunnels.

For providing additional illumination inside the ventilated tunnels during monsoon period, additional lights, almost more than three times the lights glowing earlier, have been provided on experimental basis.

#### **LED based Tunnel Lighting:**

High Pressure Sodium Vapour (HPSV) type light fittings were provided for tunnel lighting during construction phase of Konkan Railway. Such luminaires emit yellow light and are energy in-efficient. Over the period, lighting technology has undergone a sea change. Since the environment inside the tunnels is quite different, ordinary light fittings are not found suitable for tunnel applications. Experimentation done with Compact Fluorescent Lamp (CFL) and T5 fitting did not yield the desired results. After extensive trials, proper specifications of LED lights have been developed for tunnel application by 'in-house' effort. These compact LED type light fittings emit white light and are energy efficient. With the provision of LED lights, the illumination inside tunnels has increased considerably. Also, there is saving in energy consumption by about 35-40%. Their life cycle cost is low and thus are economical in the long run. White light emitted by such lights eliminates any confusion to the Loco Pilots in sighting signals provided inside the tunnels.

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## **b. VENTILATION ARRANGEMENT IN LONG TUNNELS:**

Diesel locomotive hauled Passenger & Freight trains operating through long tunnels leave behind dense smoke inside these tunnels polluting the tunnel environment and also reducing the visibility level. Therefore Forced Air Ventilation arrangement is provided to generate desired forced air velocity inside the tunnel to clear/ reduce the pollution level and also to improve visibility.

Following two types of Tunnel Ventilation systems are adopted:

- (i) Longitudinal ventilation system: In tunnels without shafts, Jet fans are suspended from the crown of the tunnel.
- (ii) Transverse ventilation system: In tunnels with shafts, Large capacity centrifugal/ axial flow fans are provided in a suitable fan building cum air handling room on top of the shaft.
- (iii) Transverse ventilation system with Centrifugal fans is provided in Karbude Tunnel. Jet fans are provided in other ventilated tunnels namely Nathuwadi, Parchuri, Tike, Berdewadi, Barcem and Karwar.

## **TUNNEL AMBIENCE MONITORING SYSTEMS :**

For monitoring the ambience inside the tunnels sensors have been provided to monitor levels of carbon monoxide (i.e. CO level), temperature, Visibility and Smoke inside the tunnels for safe passage of Train.

Train location inside the tunnel is monitored with conventional track circuiting or Infra Red units.

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**c. SELF PROPELLED ACCIDENT RELIEF MEDICAL VAN (SPARMV):**

As the name suggests, SPARMVs are required to provide medical and other relief at the accident site within the quickest possible time. One set each of SPARMV is stationed at Ratnagiri and Verna station.

Both the SPARMVs are equipped with the necessary re-railing, cutting, lighting and medical equipments for meeting requirements of emergency situations. The SPARMVs have a speed potential of 75 kmph.

- d.** In our endeavour to improve working conditions for higher productivity and safety, air conditioning has been provided in running room at Surathkal and Madgaon so that staff may rest well and perform duties with more alertness.

**VII. TUNNEL LIGHTING & VENTILATION WORKS EXECUTED :**

**a. MSRDC MUMBAI-PUNE EXPRESSWAY ROAD TUNNELS :**

The work of provision of ventilation and lighting in five twin tube tunnels of Bhatan, Madap, Khandala, Kamshet I and Kamshet II in the Mumbai-Pune Expressway was awarded to Konkan Railway on invitation by Maharashtra State Road Development Corporation (MSRDC) which was successfully undertaken by the Corporation at an estimated cost of ₹.24.36 crore (electrical works). This work involved provision of sophisticated microprocessor based monitoring & control system, commissioned for the first time in the country for road traffic inside a tunnel.

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**b. “JAWAHAR” ROAD TUNNEL IN J&K STATE :**

Recognizing Konkan Railway's professional skill and special expertise in the field of Tunnel Lighting, Ventilation and Control Systems, Border Roads Organization awarded a turnkey project of developing, design, specifications, and detailed engineering, erection and commissioning of micro processor based lighting, ventilation, environment/ambience control and surveillance system of twin tubes of Jawahar Road Tunnel along Jammu-Srinagar Highway at a cost of ₹ 9.17 crore. This project was completed and the system commissioned on 10th December, 2000. This feat was achieved against all odds in tough terrain and highly uncondusive environment such as extreme climatic conditions and prevalent militancy.

**c. CONSULTANCY WORKS :**

Konkan Railway has provided consultancy for designing of Ventilation System in two railway tunnels of Koraput-Raigada section of South Eastern Railway. The consultancy included design, providing detailed engineering drawings, specification, preparation of tenders etc. The work has been executed under the supervision of Konkan Railway's engineers.

Konkan Railway has also rendered consultancy for designing Ventilation System in 2.2 km Railway tunnels near Khandala in south east ghat section of Central Railway.



## **VIII. CONSERVATION OF ELECTRICAL ENERGY - MARCH TOWARDS GREEN TECHNOLOGY :**

Train operation on Konkan Railway has significantly increased in the recent years. To provide services matching to the enhanced requirement of train operation, Electrical infrastructural facilities have to be inescapably augmented resulting in higher connected load. However while doing so special care has been taken to ensure conservation of electrical energy with an emphasis on the use of green technology to address environmental concerns.

Various measures adopted for the same include:

- “Intelligent Lighting system” for station area lighting has been provided at 16 stations on KR route, through which station area lighting is automatically switched ‘ON’ or ‘OFF’ depending on train arrival-departure and ambient illumination levels.
- Passive Infra Red (PIR) motion detectors have been provided in officers’ cabins to automatically switch off AC and other Electrical loads when the cabin is unoccupied.
- Compact Fluorescent Lamps (CFLs) and energy efficient T5 fittings are being provided in place of fluorescent tube lights.
- Old and energy inefficient ACs have been replaced with new energy efficient machines having rating of 3 star and above.
- Automatic and remote operations of pumps has been provided at 3 stations.
- Solar lamps and Solar water heater have been provided in Rest Houses and Running Rooms. Their usage is being promoted further.

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- LED based lamp which consume very little power are provided inside all lighted tunnel.
- Incandescent Lamps have been completely phased out and replaced by CFLs.
- Wind + Solar Hybrid Renewable Energy System have been provided at Vinhere station and Level Crossing gate No.17 & 32 of capacity 7.5 KW & 950 W respectively.
- Continuing our endeavours to promote usage of clean energy, Solar Power Plant of 350 kilowattpower at Ratnagiri, 25 kilowattpower each at Chiplun, Kankavali & Kudal, 20 kilowattpower each at Sawantwadi & Karmali, 7 kilowattpower each at Thivim & Udupi and 2 kilowattpower each at Khed, Chiplun & Kankavali stations have been installed.
- Halogen lights for “Rolling-in” examination of rakes have been replaced by LED lights at Ratnagiri, Madgaon & Surathkal stations resulting in better illumination levels, with reduction in energy consumption. This helps the 'Rolling-in examination in better way. This has improved the productivity and safety.
- LED lights have been provided in toilet at all stations. With this provision, the illumination levels have improved.
- HPSV High masts having HPSV type light fittings have been replaced by LED type fittings at Chiplun, Kankavali, Kudal, Sawantwadi & Madgaon stations. Also High mast with LED light fittings has been provided at Kumta station covering approximate 1962 sq.mtrs of circulating area.

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## **IX. TECHNOLOGY DEVELOPMENTS :**

### **a. INTELLIGENT LIGHTING SYSTEM :**

Capturing Train movement from the computer (Railway Application Package), the Intelligent Lighting System automatically raises illumination to full levels just before arrival of a train, on approach road, circulating area, main porch and the platform on which the train is likely to arrive. At rest of the areas, the lights are kept ON to partial levels providing general illumination. Lights are automatically restored to partial levels after a pre-set interval after departure of the train.

The system also provides for automatically sensing the ambient illumination levels to switch ON/OFF the lights whenever visibility is poor during daytime, for e.g. during a cloudy afternoon.

This fully automatic system eliminates any human intervention, is energy efficient, saves human resources and provides valuable database which can be gainfully utilized for “Predictive Maintenance”. This also reduces the down time and increases the availability of equipments.

### **b. REMOTE OPERATION OF TUNNEL VENTILATION SYSTEM:**

Forced Ventilation system in five tunnels was provided during construction phase. In these tunnels, the tunnel ambience and ventilation system is controlled locally through Tunnel Ventilation Control Room (TVCR) provided near one of the tunnel portals. These TVCRs are manned round the clock for monitoring ambience inside the tunnel and for operation of the jet fans.

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In order to achieve better control, higher flexibility for operation and savings in terms of human resources otherwise required in case of local TVCRs, the operation of Tunnel Ventilation system of Tike, Berdewadi and Nathuwadi tunnels is now being done remotely from Karbude TVCR. Similarly the operation of Tunnel Ventilation system of Barcem Tunnel is being done remotely from Karwar TVCR.

**c. PASSIVE INFRA RED (PIR) MOTION DETECTORS :**

For efficient energy management and to automatically switch off the Light and ACs when the cabin is unoccupied by the official, Passive Infra Red (PIR) Sensors have been used. These sensors react to the body movement to automatically switch “ON” the connected electrical load such as lights, fan, AC etc and switch “OFF” (after a pre-set time delay), when the area is left unoccupied.

**d. SELF LIGHTED TRAIN :**

In order to illuminate Rail level and to provide convenient and safe alighting in a situation of unscheduled halt of a train, Konkan Railway has endeavored with novel application of technology. Footboard lights have been provided on both sides of the coach, which automatically light up as soon as the train halts and automatically switch OFF when the train starts. Thus the train rake itself illuminates the surface of the rail level platform during its halt. This offers great relief to passengers as they have sufficient surface illumination where they alight.

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## **X. ELECTRIFICATION :**

To take up route Electrification of Konkan Railway, work order for Section-1 Roha (excl.) to Verna(excl.) has been awarded to M/s Larsen & Toubro Ltd, Faridabad on 22.05.2017 with completion period of 36 months. Mobilization work is in progress. Further, work order for Section-2 [Verna (incl.) to Thokur (incl.)] has been awarded to M/s STS Kalptaru (JV) on 02.08.2017 with completion period of 30 months.

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