



## **ELECTRICAL DEPARTMENT**

I. Electrical Department on Konkan Railway is headed by the Chief Electrical Engineer (CEE) who is assisted by two Deputy Chief Electrical Engineer and two Assistant Electrical Engineers at the Corporate Office. Also Chief Electrical Engineer (CEE) is the Electrical Inspector to Govt. of India (EIG) for Konkan Railway. 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.
- Scrutiny of all proposal requiring EIG's sanction / permission and to put up the same to EIG for sanction.

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

For passenger service operation, Konkan Railway has a holding of 178 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-Diva) are maintained at Madgaon station. In addition to this, secondary maintenance of Goa Sampark Kranti 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-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.

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.

## **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.

### **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 Ratnagiri, Sawantwadi, Verna, Madgaon, Karwar and Surathkal 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.

**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:

- Energy efficient LED based lamp consume very little power are provided in all lighted tunnels, stations, offices, service buildings. With this provision, illumination levels have also improved.
- Old and energy inefficient ACs have been replaced with new energy efficient machines having rating of 3 star and above.
- Solar lamps and Solar water heater have been provided in Rest Houses and Running Rooms. Their usage is being promoted further.
- 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, 180 kilowattpower at Madgaon, 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.



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.

## **IX. TECHNOLOGY DEVELOPMENTS :**

### **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.

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 Nathuwadi, Parchuri, Tike, Berdewadi, Barcem and Karwar tunnels is now being done remotely from Karbude TVCR.

## **X. Railway Electrification :**

Konkan Railway is a very important economic rail link of West Coast passing through 3 states of Maharashtra, Goa and Karnataka. Hon'ble Prime Minister Shri Narendra Modi has dedicated Konkan Railway's electrified route to the Nation on 20-06-2022. Electrification of Konkan Railway route has not only enabled seamless train operation over the entire West Coast but also helped in reduction of energy cost by approximately 70% and in reduction of carbon footprints as well as preservation of ecology on Konkan Region.

A brief overview of electrification of Konkan Railway and its advantages are as under :-





### **Brief Overview of Electrification**

- Route km: 740 - Maharashtra: 382 km, Goa: 106 km & Karnataka: 252 km
- Track km: 970 - Maharashtra: 513 km, Goa: 163 km & Karnataka: 294 km
- Cost: ₹ 1287 Cr. (Equity ₹ 200 Cr., Debt ₹ 1087 Cr.)
- Completed on 28th March 2022.

### **Advantages**

- Internal Rate of Return (IRR) - more than 15%
- Approx 70% savings in cost of Energy for transportation
- 10% improvement in Average Speed
- Higher throughput which improves line capacity
- Seamless train operations over the entire west coast
- Saving in the energy being spent for running Tunnel Ventilation
- To preserve environment and to reduce carbon footprints
- To reduce dependency on imported crude oil

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