Indigenously Developed Kavach 4.0 Commissioned on Mathura-Kota Section of the Delhi-Mumbai Route

Commissioning of Kavach 4.0 on Mathura-Kota Section of Busy Delhi-Mumbai Route in Record Time a Big Achievement: Shri Ashwini Vaishnaw

Kavach Enables Speed Control for Loco Pilots Through Effective Brake Application; Loco Pilots to Get Signal Info Inside Cab, Even in Fog

Indian Railways to Commission Kavach 4.0 Nationwide Within 6 Years; Many Developed Nations Took 20–30 Years to Deploy Train Protection Systems

Railways Commitment to Safety: Kavach Among Many Other Safety Measures Backed by 1 Lakh Crore Annual Investment

Posted On: 30 JUL 2025 5:58PM by PIB Delhi

Indian Railways has commissioned indigenous railway safety system Kavach 4.0 on the Mathura-Kota section of high-density Delhi-Mumbai route. It is a significant step towards modernization of railway safety systems in the country.

Union Minister for Railways Shri Ashwini Vaishnaw said, “Railways has indigenously designed, developed, and manufactured the Kavach Automatic Train Protection System, taking inspiration from Hon’ble PM Shri Narendra Modi Ji’s ‘Atmanirbhar Bharat’ vision. Kavach 4.0 is a technology-intensive system. It was approved by the Research Designs & Standards Organisation (RDSO) in July 2024. Many developed nations took 20-30 years to develop and install train protection systems. The commissioning of Kavach 4.0 on the Kota-Mathura section has been achieved in a very short timeframe. This is a very big achievement.”

Advanced Train protection systems of international standard, were not installed in the country in the last 60 years after independence. To ensure train and passenger safety, Kavach system has recently been operationalized.

Indian Railways is gearing up to commission Kavach 4.0 on various routes throughout the country within a short span of 6 years. Over 30,000 people have already been trained on Kavach systems. IRISET (Indian Railway Institute of Signal Engineering and Telecommunications) has signed MOU with 17 AICTE approved Engineering colleges, institutions, universities for incorporating Kavach as part of their BTech course curriculum.

Kavach will help the loco pilots in maintaining train speed by effective brake application. Even in low visibility conditions like fog, the loco pilots will not have to look outside from the cabin for a signal. Pilots can see the information on the dashboard installed inside the cab.

What is Kavach?

- Kavach is an indigenously developed train safety system. It is designed to prevent accidents by monitoring and controlling train speeds.
- It is designed at Safety Integrity Level 4 (SIL 4). This is the highest level of safety design.
- Development of Kavach started in 2015. The system was extensively tested for over 3 years.
- After technical improvements, the system was installed in South Central Railway (SCR). The first operational certificate was granted in 2018.
- Based on the experiences gained in SCR, an advanced version 'Kavach 4.0' was developed. It was approved in May 2025 for speeds up to 160 kmph.
- Kavach components are being manufactured indigenously.

Complexity of Kavach

Kavach is an extremely complex system. Commissioning of Kavach is equivalent to setting up a telecom company. It includes the following sub-systems:

1. RFID tags: Installed at every 1 km along the entire length of the track. Tags are also installed at every signal. These RFID tags provide precise location of the trains.

(Installation of RFID Tags on tracks)

2. Telecom Towers: Full-fledged telecom towers including optical fiber connectivity and power supply are installed across the track length every few kilometers. Kavach systems installed on locos and Kavach controllers at the stations are constantly communicating using these towers. It is equivalent to installing

a complete network like that of a telecom operator.

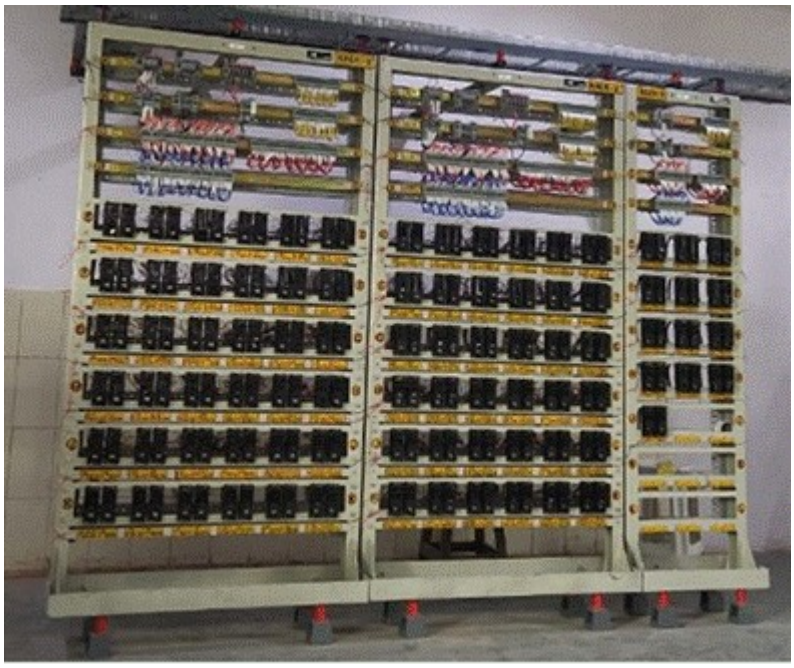
(Telecom towers installed)

3. Loco Kavach: It interacts with the RFID tags installed on the tracks and relays the information to telecom towers and receives radio information from Station Kavach. Loco Kavach is also integrated with the braking system of the locomotives. This system ensures that brakes are applied in case of an emergency situation.

(Installation of Loco Kavach)

4. Station Kavach: Installed at every station and block section. It receives information from the Loco Kavach and signaling system and guides the Loco Kavach for safe speeds.

(Installation of Station Kavach)



(Station Kavach)

5. Optical Fibre Cable (OFC): Optical fiber is laid along the tracks which connects all these systems for high-speed data communication.
6. Signalling system: Signalling system is integrated with the Loco Kavach, Station Kavach, telecom towers, etc.

(Station Manager's Operation Panel)

These systems need to be installed, checked, and certified without disrupting the railway operations including heavy movement of passenger and goods trains.

Kavach Progress

Sr. No.	Item	Progress
1	Optical fibre laid	5,856 km
2	Telecom towers installed	619
3	Kavach installed at stations	708
4	Kavach installed on Locos	1,107
5	Trackside equipment installed	4,001 Rkm

Indian Railways invests more than INR 1 lakh crore per year on safety related activities. Kavach is one of the many initiatives taken to enhance safety of passengers and trains. The progress made and the pace of deployment of Kavach reflect the commitment of Indian Railways towards ensuring railway safety.

*****

Dharmendra Tewari/ Dr. Nayan Solanki/ Ritu Raj

(Release ID: 2150296)