GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

LOK SABHA
UNSTARRED QUESTION NO. 271
TO BE ANSWERED ON 27.11.2024

KAVACH SYSTEM IN ALL ZONES OF RAILWAYS

271. DR. NISHIKANT DUBEY:
SHRI AMRINDER SINGH RAJA WARRING:

Will the Minister of RAILWAYS be pleased to state:

(a) the steps taken/being taken by the Government to enhance level of passenger safety in Railways;
(b) whether Kavach system has been made operational in all zones of railways across the country particularly in Jharkhand;
(c) if so, the details thereof and if not, the reasons therefor;
(d) the manner in which Government proposes to implement Kavach system across the country;
(e) the time likely to be taken for installation of Kavach system across the country;
(f) the cost to be incurred for implementation of Kavach system;
(g) whether the Government foresees any delay in achieving this target, if so the details thereof; and
(h) whether the Government intends to conduct any studies to determine the causes of such delay, if so, the details thereof?

ANSWER

MINISTER OF RAILWAYS, INFORMATION & BROADCASTING AND ELECTRONICS & INFORMATION TECHNOLOGY

(SHRI ASHWINI VAISHNAW)

(a) to (h): A Statement is laid on the Table of the House.

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STATEMENT REFERRED TO IN REPLY TO PARTS (a) to (h) OF UNSTARRED QUESTION NO. 271 BY DR. NISHIKANT DUBEY AND SHRI AMRINDER SINGH RAJA WARRING TO BE ANSWERED IN LOK SABHA ON 27.11.2024 REGARDING KAVACH SYSTEM IN ALL ZONES OF RAILWAYS.

(a) Safety is accorded the highest priority on Indian Railways. The various safety measures taken to enhance safety in train operations are as under:-

1. **On Indian Railways, the expenditure on Safety related activities has increased over the years as under:**

Expenditure on Safety related activities			**(Rs. in Cr.)**
	2022-23 (Act)	**2023-24(Act)**	**BE 2024-25**
Maintenance of Permanent Way & Works	**18,115**	**20,322**	**21,386**
Maintenance of Motive Power and Rolling Stock	**27,086**	**30,864**	**31,494**
Maintenance of Machines	**9,828**	**10,772**	**11,864**
Road Safety LCs and ROBs/ RUBs	**5,347**	**6,662**	**9,980**
Track Renewals	**16,326**	**17,850**	**17,652**
Bridge Works	**1,050**	**1,907**	**2,137**
Signal & Telecom Works	**2,456**	**3,751**	**4,647**
Workshops Incl. PUs and Misc. expenditure on Safety	**7,119**	**9,523**	**9,615**
Total	**87,327**	**1,01,651**	**1,08,776**

2. **Electrical/Electronic Interlocking Systems with centralized operation of points and signals have been provided at 6,608 stations up to 31.10.2024 to eliminate accident due to human failure.**

3. **Interlocking of Level Crossing (LC) Gates has been provided at 11,053 level Crossing Gates up to 31.10.2024 for enhancing safety at LC gates.**

4. **Complete Track Circuiting of stations to enhance safety by verification of track occupancy by electrical means has been provided at 6,619 stations up to 31.10.2024.**

5. **Kavach is a highly technology intensive system, which requires safety certification of highest order. Kavach was adopted as a National ATP system in July 2020. Kavach is provided progressively in phased manner. Kavach has already been deployed on 1548 RKm on South Central Railway and North Central Railway. Presently, the work is in progress on Delhi-Mumbai and Delhi-Howrah corridors (approximately 3000 Route Km). Track side works on these routes have been completed on about 1081 RKm (705 RKm on Delhi-Mumbai section and 376 RKm on Delhi-Howrah section). Regular trials are being done on these sections.**

6. **Detailed instructions on issues related with safety of Signalling e.g. mandatory correspondence check, alteration work protocol, preparation of completion drawing, etc. have been issued.**

7. **System of disconnection and reconnection for S&T equipment as per protocol has been re-emphasized.**

8. **All locomotives are equipped with Vigilance Control Devices (VCD) to improve alertness of Loco Pilots.**

9. **Retro-reflective sigma boards are provided on the mast which is located two OHE masts prior to the signals in electrified territories to alert the crew about the signal ahead when visibility is low due to foggy weather.**

10. **A GPS based Fog Safety Device (FSD) is provided to loco pilots in fog affected areas which enables loco pilots to know the distance**

of the approaching landmarks like signals, level crossing gates etc.

11. Modern track structure consisting of 60kg, 90 Ultimate Tensile Strength (UTS) rails, Prestressed Concrete Sleeper (PSC) Normal/Wide base sleepers with elastic fastening, fanshaped layout turnout on PSC sleepers, Steel Channel/H-beam Sleepers on girder bridges is used while carrying out primary track renewals.
12. Mechanisation of track laying activity through use of track machines like PQRS, TRT, T-28 etc to reduce human errors.
13. Maximizing supply of 130m/260m long rail panels for increasing progress of rail renewal and avoiding welding of joints, thereby improving safety.
14. Ultrasonic Flaw Detection (USFD) testing of rails to detect flaws and timely removal of defective rails.
15. Laying of longer rails, minimizing the use of Alumino Thermic Welding and adoption of better welding technology for rails i.e. Flash Butt Welding.
16. Monitoring of track geometry by OMS (Oscillation Monitoring System) and TRC (Track Recording Cars).
17. Patrolling of railway tracks to look out for weld/rail fractures.
18. The use of Thick Web Switches and Weldable CMS Crossing in turnout renewal works.
19. Inspections at regular intervals are carried out to monitor and educate staff for observance of safe practices.
20. Web based online monitoring system of track assets viz. Track database and decision support system has been adopted to decide rationalized maintenance requirement and optimize inputs.
21. Detailed instructions on issues related with safety of Track e.g. integrated block, corridor block, worksite safety, monsoon precautions etc. have been issued.

22. **Preventive maintenance of railway assets (Coaches & Wagons) is undertaken to ensure safe train operations.**

23. **Replacement of conventional ICF design coaches with LHB design coaches is being done.**

24. **All unmanned level crossings (UMLCs) on Broad Gauge (BG) route have been eliminated by January 2019.**

25. **Safety of Railway Bridges is ensured through regular inspection of Bridges. The requirement of repair/rehabilitation of Bridges is taken up based upon the conditions assessed during these inspections.**

26. **Indian Railways has displayed Statutory "Fire Notices" for widespread passenger information in all coaches. Fire posters are provided in every coach so as to educate and alert passengers regarding various Do's and Don'ts to prevent fire. These include messages regarding not carrying any inflammable material, explosives, prohibition of smoking inside the coaches, penalties etc.**

27. **Production Units are providing Fire detection and suppression system in newly manufactured Power Cars and Pantry Cars, Fire and Smoke detection system in newly manufactured coaches. Progressive fitment of the same in existing coaches is also underway by Zonal Railways in a phased manner.**

28. **Regular counselling and training of staff is undertaken.**

29. **Concept of Rolling Block introduced in Indian Railways (Open Lines) General Rules vide Gazette notification dated 30.11.2023, wherein work of integrated maintenance/ repair/ replacement of assets is planned up to 52 weeks in advance on rolling basis and executed as per plan.**

The details of the Safety related works undertaken by Railways are tabulated below:-

SN	Item	2004-05 to 2013-14	2014-15 to 2023-24	2014-24 Vs. 2004-14
	Track Maintenance			
1.	Expenditure on Track Renewal (Rs. in Cr.)	47,038	1,09,577	2.33 times
2.	Rail Renewal Primary (Track Km)	32,260	43,335	1.34 times
3.	Use of high-quality rails (60 Kg) (Km)	57,450	1,23,717	2.15 times
4.	Longer Rail Panels (260m) (Km)	9,917	68,233	6.88 times
5.	USFD (Ultra Sonic Flaw detection) Testing of Rails (Track km)	20,19,630	26,52,291	1.31 times
6.	USFD (Ultra Sonic Flaw detection) Testing of Welds (Nos.)	79,43,940	1,73,06,046	2.17 times
7.	New Track KM added (Track km)	14,985	31,180	2.08 times
8.	Weld failures (Nos.)	In 2013-14: 3699	In 2023-24: 481	87% reduction
9.	Rail fractures (Nos.)	In 2013-14: 2548	In 2023-24: 383	85% reduction
10	Thick Web Switches (Nos.)	Nil	21,127	
11	Track Machines (Nos.)	As on 31.03.14 = 748	As on 31.03.24 = 1,661	122% increase
	Level Crossing Gate Elimination			
1.	Elimination of Unmanned Level Crossing Gates (Nos.)	As on 31.03.14: 8948	As on 31.03.24: Nil (All eliminated by 31.01.19)	100% reduction
2.	Elimination of Manned Level Crossing Gates (Nos.)	1,137	7,075	6.21 Times
3.	Road over Bridges (RoBs)/ Road under Bridges (RUBs) (Nos.)	4,148	11,945	2.88 Times

4.	Expenditure on LC Elimination (LC+ROB+RUB)	8,825	41,957	4.75 Times
	Bridge Rehabilitation			
1.	Expenditure on Bridge Rehabilitation (Rs. in Cr.)	3,924	8,255	2.10 Times
	Signalling Works			
1.	Electronic Interlocking (Stations)	837	2,964	3.52 times
2.	Automatic Block Signaling (Km)	1,486	2,497	1.67 times
3.	Fog Pass Safety Devices (Nos.)	As on 31.03.14: 90	As on 31.03.24: 19,742	219 times

S N	Item	2004-05 to 2013-14	2014-15 to 2023-24	2014-24 Vs. 2004-14
	Rolling Stock			
1.	Manufacture of LHB Coaches (Nos.)	2,337	36,933	15.80 times
2.	Provision of Fire and Smoke Detection System in AC coaches (Nos. of Coaches)	0	19,271	
3.	Provision of Fire Detection and Suppression System in Pantry and Power Cars (Nos. of Coaches)	0	2,991	
4.	Provision of Fire Extinguishers in Non –AC coaches (Nos. of Coaches)	0	66,840	

(b) to (h):

1. **Kavach is an indigenously developed Automatic Train Protection (ATP) system. Kavach is a highly technology intensive system, which requires safety certification of highest order (SIL-4).**

2. **Kavach aids the Loco Pilot in running of train within specified speed limits by automatic application of brakes in case Loco Pilot fails to do so and also helps the trains to run safely during inclement weather.**

3. **The first field trials on the passenger trains were started in February 2016. Based on the experience gained and Independent Safety Assessment of the system by Independent Safety Assessor (ISA), three firms were approved in 2018-19, for supply of Kavach ver 3.2.**

4. **Kavach was adopted as National ATP system in July 2020.**

5. **Implementation of Kavach System involves following Key Activities:**

   a. **Installation of Station Kavach at each and every station, block section.**
   b. **Installation of RFID Tags throughout the track length.**
   c. **Installation of telecom Towers throughout the section.**
   d. **Laying of Optical Fibre Cable along the track.**
   e. **Provision of Loco Kavach on each and every Locomotive running on Indian Railways.**

6. **Based on deployment of Kavach version 3.2 on1465 RKm on South Central Railway, lot of experience was gained. Using that further improvements were made. Finally, Kavach specification version 4.0 was approved by RDSO on 16.07.2024.**

7. **Kavach version 4.0 covers all the major features required for the diverse railway network. This is a significant milestone in safety for Indian Railways. Within a short period, IR has developed, tested and started deploying Automatic Train Protection System.**

8. **Major improvement in Version 4.0 includes increased Location Accuracy, Improved Information of Signal Aspects in bigger yard, Station to Station Kavach interface on OFC and Direct Interface to existing Electronic Interlocking System. With these improvements, now large scale deployment has started.**

9. **Kavach has already been deployed on 1548 RKm on South Central Railway and North Central Railway. Presently, the work is in progress on Delhi– Mumbai & Delhi– Howrah corridors (approximately 3000 Route km). Track side works on these routes have been completed on about 1081 RKm (705 RKm on Delhi-Mumbai section and 376 RKm on Delhi-Howrah section). Regular trials are being done on these sections.**

10. **Progress of Key items comprising Kavach system on above mentioned routes upto Oct' 2024 is as under:-**

    a. **Laying of Optical Fibre Cable: 4960 Km**
    b. **Installation of Telecom Towers: 378 Nos.**
    c. **Provision of Kavach at Stations: 381 Nos.**
    d. **Provision of Kavach in Loco: 482 Locos**
    e. **Installation of Track side equipment: 1948 RKm.**

11. **Next phase of Kavach implementation is planned as under:-**

    a. **Project for equipping 10,000 Locomotives has been finalized.**

    b. **Bids for track side Works of Kavach for approximately 15000 RKm have been invited, out of which Bids for about 9000 Rkm**

have been opened. It covers all GQ, GD, HDN and Identified sections of Indian Railways.

12. Parts of the routes mentioned above are also passing through State of Jharkhand.

13. Currently, 3 OEMs are approved for supply of Kavach System. To increase capacity and scale of implementation, trials and approval of more OEMs are at different stages.

14. Specialized training programme on Kavach are being conducted at centralized training institutes of Indian Railways to impart training to all concerned officials. By now more than 9000 technicians, operators and engineers have been trained on Kavach technology. Courses have been designed in collaboration with IRISET.

15. The cost for provision of Track Side including Station equipment of Kavach is approximately Rs. 50 Lakhs/Km and cost for provision of Kavach equipment on locomotives is approximately Rs. 80 Lakh/Loco.

16. The funds utilized on Kavach works so far is Rs. 1547 Crores. The allocation of funds during the year 2024-25 is Rs. 1112.57 Crores. Requisite funds will be made available as per the progress of works.

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