GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

LOK SABHA

UNSTARRED QUESTION NO. 5156

TO BE ANSWERED ON 02.04.2025

INSTALLATION OF TRAIN ANTI-COLLISION SYSTEMS

5156. SHRI GURMEET SINGH MEET HAYER:

SHRI ANAND BHADAURIA:

Will the Minister of RAILWAYS be pleased to state:

(a) the current status of the installation of train anti-collision systems (such as TCAS/Kavach) in Railways alongwith the details of the number of trains equipped with this system and the number still lacking it;

(b) the details of funds allocated and utilised for installation of Kavach during the year 2024-25 till 31st March, 2025 along with the physical progress in installation of the same;

(c) the details of funds allocated for installation of anti-collision device – Kavach in Railways during the years 2025-26;

(d) the details of breakdown of trains with and without anti-collision systems including passenger trains, freight trains and others, category-wise;

(e) the time by when the Government has plan to ensure that all trains are equipped with such a system the steps taken/being taken by the Government to equip the entire Railways with Kavach in a time bound manner along with the target therefor;

(f) the number of train accidents occurred on trains without such systems since implementation of an anti-collision system on Railways;

(g) the details of status of each accident including the date, location, cause and whether the affected train had an anti-collision system installed, if so, the details thereof; and

(h) whether many lives were lost and many passengers were injured in these accidents, if so, the details thereof alongwith its estimated economic loss?

ANSWER

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

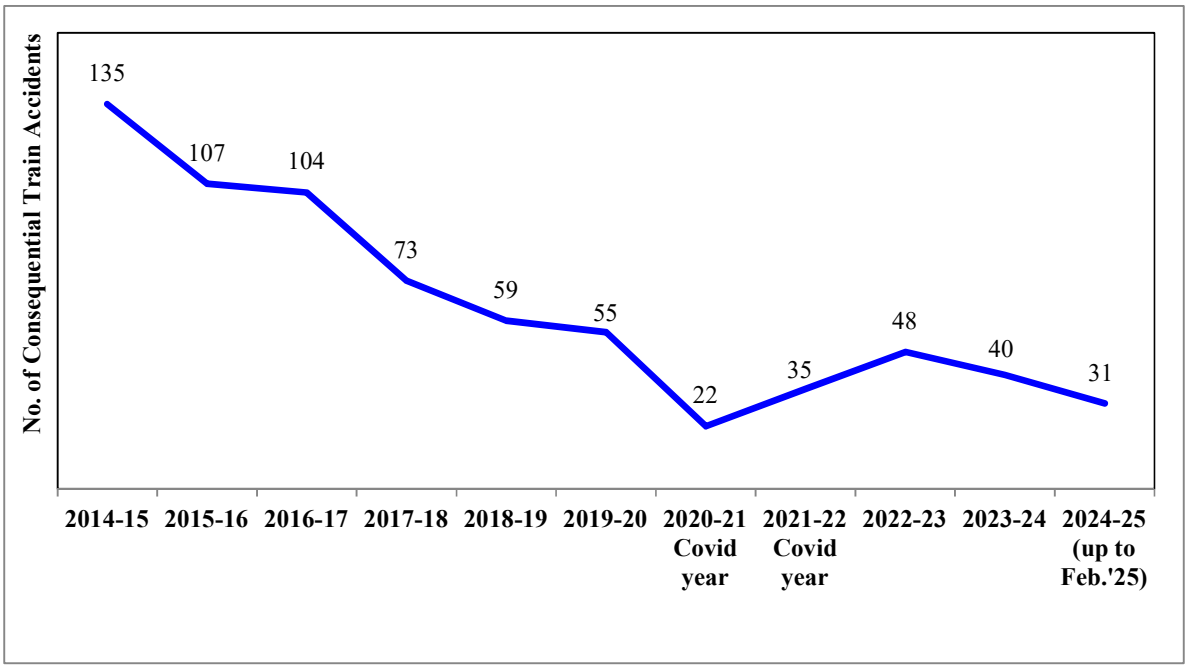
(SHRI ASHWINI VAISHNAW)

(a) to (h): Safety is accorded the highest priority on Indian Railways. As a consequence of various safety measures taken over the years, there has been a steep decline in the number of accidents. Consequential Train Accidents have reduced from 135 in 2014-15 to 31 in the year 2024-25 as shown in the graph below. The causes of these accidents broadly include track defects, Loco/Coach defects, equipment failures, human errors etc.

It may be noted that the consequential train accidents during the period 2004-14 was 1711 (average 171 per annum), which has declined to 31 in 2024-25.

Another important index showing improved safety in train operations is Accidents Per Million Train Kilometer (APMTKM) which has

reduced from 0.11 in 2014-15 to 0.03 in 2023-24, indicating an improvement of approx. 73% during the said period.



Consequential Train accidents on Indian Railways and causalities (including railway passengers and railway personnel) therein are as follows:-

Period	No. of Consequential Train Accidents	No. Of Deaths	No. Of Injuries
2004-05 to 2013-14	1711	904	3155
2014-15 to 2023-24	678	748	2087

The various safety measures, including track modernization, 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.)					
	2013-14 (Act)	2022-23 (Act)	2023-24(Act)	RE 2024-25	BE 2025-26
Maintenance of Permanent Way & Works	9172	18,115	20,322	21,800	23,316
Maintenance of Motive Power and Rolling Stock	14796	27,086	30,864	31,540	30,666
Maintenance of Machines	5406	9,828	10,772	12,112	12,880
Road Safety LCs and ROBs/ RUBs	1986	5,347	6,662	8,184	7,706
Track Renewals	4985	16,326	17,850	22,669	22,800
Bridge Works	390	1,050	1,907	2,130	2,169
Signal & Telecom Works	905	2,456	3,751	6,006	6,800
Workshops Incl. PUs and Misc. expenditure on Safety	1823	7,119	9,523	9,581	10,134
Total	39463	87,327	1,01,651	1,14,022	1,16,470

2. Electrical/Electronic Interlocking Systems with centralized operation of points and signals have been provided at 6,623 stations up to 28.02.2025 to eliminate accident due to human failure.
3. Interlocking of Level Crossing (LC) Gates has been provided at 11,089 level Crossing Gates up to 28.02.2025 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 6,631 stations up to 28.02.2025.
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 3727 RKm till end of Feb'25. 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)

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Normal/Wide base sleepers with elastic fastening, fan shaped 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.

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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 related to better maintenance practices, Technological improvements, better infrastructure and rolling stock etc. undertaken by Railways are tabulated below:-

SN	Item	2004-05 to 2013-14	2014-15 to 2024-25 (till Jan 25)	2014-25 Vs. 2004-14
	Technological improvements			
1	Use of high-quality rails (60 Kg) (Km)	57,450 km	1.4 lakh km	More than 2 times
2	Longer Rail Panels (260m) (Km)	9,917 km	76,000 km	More than 7 times
3	Electronic Interlocking (Stations)	837 stations	3,243 stations	4 times
4	Fog Pass Safety Devices (Nos.)	As on 31.03.14: 90 nos.	As on 31.01.25: 25,293	281 times
5	Thick Web Switches (Nos.)	Nil	27,079 nos.	
	Better maintenance practices			
1	PrimaryRail Renewal (Track Km)	32,260 km	49,000 km	1.5 times
2	USFD (Ultra Sonic Flaw detection) Testing of Welds (Nos.)	79.43 lakh	1.9 crore	More than 2 times
3	Weld failures (Nos.)	In 2013-14: 3699 nos.	In 2024-25: 301 nos.	92 % reduction
4	Rail fractures (Nos.)	In 2013-14: 2548 nos.	In 2024-25: 243 nos.	91% reduction
	Better infrastructure and Rolling stock			
1	New Track KM added	14,985	34,000 km	More than 2

	(Track km)	nos.		times
2	Flyovers (RoBs)/ Underpasses (RUBs) (Nos.)	4,148 nos.	12,771 nos.	More than 3 times
3	Unmanned Level crossings (nos.) on BG	As on 31.03.14: 8948	As on 31.03.24: Nil (All eliminated by 31.01.19)	Removed
4	Manufacture of LHB Coaches (Nos.)	2,337 nos.	41,551	More than 17 times

The status of implementation of Kavach is as under:

i) **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).**

ii) **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.**

iii) **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.**

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

v) **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.

vi) Based on deployment of Kavach version 3.2 on 1465RKm 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.

vii) 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.

viii) 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, Kavach Ver.4.0. is planned for large scale deployment over Indian Railways.

ix) Progress of Key items comprising Kavach system on Indian Railways upto Feb' 2025 is as under: -

SN.	Items	Progress
i	Laying of Optical Fibre Cable	5743 Km
ii	Installation of Telecom Towers	540 Nos.
iii	Provision of Kavach at Stations	664 Nos.
iv	Provision of Kavach in Loco	795 Locos
v	Installation of Track side equipment	3727 Rkm

x) Next phase of Kavach implementation is planned as under:-

a. Project for equipping 10,000 Locomotives has been finalized. 69 number of loco sheds have been prepared for equipping with Kavach.

b. Bids for track side Works of Kavach for approximately 15,000 RKm have been invited covering all GQ, GD, HDN and identified sections of Indian Railways, out of which works of 1865 RKm have been awarded.

xi) 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.

xii) 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 20,000 technicians, operators and engineers have been trained on Kavach technology. Courses have been designed in collaboration with IRISET.

xiii) The funds utilized on Kavach works so far is Rs. 1950 Crores. The allocation of funds during the year 2024-25 is Rs. 1112.57 Crores. Further, provision of Rs. 2000 Crores has been made for Kavach work during the year 2025-26. Requisite funds are made available as per the progress of works.

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