

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**LOK SABHA
STARRED QUESTION NO. 100
TO BE ANSWERED ON 26.07.2023**

IMPLEMENTATION OF KAVACH SYSTEM

***100. DR. RAMAPATI RAM TRIPATHI:
SHRI DEEPAK BAIJ:**

Will the Minister of RAILWAYS be pleased to state:

- (a) the steps taken by the Government to enhance the level of passenger safety in Railways;**
- (b) whether the implementation of the KAVACH system has started in all the regions of Indian Railways, if so, the details thereof along with the date on which the said device was invented and if not, the reasons therefor;**
- (c) whether the Government is planning to implement the KAVACH system throughout India, if so, the time by which it is likely to be done;**
- (d) the total expenditure to be incurred once it is implemented;**
- (e) whether the lack of KAVACH system has contributed towards train accidents including the Balasore train tragedy in Odisha;**
- (f) if so, whether the Railways has decided to conduct a safety audit in its divisions; and**
- (g) if so, the details in this regard?**

ANSWER

**MINISTER OF RAILWAYS, COMMUNICATIONS AND
ELECTRONICS & INFORMATION TECHNOLOGY**

(SHRI ASHWINI VAISHNAW)

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

STATEMENT REFERRED TO IN REPLY TO PARTS (a) TO (g) OF STARRED QUESTION NO.100 BY DR. RAMAPATI RAM TRIPATHI AND SHRI DEEPAK BAIJ TO BE ANSWERED IN LOK SABHA ON 26.07.2023 REGARDING IMPLEMENTATION OF KAVACH SYSTEM.

(a) In order to enhance the level of safety, Indian Railways have taken steps, some of which are as given below. As a result of these the consequential train accidents have been brought down from 473 in 2000-01 to 48 Nos. in 2022-23:-

- 1. Rashtriya Rail Sanraksha Kosh (RRSK) has been introduced in 2017-18 for Replacement/renewal/upgradation of critical safety assets, with a corpus of ₹1 lakh crore for five years. From 2017-18 till 2021-22 a Gross expenditure of Rs. 1.08 lakh crore was incurred on RRSK works.**
- 2. Electrical/Electronic Interlocking Systems with centralized operation of points and signals have been provided at 6427 stations.**
- 3. Interlocking of Level Crossing (LC) Gates has been provided at 11093 level Crossing Gates.**
- 4. Complete Track Circuiting of stations to enhance safety for verification of track occupancy by electrical means has been provided at 6377 stations.**
- 5. 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.**
- 6. System of disconnection and reconnection for S&T equipment as per protocol has been re-emphasized.**
- 7. All locomotives are equipped with Vigilance Control Devices (VCD) to ensure alertness of Loco Pilots.**

- 8. Retro-reflective sigma boards are provided on the mast which is located between two OHE masts prior to the signals in electrified territories to warn the crew about the signal ahead when visibility is low due to foggy weather.**
- 9. A Global Positioning System (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.**
- 10. 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.**
- 11. Mechanisation of track laying activity through use of track machines like PQRS, TRT, T-28 etc to reduce human errors.**
- 12. Maximizing supply of 130m/260m long rail panels for increasing progress of rail renewal and avoiding welding of joints, thereby ensuring safety.**
- 13. Laying of longer rails, minimizing the use of Alumino Thermic Welding and adoption of better welding technology for rails i.e. Flash Butt Welding.**
- 14. Monitoring of track geometry by OMS (Oscillation Monitoring System) and TRC (Track Recording Cars).**
- 15. Patrolling of railway tracks to look out for weld/rail fractures.**
- 16. The use of Thick Web Switches and Weldable Cast Manganese Steel (CMS) Crossing in turnout renewal works.**

- 17. Inspections at regular intervals are carried out to monitor and educate staff for observance of safe practices.**
- 18. 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.**
- 19. Detailed instructions on issues related with safety of Track e.g. integrated block, corridor block, worksite safety, monsoon precautions etc. have been issued.**
- 20. Preventive maintenance of railway assets (Coaches & Wagons) is undertaken to ensure safe train operations and to keep a check on Rail Accidents across the country.**
- 21. Replacement of conventional Integral Coach Factory (ICF) design coaches with Linke Hofmann Busch (LHB) design coaches is being done.**
- 22. All unmanned level crossings (UMLCs) on Broad Gauge (BG) route have been eliminated by January 2019.**
- 23. 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.**
- 24. Indian Railways has displayed Statutory "Fire Notices" for widespread passenger information in all coaches. Fire posters are provided in every coach so as to inform and alert passengers regarding various Do's and Don't to prevent fire. These include messages regarding not carrying any inflammable material, explosives, prohibition of smoking inside the coaches, penalties etc.**

- 25. Production Units are providing Fire detection and suppression system in newly manufactured Power Cars and Pantry Cars and 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.**
- 26. Regular counselling and training of staff is undertaken.**

Summarising the above, the improvements in Safety Performance are tabulated below;

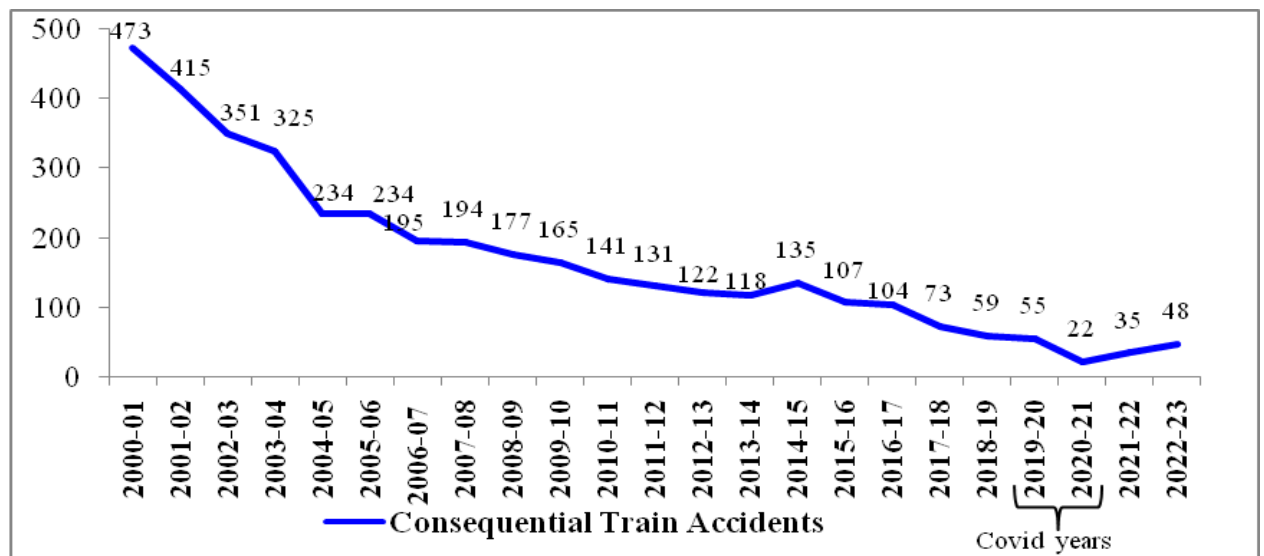
Data Table for IR Safety Performance

SN	Item	Unit	During FY 2004-05 to 2013-14		During FY 2014-15 to 2022-23		Comparison of the period 2014-23 with the period 2004-14
			Cumulative for 10 years	Average Per Year	Cumulative for 9 years	Average Per Year	
A.	Track Maintenance						
1.	Expenditure on Track Renewal	Rs. In Cr.	47,018	4,702	91,809	10,201	2.2 Times
2.	Rail Renewal Primary	TKM	32,260	3,226	37,284	4,143	1.3 Times
3.	Use of high quality rails (60 Kg)	KM	57,450	5,745	1,23,717	13,746	2.4 Times
4.	Longer Rail Panels (260m)	KM	9,917	992	68,233	7,581	7.7 Times
5.	USFD (Ultra Sonic Flaw detection) Testing of Rails	TKM	20,19,630	2,01,963	26,52,291	2,94,699	1.5 Times
6.	USFD (Ultra Sonic Flaw detection) Testing of Welds	Nos.	79,43,940	7,94,394	1,73,06,046	19,22,894	2.4 Times
7.	Track KM added	TKM	14,985	1,499	25,871	2,875	1.9 Times
8.	Weld failures	Nos.	In 2013-14 : 3699		In 2022-23: 724		80% Reduction
9.	Rail fractures	Nos.	In 2013-14 : 2548		In 2022-23: 531		79% Reduction

10	Thick Web Switches	Nos.	Nil	Nil	15,146	1,683	
11	Track Machines	Nos.	As on 31.03.14 = 748		As on 31.03.23 = 1548		2.1 Times
B.	Level Crossing Gate Elimination						
1.	Elimination of Unmanned Level Crossing Gates	Nos.	As on 31.03.2014: 8948		As on 31.03.2023: Nil (All eliminated by 31.01.19)		100% Reduction
2.	Elimination of Manned Level Crossing Gates	Nos.	1,137	114	6,291	699	6.2 Times
3.	Construction of Road over Bridges (i.e. Flyovers)/ Road under Bridges (i.e. Underpasses)	Nos.	4,148	415	10,867	1,207	2.9 Times
4.	Expenditure on LC Elimination	Rs. In Cr.	5,726	573	30,602	3,400	5.9 Times
C.	Bridge Rehabilitation						
1.	Expenditure on Bridge Rehabilitation	Rs. In Cr.	3,919	392	6,380	709	1.8 Times
D.	Signalling Works						
1.	Electronic Interlocking	Stations	837	84	2,521	280	3.3 Times
2.	Automatic Block Signaling	Km	1,486	148.6	1,915	212.8	1.4 Times
3.	Fog Pass Safety Devices	Nos.	As on 31.03.14 : 90		As on 31.03.23 : 19,742		219 Times
E	Rolling Stock						
1.	Manufacture of LHB Coaches	No.	2,337	234	31,956	3,551	15.2 Times
2.	Provision of Fire and Smoke Detection System in coaches	Nos. of Coaches	0	0	12,711	1,412	
3.	Provision of Fire Detection and Suppression System in Pantry and Power Cars	Nos. of Coaches	0	0	2,635	293	

4.	Provision of Fire Extinguishers in Non -AC coaches	Nos. of Coaches	0	0	39,819	4,424	
F.	Gross Budgetary Support for Railway Investment (GBS FY 23-24 : Rs 2.4 Lakhs Cr.)	Rs. In Cr.	1,56,739	15,674	8,25,967 (Incl. of BE 23-24)	82,597	5.3 Times
G.	Expenditure on safety related works	Rs. In Cr.	70,273	7,027	1,78,012 (Incl. of BE 23-24)	17,801	2.5 Times

Owing to these steps, there has been a significant improvement in the safety performance of Indian Railways over the years, as shown below.



(b) to (d) Regarding the implementation and expenditure of Kavach system the details are as under:

- 1. Kavach is indigenously developed Automatic Train Protection (ATP) system. Kavach is a highly technology intensive system, which requires safety certification of highest order.**
- 2. Kavach aids the loco pilot in train running within specified speed limits by automatic application of brakes in case Loco**

Pilot fails to do so and also help the train safely run during inclement weather.

- 3. The first field trials on the passenger trains were started in February 2016. Based on the experience so gained and Independent Safety Assessment of the system by a 3rd party (Independent Safety Assessor: ISA) three firms were approved in 2018-19, for supply of Kavach.**
- 4. Subsequently Kavach was adopted as a National ATP system in July 2020.**
- 5. Kavach has so far been deployed on 1465 Route km and 121 locomotives (including Electric Multiple Unit rakes) on South Central Railway.**
- 6. Kavach tenders have been awarded for Delhi – Mumbai & Delhi – Howrah corridors (approximately 3000 Route km) and work is in progress on these routes.**
- 7. Indian Railways is preparing Detailed Project Report (DPR) and detailed estimate for another 6000 RKm.**
- 8. The amount spent so far on Kavach implementation is Rs.351.91 Crores. 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 loco is approximately Rs. 70 lakh/ loco.**
- 9. Presently there are three Indian OEMs who are approved for Kavach. Efforts are being made to develop more vendors to enhance the capacity and scale up the implementation of Kavach.**

(e) to (g) Balasore train accident is not linked with the provision of Kavach.

Kavach is an Automatic Train protection system which is an aid to Loco Pilot in train running within specified speed limits, by automatic application of Brakes in case the Loco Pilot fails to do so. It also applies brake in case a Loco Pilot fails to apply brakes at Red Signal.
