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भारत सरकार - रेल मंत्रालय  
अनुसंधान अभिकल्प और मानक संगठन  
लखनऊ - 226 011

Government of India-Ministry of Railways  
Research Designs & Standards Organisation  
Lucknow - 226 011



An ISO 9001:2000  
Organisation

MC/LHB/Coach

Date: 28-08-2008

The General Manager (Engg.):

1. Northern Railway, Baroda House, New Delhi - 110 001
2. North Central Railway, Allahabad-211001

Sub: Speed Certificate for operation of Shatabdi Express train comprising maximum 24 numbers of LHB AC EOG coaches on New Delhi – Kanpur Central section at a maximum speed of 140 kmph on track maintained to C&M-1 Volume-I standard and on Kanpur Central-Lucknow section at a maximum speed of 105 km/h on track maintained to other than C & M-1 Volume-1 standard.

RCF built LHB AC EOG broad gauge coaches have been fitted with FIAT bogies under transfer of technology from M/s. ALSTOM-LHB. These coaches generally conforming to RDSO drawing no. SK. 96077 and to RCF drawing No. LE 90009, have speed potential for operating at a maximum speed of 160 km/h on track maintained to standards contained in RDSO's Report no. C&M-I Vol.-I. These coaches provided with disc brakes and centre buffer couplers are built to the state-of-art technology and have a unique feature of wheel slide protection device (WSP) to prevent formation of wheel flats.

- 1.1 LHB AC EOG coaches have undergone detailed oscillation trials and speed certificates for regular operation of LHB AC EOG chair cars and LHB AC Generator Vans at a maximum speed of 160 km/h on track maintained to C&M-I Vol. I standard have been issued vide letters of even no. dated 19.3.2003 and 20.3.2003 respectively. Coupler force and emergency braking distance trials have been conducted on LHB AC EOG coaches on Ghaziabad-Kanpur section of North Central Railway and the results are contained in RDSO's Report no. MT- 283 (March 2001). Confirmatory Oscillograph Car Runs of 21 LHB AC EOG coaches with WDP3A Loco have been conducted on GZB- CNB high-speed route of North Central Railway and in both up and down directions upto a max speed of 140 kmph have been done. The results contained in RDSO Report no. RDSO/T.G/MT- 854/F(Rev.0) (March-2008) are satisfactory upto a maximum speed of 140 km/h.

Based on satisfactory results of detailed oscillation trials conducted, the speed certificate has been issued up to speed 105 km/h on track maintained to other than C & M-1 Volume-1' standard vide this office letter of even no. dated 02/5/2003.

#### Locomotive

- 1.2 WAP5 class of locomotive with Bo-Bo bogies is imported from M/s ABB, Switzerland. Outline of locomotive is as per drawing no. SK.EL.4353. The axle load of locomotive is  $19 \pm 2\%$  t. Detailed oscillation trials of WAP5 have been done at a maximum test speed of 180 km/h and results are contained in RDSO's Report No.-MT-88 (June-97), are satisfactory. Based on results of trials of WAP5 class of locomotive has

been cleared for the operation at a maximum speed of 160 km/h on track maintained to standards laid down in Report No. C&M-1 Volume-1 vide letter no. SD.WAP5.11, dated 19.6.97. Confirmatory Oscillograph Car Runs of WAP5 Locomotive have been conducted on GZB- CNB high-speed route of North Central Railway on both up and down directions upto a max speed of 140 km/h have been done. The results are contained in RDSO's Report no. RDSO/T.G/MT- 850/F (Rev.0) (March-2008), are satisfactory upto maximum speed of 140 km/h.

- 1.3 The WAP4 locomotive, previously named as WAP1 (5,000 hp) locomotive conforming to RDSO sketch no. SK.DL-3031A Alt.1 has undergone detailed oscillation trials at a maximum speed of 160 km/h and the results are contained in RDSO report no. M-529 (Feb. 1994). Based on the results, this locomotive has been cleared up to a max. speed of 140 km/h on track maintained to standard as per C&M-1 Vol.I vide this office letter no. SD.WAP1.11 dt. 27.9.1994. This class of locomotive has been renamed as WAP4 vide Rly. Bd.'s letter no. 93/Elect. (TRS) 440/3, dated 19.01.1995. Confirmatory Oscillograph Car Runs of WAP4 Locomotive upto a max speed of 140 km/h have been conducted on GZB- CNB high-speed route of North Central Railway. The results contained in RDSO Report no. RDSO/T.G/MT- 852/F (Rev.0) of (March-2008), are satisfactory.
- 1.4 4000 hp WDP4 class of locomotives fitted with two nos. three-axle bogie each having A-A-1 axle arrangements are imported locomotives from M/s General Motors, USA. General arrangement of locomotive is as per General Motor's drawing no. L020792. The General arrangement of bogie is shown in General Motor's drawing no. 40087064. The max. axle load of locomotives is 19.5 t (nominal). Speed certificate for operation of WDP4 locomotives on Rajdhani Standard track upto a maximum speed of 160 km/h has been issued vide this office letter No.SD.WAP4.11 dated 5/7-3-20002 followed with amendment dated 28-2/3-3-2003. To ascertain the suitability of WDP4 locomotive to haul Rajdhani/Shatabdi Express and other similar trains the Confirmatory Oscillograph Car Runs of WDP4 Loco have been conducted on GZB - CNB high-speed route of North Central Railway on both up and down directions upto a max speed of 140 km/h. The results contained in RDSO's Report no. RDSO/T.G/MT- 856/F(Rev.0) (April-2008) are satisfactory upto maximum speed of 140 km/h.

The detailed oscillation trials of WDP4 class of locomotives have been conducted upto a speed of 115 km/h on Sultanpur-Lucknow section of track maintained to other than C & M-1 (Volume-1) standard of NR. Based on the results of oscillation trials contained in RDSO Report no. MT-340 (May 2002), WDP4 class of locomotive has been cleared for operation upto 105 km/h on mainline standard vide letter no. SD.WDP4.11, dated 30.10.2002 followed by amendments dated 28.2/3.3-2003 and 12.2.2007.

- 1.5 WDP3A previously named as WDP2 class of 3100 hp locomotive, having flexi-coil MK-5 bogies are manufactured by Diesel Locomotive Works, Varanasi. General arrangement of the locomotive is as per DLW drawing no. SK-2160 and general arrangement of the bogie is as per RDSO drawing no. VL.FM5-a.01. Detailed oscillation trials of WDM3A/WDP2 class of locomotive have been conducted at a maximum test speed of 160 km/h on Palwal-Mathura section of Central Railway and results are contained in RDSO's Report No. MT- 208 (Dec 1999). Based on the results of the trials, WDP2 class of locomotives has been cleared for operation at a maximum speed of 140 km/h on track maintained to standards laid down in Report No. C&M-I Vol.-I vide RDSO's letter no. SD.WDP2.11 dated 26.7.2000. Confirmatory

Oscillograph Car Runs of 21 LHB AC EOG coaches with WDP3A Loco have been conducted on GZB - CNB high-speed route of North Central Railway and in both up and down directions upto a max speed of 140 kmph have been done. The results contained in RDSO's Report no. RDSO/T.G/MT- 854/F(Rev.0) of (March-2008) are satisfactory upto maximum speed of 140 km/h.

2.0 Based on the above, it is certified that Shatabdi Express hauled by single WAP5 or multiple WAP4/WDP4/WDP3A class of locomotives and having maximum 24 LHB AC EOG coaches including AC Generator Van may be permitted to operate between New Delhi - Lucknow up-to the maximum speeds as given below.

a. When hauled by single WAP5 class of locomotives:

i.	New Delhi -GZB	105 km/h
ii	GZB - CNB	140km/h
iii.	CNB-Lucknow	105 km/h

b. When hauled by multiple WAP4/ /WDP4/WDP3A class of locomotives:

i.	New Delhi -GZB	105km/h
ii	GZB - CNB	140km/h
iii.	CNB-Lucknow	105 km/h

## 2.1 Track

### 2.1.1 For max. speed of 140 km/h.

a. The track shall be to a minimum standard of 52 kg (90UTS) rails on sleepers to M+7 density and minimum depth of ballast cushion below the sleepers to 250 mm which may consist of at least 100 mm clean and the rest in caked up condition on compacted and stable formation and track maintained to C & M-I Vol I.

b. The track maintenance shall be in accordance with the recommendations contained in RDSO Report no. C&M-I Vol.-I. In this connection, the instructions for the maintenance of track on high-speed routes circulated to the railways under RDSO's DO letter no. CRA/509 dated 07.7.1971 and approved by Railway Board vide their letters no. 71/W6/HS/8, dated 27.8.1971 and 71/W6/HS/1, dated 21.10.1971 should also be followed.

### 2.1.2 For speed 105 kmph

a. The track shall be to a minimum standard of 90 R rails on sleepers to M+4 density and minimum depth of ballast cushion below the sleepers to 200 mm which may consist of at least 75 mm clean and the rest in caked up condition on compacted and stable formation.

2.1.3 For track maintained to lower standard than that mentioned above, the Chief Engineer shall decide the lower maximum permissible speed on the basis of maintenance condition. In this connection, Railway Board's letter no. 65/WDO/SR/26 dated 19/20.10.1966 may be seen. When the Chief Engineer considers that the roadbed is not compacted or there is improper drainage, he may suitably restrict the maximum permissible speed, depending upon the local conditions.

- 2.1.4 The maximum permissible speed on curves to be decided on the basis of the existing provisions of the Indian Railways Permanent Way Manual Second Reprint-2004.
- 2.1.5 Before operation of Shatabdi Express train with multiple WDP3A class of Locomotive track should be attended on the following stretches or suitable speed restriction to be imposed as per RDSO Report no.RDSO/T.G./MT-854/F Rev. 0, Dt 28.03.2008.

GZB-CNB 1312-1311

CNB-GZB 1120-1121, 1308-1309, 1408-1409, 1112-1113 and 1232-1233.

## 2.2 Bridges

- 2.2.1 The clearance refers to bridges with standard design of girders, slabs, pipe culverts, piers and abutments etc. issued by RDSO for BGML, RBG and MBG-1987 standard loadings. However, the bearings of span 78.8 m (effective) designed for BGML standard loading as per RDSO's drawing no. BA-11154 should be strengthened by providing two additional anchor bolts.
- 2.2.2 Superstructures and bearings of non-standard spans including Arches and sub-structures of all bridges are to be examined under the directions of the Chief Bridge Engineer concern and certified safe by him in terms of current IRS Bridge Rules, Steel Bridge Code, Concrete Bridge Code, Arch Bridge Code, Bridge Sub Structures and Foundations code etc. read with upto-date correction slips.
- 2.2.3 Zonal Railways to certify adequacy of existing bridges for permitted rolling based on physical condition of bridges by keeping them under observations considered necessary by the Chief Bridge Engineer of Railway.
- 2.2.4 Location of bridges on which speed restrictions are imposed shall be notified by the Railways and incorporated in the working timetable.
- 2.2.5 This clearance is subject to the following parameters of locomotives and LHB AC EOG coaches:

### (A) For Locomotives:

S.No.	Description	WAP5	WAP4	WDP4	WDP3A
1.	Max. axle load	19.5 ± 2% t	19 ± 2% t	19.5 t	19.5 t
2.	Max. tractive effort	26.3 t	30.8 t	27.52 t	29.1 t
3.	Max. braking force at rail level	16.3 t	22.3 t	16.3 t	15.7 t

### (B) For LHB AC EOG Coaches

#### i) AC Chair Car (EOG) Coach

Maximum axle load	:	16.25 t
Maximum Gross Load	:	50.270 t
Maximum Braking Force	:	5.8 t (14.4% of tare weight and
(at 3 kg/cm <sup>2</sup> BC pressure)	:	8.92% of gross weight)
CG height above rail level	:	Not exceeding 1830 mm

ii) Generator van

Maximum axle load	:	16.25 t
Maximum Gross Load	:	56.8 t
Maximum Braking Force (at 3 kg/cm <sup>2</sup> BC pressure)	:	6.62 t (12.7% of tare weight and 10.18% of gross weight)
CG height above rail level	:	Not exceeding 1830 mm

## 2.3 Signaling

- 2.3.1 Provision of GR, SR, SEM and all extant instructions issued from time to time shall be complied with.
- 2.3.2 MACLS shall be provided with two distant signals or automatic signaling. If two distant signals are provided then first distant signal shall be located at a distance of 1 km in rear of the home signal and the second distant signal at a distance of 2 kms in rear of the home signal. This stipulation shall also be applicable to the IBS and interlocked gates located in the block section.
- 2.3.3 All manned level crossing gates shall be provided with telephone communication with the nearest station.

## 2.4 Traction Installation

- 2.4.1 The OHE shall have swivelling type of cantilever having the tension in the conductors regulated automatically, with a presag of 50 / 100 mm. The presage is on contact wire for a span of 72 meter, proportionately less for smaller spans.
- 2.4.2 In case of locations where porcelain section insulators are installed on main line and lie within first 1/10<sup>th</sup> and 1/3<sup>rd</sup> of the span immediately after the OHE structure and the runners in the trailing direction the maximum speed shall be limited to 120 km/h. At all other locations where porcelain section insulators are installed, the speed shall be limited to 80 km/h.
- 2.4.3 The current collection beyond 100 km/h shall be made through one number pantograph fit for high-speed operation.
- 2.4.4 It will be ensured that the cantilevers in the trial section have BFB steady arm (RI No. 2390) with 25 mm drop bracket assembly (RI no. 2360).
- 2.4.5 In 25kV a.c. traction area, the CEE of Railway shall have to ensure that the minimum height of contact wire and Electrical clearances as stipulated in provision of Chapter -V and V-A, Electric Traction "Schedule of Dimension of 1676 gauge (BG) revised 2004" is not violated and strictly followed to ensure its safe running".
- 2.4.6 In addition to the above, the CEE may impose any temporary speed restriction on the basis of his personal knowledge and experience of the OHE and the conditions prevailing on any particular section.

## **2.5 Rolling Stock**

- 2.5.1 Before starting the operation, CME of the concerned railway will certify the track worthiness and safety of the rolling stocks. He will also ensure proper maintenance of the stocks.
- 2.5.2 The Wheel Slide Protection (WSP) device of all the coaches in the rake shall be functional at the starting station. If the WSP of any coach becomes defective enroute, the brake system of that particular coach shall be isolated.
- 2.5.3 The LHB AC EOG coaches shall be maintained as per "Preventive Maintenance system for LHB Coaching Stock" issued by Railway Board and the instructions issued by RDSO & Railway Board time to time.
- 2.5.4 The earthing arrangement on the coaches shall be maintained as per technical document No. LHB-TR3, dated 27.11.1997.

## **2.6 General**

- 2.6.1 All the permanent and temporary speed restrictions in force and those that may be imposed from time to time due to track, bridges, curves, signaling and interlocking etc shall be observed.
- 2.6.2 Attention is also invited to the note on "Preparation of Electrical Equipment of Diesel and Electric Locomotives for high speed operation" circulated by this office letter no. EL/3.3.15/WAM2/Gr.CON dated 24.12.1970 and the locomotive should be attended accordingly.
- 2.6.3 LHB AC EOG coaches (other than ACCN) with 23540 mm length over body and 12340 mm maximum distance apart between any two adjacent axles infringes clauses 13 (b) 16, 17, 19 (b), 20 (b), 21(b), 22 & 32 (b) of Chapter IV (A) of BG Schedule of Dimensions, 1973 Reprint. These infringements of LHB AC coaches were condoned by Railway Board vide their letter no. 97/CEDO/SR/3 dated 07.02.1997.
- 2.6.4 The pantograph of WAP5 Locomotive in locked down condition and the surge arrestors infringe the Maximum Moving Dimensions of 1929 over non-electrified sections. After removing the pantograph pan assembly and two surge arrestors, the profile will infringe the Maximum Moving Dimensions of 1929 but will be within 'X' class loco profile. For movement of loco in non-electrified sections, pantograph pan assembly and two surge arrestors shall be removed and the movement of the loco shall be cleared by the Railway concerned as per the extant rules applicable. In non electrified section where Maximum Moving Dimensions of existing 'X' class loco are not permissible, the movement shall be in accordance with the instructions issued by Railway Board and other additional instructions issued by the Zonal Railways for the movement of ODCs. Railway Board have condoned these infringements vide the letter no. 95/CEDO/SR/18 dated 14-7-1995.
- 2.6.5 The profile of WAP4 locomotive infringes clauses 9 (b), 12 and 13 of Chapter IV (C) of the BG Metric Schedule of Dimensions, 1973 Reprint. Railway Board have condoned these infringements vide their letter no. 96/CEDO/SR/10 dated 10.5.1996.

2.6.6 The profile of WDP4 locomotive infringes clauses 11 (ii), 12, 13 and 17 of Chapter IV (C) of the BG Metric Schedule of Dimensions, 1973 Reprint. Railway Board have condoned these infringements vide their letter no. 2001/CEDO/SR/18 dated 23.8.2001.

2.6.7 The profile of WDP3A locomotive infringes clauses 12 and 13 of Chapter IV (C) of the BG Metric Schedule of Dimensions, 1973 Reprint. Railway Board have condoned these infringements vide their letter no. 98/CEDO/SR/13 dated 12.10.1998.

2.6.8 Fencing of track at vulnerable location prone to cattle crossing shall be provided as per requirement.

DA: 1. Rly. Bd.'s letter no.97/CEDO/SR/3 dated 07.02.1997  
2. RDSO SK.96077



**(S. Mani)**

**Exe. Director Standards (Motive Power)**

Copy to:

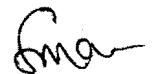
The Secretary (Mech., Elec. & Engg. /G)  
Railway Board, Rail Bhawan,  
New Delhi - 110 001

The General Manager (Mech., Elect. Optg. and S & T)

1. Northern Railway, Baroda House, New Delhi - 110 001
2. North Central Railway, Allahabad-211001

DA:

1. Rly. Bd.'s letter No.97/CEDO/SR/3 dated 07.02.1997
2. RDSO SK.96077



**(S. Mani)**

**Exe. Director Standards (Motive Power)**

GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)

No. 97/CEDO/SR/3.

1/24/7

1977 (Part 1) 07.02.97

To,

The Director General (Track),  
R.D.S.O.,  
Manak Nagar,  
LUCKNOW - 226 001.

Sub: LHB Coach - Condonation of the infringements  
to Schedule of dimensions 1973.

With reference to your application No. CT/LC/BS, dt. 17/20.1.97, sent through the Chief Commissioner of Railway Safety, Lucknow, the sanction of Ministry of Railways is hereby communicated for condonation of infringement to items 19(b), 16, 17, 19(b), 20(b), 21(b), 22 & 32(b) of Chapter-IV(A) of B.G. Schedule of dimensions (1973) involved in 23540 mm long LHB coach with 2350 mm width.

The sanction is based on Form-KI and Sketch No. 96077 accompanying your application referred to above.

( V.K. BAHANI )  
Exec. Dir. Civil Engg. (G)  
Railway Board.

No. 97/CEDO/SR/3.

New Delhi, Dt. 07.02.97.

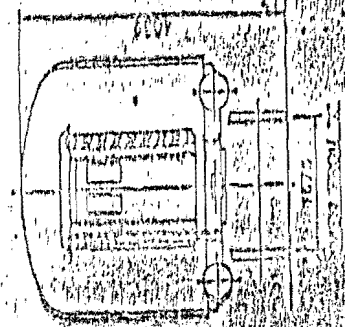
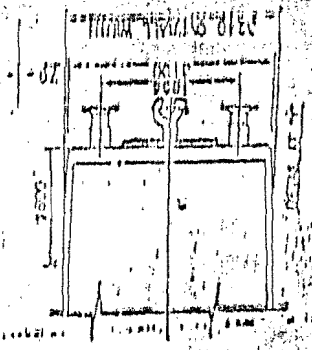
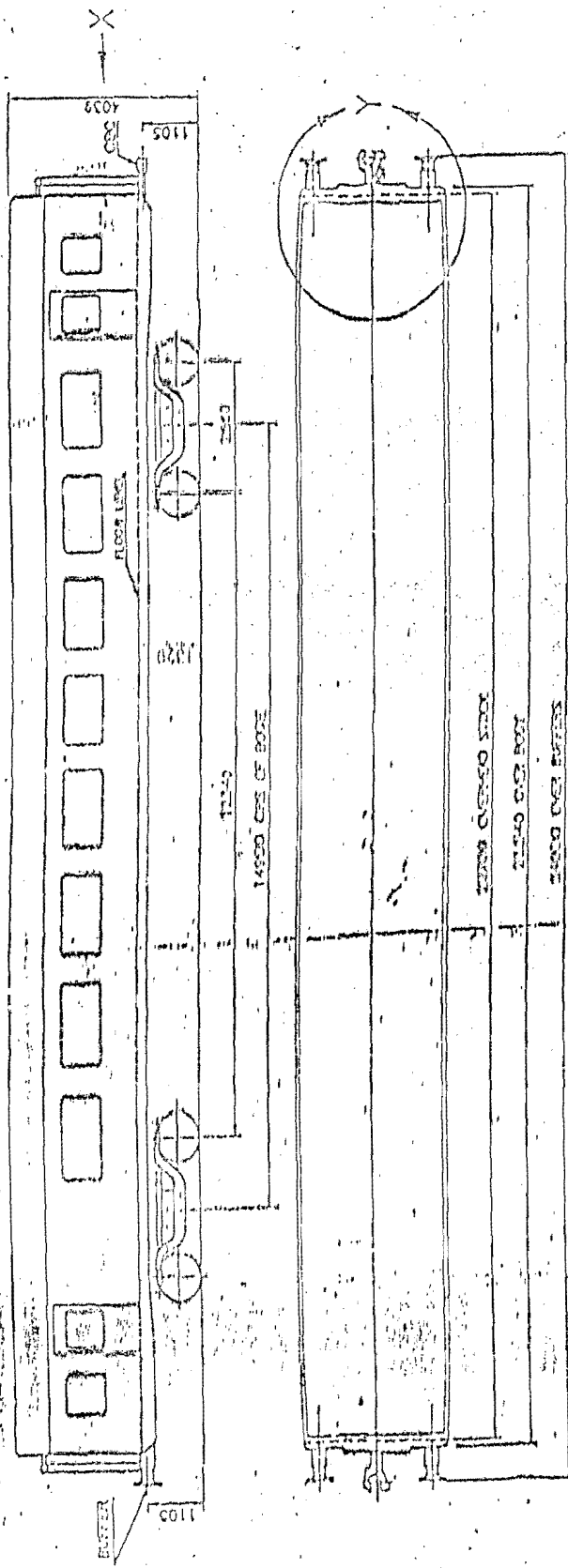
Copy forwarded for information to the Chief Commissioner of Railway Safety, 16-A, Ashok Marg, Lucknow - 226 001 with reference to his endorsement No. G. 17012/1/97/RS dated Nil.

( V.K. BAHANI )  
for Secretary Railway Board.

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15-7  
File No. 17012/1/97/RS





DIMENSIONS ARE TO BE PROVIDED ONLY  
 IN POWER CAR

DIAGRAM SHOWING MAIN DIMENSIONS  
 OF LHB-IR COACH.

SKETCH-96077