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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

5-NY 3224
AN ISO 9001
CERTIFIED
ORGANISATION

No. MC/LHB/Coach

Date: 22.07.2014

महाप्रबन्धक (इंजीनियरिंग),

1. उत्तर रेलवे, बडौदा हाऊस, नई दिल्ली - 1100 01
2. उत्तर मध्य रेलवे, हास्टिंग रोड, इलाहाबाद - 211001

Sub: Speed Certificate for operation of Shatabdi Express and other similar trains hauled by single WAP5 class of locomotive comprising maximum 12 numbers of LHB AC (EOG) coaches including two Generator Vans on New Delhi - Agra Cantt.-New Delhi section of Northern Railway & North Central Railway upto a maximum speed of 160 kmph, on track maintained to C&M-I, Vol.-I standard.

- 1.0 Shatabdi Express train service between New Delhi - Agra Cantt comprising of LHB AC EOG coaches at 150 km/h are already in operation. A speed certificate regarding this had been issued vide RDSO letter no. SD.Pol.12.10 dated 17.06.2004 and subsequent amendment dated 28.02.2005 to all concerned.
- 1.1 Indian Railways had signed a contract with M/s LHB Germany for supply of 24 nos. all metal lightweight high-speed BG AC coaches along with transfer of technology. RCF has built LHB AC/Non AC EOG broad gauge coaches fitted with FIAT bogies under Transfer of Technology from M/s. ALSTOM-LHB. The AC coaches, generally to RDSO drawing no. Sk. 96077 and to RCF's drawing no. LE 90009 have a speed potential for operation 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 have been built to the-state-of-art technology, fitted with disc brakes and centre buffer couplers and have a unique feature of wheel slide protection device (WSP), to prevent formation of wheel flats.
- 1.2 LHB AC EOG Chair car has undergone detailed oscillation trials up to test speed of 180 kmph on Palwal-Mathura section of Northern Railway & North-Central Railway on track maintained to C&M-I, Vol.-I standard. The test results of trials as contained in RDSO Report no. MT-240, exhibit satisfactory riding and stability behavior, upto test speed of 180 kmph on track maintained to C&M-I, Vol.-I standard. The LHB AC Generator Van has undergone detailed oscillation trials up to test speed of 145 kmph on Palwal-Mathura section of Northern Railway & North-Central Railway and from 145 kmph upto 180 kmph on Ghaziabad-Tundla section of North-Central Railway on track maintained to C&M-I, Vol.-I standard. The test results of trials as contained in RDSO Report no. MT-274 and MT-282 respectively. The test results of these trials exhibit satisfactory riding and stability behavior, upto test speed of 180 kmph on track maintained to C&M-I, Vol.-I standard. Similarly, LHB AC 3-Tier EOG variant coach has undergone detailed oscillation trials up to test speed of 180 kmph on Ghaziabad-Tundla section of North-Central Railway on track maintained to C&M-I, Vol.-I standard. The test results of trials as contained in RDSO Report no. MT-412,

exhibit satisfactory riding and stability behavior, upto test speed of 180 kmph on track maintained to C&M-I, Vol.-I standard. On the basis of satisfactory riding and stability behavior, the speed certificates for regular operation of LHB AC chair cars, LHB AC Generator Van and LHB AC 3-Tier EOG coach at a maximum speed of 160 km/h on track maintained to C&M-I Vol.-I standard have been issued vide RDSO's letters nos. MC/LHB/Coach dated 19.3.2003, MC/LHB/Coach dated 20.3.2003 and MC/LHB/Coach dated 20.5.2003 alongwith partial amendment issued on 27.02.2004 respectively.

- 1.3 Coupler force and EBD trials of 18 numbers of LHB AC EOG coaches with single WAP5 Locomotive have been conducted on NDLS-CNB-NDLS section of Northern Railway and North Central Railway and the test results as contained in Report no. MT-283 (March 2001) are found within limit.
- 1.4 The Confirmatory Oscillograph Car Runs of 12 numbers of LHB AC EOG coaches hauled by single WAP5 Locomotive have been conducted on New Delhi – Agra Cantt section of Northern Railway and North Central Railway in both Up and Down directions upto a maximum speed of 160 km/h. The test results as contained in RDSO's Report no. RDSO/2014/TG/MT-1346/F Rev.0 Amendment-Nil, dated 10.07.2014, exhibit satisfactory riding and stability behavior upto maximum speed of 160 kmph.
- 1.5 WAP5 class of locomotives imported from M/s ABB, Switzerland have undergone detailed oscillation trials at maximum speed of 180 kmph and the results are contained in RDSO's report no. MT-88 (June,1997). Based on the results, WAP5 class of locomotives have been cleared for operation up to a maximum speed of 160 kmph on track maintained to standards laid down in RDSO report no. C&M-I Vol.-I vide RDSO's letter no. SD.WAP5.11 dated 19.06.1997 followed by amendments dated 23.10.2006, 20.01.2012 and 13.06.2012.
- 2.0 Based on the above, it is certified that Speed Certificate for operation of Shatabdi Express and other similar trains hauled by single WAP5 class of locomotive comprising maximum 12 numbers of LHB AC EOG coaches including two Generator Vans may be permitted to operate upto a maximum speed of 160 kmph on New Delhi – Agra Cantt –New Delhi section of Northern Railway & North Central Railway, on track maintained to C&M-I, Vol.-I standard subject to the following conditions:

2.1 Track

- 2.1.1 The track shall be to a minimum standard of 60kg/90UTS rail laid on PRC sleeper with 1660 sleeper density on 300mm ballast cushion below the sleepers which may consist of at least 150mm clean and rest in caked up condition, on compacted and stable formation. However, sections which are cleared for 150kmph can be used for limited 160kmph train operation with the same stipulation with which 150kmph speed was introduced i.e. with track structure of 52 Kg/90UTS rails laid on PSC sleepers.

The track shall be maintained to the standards recommended in RDSO's report no. C&M-I, Vol.-I. In this connection, the instruction for maintenance of track on high speed routes, circulated to the railways under RDSO's DO letter no. CRA/509 dated 07.07.1971 and approved by Railway Board vide letters no. 71/W6/HS/8 dated 27.08.1971 and 71/W6/HS/1 dated 21.10.1971 should also be followed.

- 2.1.2 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.

- 2.1.3 The maximum permissible speed on curves shall be decided on the basis of the existing provisions of the Indian Railways Permanent Way Manual second reprint 2004.
- 2.1.4 Zonal Railway shall ensure that all turnouts on section are with fixed heel curved switches laid on PSC sleeper layout with CMS crossings with adequate arrangement to ensure designed geometry of turnouts. Turnouts with thick web switches shall be preferred on such routes. Provision of clamp type lock along with thick web switches in facing direction on mainlines shall be ensured. Other turnouts on the route shall be provided with thick web switches in planned manner.
- 2.1.5 The welds shall be protected by joggled fish plates as per provisions of Para 6.4 and Para 8.14 of USFD Manual and Para 6.3 of AT welding manual and other policy instructions of Railway Board. The maintenance of Rails and Rail joints shall be ensured as per Para 250 & 251 of IRPWM. In addition, wherever condition warrants on account of corrosion on rail/weld collar, wear on rail, cupping of welds etc., necessary precautions shall be taken for fish plating/ joggled fish plating.
- 2.1.6 Zonal Railways may ensure further detailed examination of track as deemed fit based on age-cum-condition basis, overdue renewal and condition of formation etc. as per provisions of Chapter III of IRPWM-2004 regarding permanent way renewals.
- 2.1.7 Preferably Improved SEJ should be provided on such routes.

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 & MBG-1987 standard loadings. However, the bearings of span 78.8 mtrs. (effective) designed for BGML standard loading as per RDSO's drg. No. BA-11154 should be strengthened by providing two additional anchor bolts.
- 2.2.2 All other designs of superstructures and sub-structures are to be examined under the directions of the Principal Chief Engineer/Chief Engineer (Co-ordination) concerned 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 Foundation Code, etc. read with up to date correction slips.
- 2.2.3 This clearance is subject to the following parameters of locomotive and LHB AC EOG coaches:

(A) For Locomotive:

S. No	Description	WAP5
1.	Max. axle load	19.5 ±2% t
2.	Max. tractive effort	26.3 t
3.	Max. braking force at rail level	16.3 t

(B) For LHB AC (EOG) Coaches

- i) Executive AC Chair Car Coach (LWFCZAC)

Maximum axle load	:	16.25 t
Maximum Braking Force (at 3.8 kg/cm ² BC pressure)	:	5.8 t / Coach
Max. CG height from rail level	:	Not exceeding 1830mm

ii) Second AC Chair Car Coach (LWSCZAC)

Maximum axle load	:	16.25 t
Maximum Braking Force (at 3.8 kg/cm ² BC pressure)	:	5.8 t / Coach
Max. CG height from rail level	:	Not exceeding 1830mm

iii) Generator van (LWLRRM)

Maximum axle load	:	16.25 t
Maximum Braking Force (at 3.8 kg/cm ² BC pressure)	:	6.6 t / Coach
Max. CG height from rail level	:	Not exceeding 1830mm

2.2.4 Location of bridges on which speed restrictions imposed shall be notified by the railways and incorporated in the working time table.

2.2.5 The above clause have been arrived considering bridges are in physically sound condition. In case the bridges are not in satisfactory physical condition, necessary speed restriction to be imposed by concern Chief Bridge Engineer of zonal railway.

2.3 Signalling

2.3.1 Provisions of GR, SR, SEM and extant instructions issued from time to time shall be complied with.

2.3.2 MACLS shall be provided with two distant signals or four aspect 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.

2.3.4 With a view to maintain safety, the last stop signal shall not be taken 'OFF' at station unless:

- i) The sections upto the stations in advance is clear, and
- ii) At the station in advance, the route of the train is clear, correctly set and locked for reception of train.

2.3.5 **The following provisions are mandatory:-**

- i) Electrical operation of points and means for locking both switches.
- ii) Electrical means for lock detection and independent switch detection by the respective signals.
- iii) The interlocking between signals and points shall be by electrical or electronic means (PI/RR/SSI).
- iv) Track circuiting of all running line from first stop signal to last stop signal.

- v) At stations provided with Central Panel Interlocking arrangement for verifying complete arrival of train by suitable means (axle counter/track circuit block proving).
 - vi) Means for directly holding the closed switch rail to corresponding stock rail and preventing the points from being unlocked during the passage of the train (clamp lock) is required for facing point.
 - vii) Provision for preventing signal passing at 'ON' is not considered mandatory till number of trains running at 160 kmph are upto 2 in the section. However, for any increase in number of trains beyond 2 , provision of preventing signal passing at "ON" is mandatory.
- 2.3.6 25 Watts VHF sets shall be provided in the locomotive & guards van for communication between loco pilot, guard and adjacent station master till such time mobile train radio communication work is commissioned in the section.

2.4 Traction Installation

- 2.4.1 The 25 kV AC OHE shall have swiveling type cantilever assembly having tension in the conductors, regulated automatically with a presag. The presag of 50/100 mm (0.8 mm per meter /1.6 mm per meter presage) is on the contact wire for a maximum span of 72 meters proportionately less for smaller spans.

The gradient of contact wire and the difference in the gradient of contact wire between two adjacent spans (relative gradient) may be kept as 3 mm/meter and 1.5 mm/ meter respectively.

The above presage as well as gradient of contact wire are for running of one to two trains each way at 60 kmph.

- 2.4.2 In case of locations where AC porcelain section insulators are installed on main line and lie within first 1/10th and 1/3rd of the span immediately after the OHE structure and the runners are in the trailing direction, the maximum speed shall be limited to 120 km/h. At all other locations where 25 kV AC porcelain section insulators are installed, the speed shall be limited to 80 km/h.
- 2.4.3 It shall be ensured that the cantilevers in the section have BFB steady arm assembly with 25 mm drop bracket.
- 2.4.4 The current collection shall be made through one number pantograph fit for high speed operation.
- 2.4.5 The current collecting pantograph shall be checked before and after the use.
- 2.4.6 In 25 KV AC traction area, the CEE of the concerned 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 of Schedule – I of ' Schedule of Dimensions of 1676 mm Gauge (BG) revised 2004 ' with latest Addendum & Corrigendum Slips is not violated.
- 2.4.7 Any temporary speed restriction on the basis of performance/ experience of the sectional OHE and field conditions prevailing on the particular section, may be imposed by Traction Distribution Officers.
- 2.4.8 There shall not be crossed type OHE within the section, otherwise suitable speed restrictions may be imposed.

2.5 Rolling Stock

- 2.5.1 Before starting the operation, Mechanical/ Electrical department of the concerned railway shall arrange to certify the track worthiness and safety of the rolling stocks. They shall 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 earthing arrangement on the coaches shall be maintained as per design.
- 2.5.4 The LHB AC EOG coaches shall be maintained as per "Maintenance Manual for LHB Coaches" issued by CAMTECH, Gwalior in 2013.

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, signalling 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 with 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 chair car and generator van 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 the 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 sections where Maximum Moving Dimensions of existing 'X' class locos 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 their letter No.95/CEDO/SR/18 dated 14.7.1995.
- 2.6.5 The adequacy of the brake power available on the locomotives in conjunction with the coaching stock to be used in the proposed train, vis-a-vis the signalling system available on the route, shall have to be established.
- 2.6.6 All level crossing gates should be manned.
- 2.6.7 Concerned Zonal Railway will arrange for provision of sturdy fencing of track as per requirement at vulnerable locations prone for cattle crossing / trespassing identified by General Manager of respective railway to prevent trespassing/cattle crossing. Zonal railways

should also provide subways at suitable location to avoid trespass and ensure effectiveness of fencing provided.

संलग्नकः

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



(सी. मधुसूदन राव)

कार्यकारी निदेशक मानक/चालन शक्ति

प्रतिलिपि:

1. सचिव (यांत्रिक/विद्युत/इंजीनियरिंग-जी), रेलवे बोर्ड, रेल भवन, नई दिल्ली-110 001
2. मुख्य रेल संरक्षा आयुक्त, मण्डल रेल प्रबन्धक कार्यालय, पूर्वोत्तर रेलवे परिसर, अशोक मार्ग लखनऊ-226001
3. महाप्रबन्धक (यांत्रिक/विद्युत/ओपरेटिंग/एस एण्ड टी)
 - i) उत्तर रेलवे, बडौदा हाऊस, नई दिल्ली - 1100 01
 - ii) उत्तर मध्य रेलवे, हास्टिंग रोड, इलाहाबाद - 211001

संलग्नकः

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



सी. मधुसूदन राव)

कार्यकारी निदेशक मानक/चालन शक्ति

रेल मंत्रालय MINISTRY OF RAILWAYS
(रेलवे बोर्ड RAILWAY BOARD.)

No. 97/CEDO/SR/3.

रेल बोर्ड का निर्देश-1997, दिनांक
07.02.97

To,

The Director General (TSSG),
P.O.S.O.,
Manak Nagar,
LUCKNOW - 226 001.

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

With reference to your application No. 97/10/ES. dt.
17/2/1.97, sent through the Chief Commissioner of Railway
Safety, Lucknow, the sanction of Ministry of Railways is
hereby communicated for concession of infringement to item
13(b), 15, 17, 19(b), 20(b), 21(b), 22 & 22(b), of Chapter-IV(A)
of S.G. Schedule of dimensions (1973) involved in 22640 cm
long LHB coach with 2350 mm width.

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

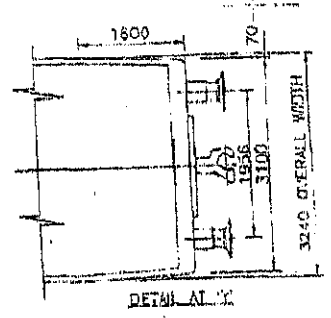
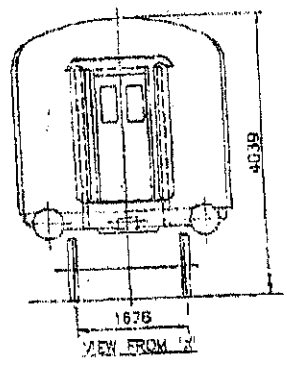
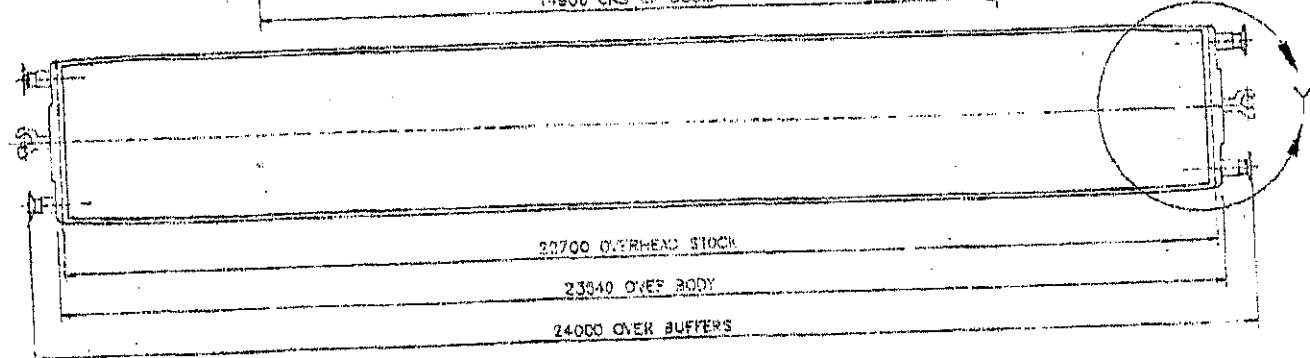
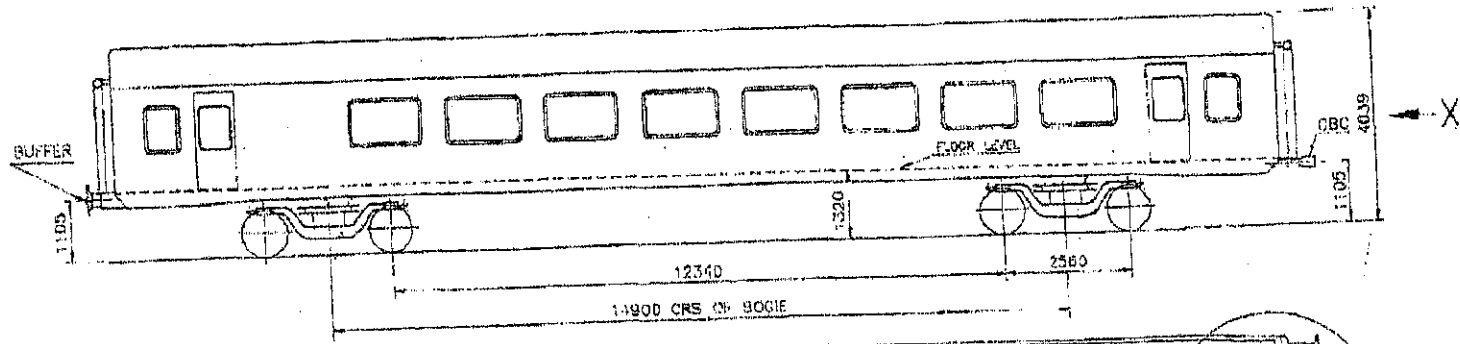
(V.K. SARMA)
Exec. Dir. Civil Engg. (C)
Railway Board.

No. 97/CEDO/SR/3.

New Delhi, dt. 07.02.97.

Copy forwarded for information to the Chief
Commissioner of Railway Safety, 15-A, Ashok Marg, Lucknow
226 001 with reference to his endorsement No. Q.17/1/97/AS
dated 11/2/97.

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



NOTE:-
BUFFERS ARE TO BE PROVIDED ONLY
IN POWER CAR.

DIAGRAM SHOWING MAIN DIMENSIONS
OF LHB-IR COACH

SKETCH-96077