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No. SD. INV. 9. 3

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महाप्रबन्धक (इंजीनियरिंग),
मध्य रेलवे छत्रपति शिवाजी टर्मिनस,
मुम्बई - 400 001

Sub: Speed Certificate for operation of passenger trains comprising 25 air braked coaches with WAP7/WAP4/WAG5(A/B/C)/WAG7/WAP5/WDM3A/WDG3A and WDM3D locomotive over the Maramijhri - Dharkhoh and Chichonda - Teegaon descending the ghat sections of Nagpur division of Central Railway.

1.0 WAP7 class of locomotive has been designed to haul mail/express trains up to a maximum speed of 140 km/h. Outline of the locomotive has been shown in RDSO's sketch no. SK.EL-4490. On the basis of satisfactory test results of detailed oscillation trials, as contained in RDSO report nos. MT- 453 (Dec' 2003) & MT - 893 (Aug' 2009), this locomotive has been cleared to run up to a maximum speed of 105 km/h on track maintained to other than C&M - I Vol. I and upto 140 km/h on track maintained to C&M-I Vol. I standards vide speed certificate no. EL/3.1.35/4 dated 20-1-2004 & 13.10.2009.

1.1 5000 hp WAP4 (earlier WAP1) class of locomotive has been designed to haul mail/express trains up to a maximum speed of 140 km/h. The General arrangement of the loco is shown in RDSO Drawing No.SK.DL-3031 A (latest alt). On the basis of satisfactory test results of detailed oscillation trials, as contained in RDSO report nos. M-529 & MT-164 (Jan.1999), this loco has been cleared to run up to a maximum speed of 140 km/h on track maintained to C&M-I Vol. I standards and upto 105 km/h on track maintained to other than C&M - I Vol. I vide speed certificate nos. SD.WAP1.11 dtd. 13.5.1994 & 5-2-99.

1.2 WAG5A/B/C class of locomotives, fitted with standard trimount bogie and TAO-659 traction motor are designed generally for freight train operation. On the basis of satisfactory test results of detailed oscillation trials, as contained in this office report no. M-527 (Dec'93), this locomotive has been cleared to run up to a maximum speed of 105 km/h vide speed certificate no.SD.WAG5.11 dated 07-07-1994.

1.3 WAG7 class of locomotive has been provided with 5400 kVA high capacity transformers, uprated smoothing reactors (SL30) capable of handling 1300 Amps current and specially designed with high adhesion bogies. On the basis of satisfactory results of detailed oscillation trials, as contained in this office report no. MT-70 (January'97), this locomotive has been cleared to run up to a maximum speed of 100 km/h vide speed certificate no. SD.WAG7.11 dated 02-02-2006 followed by amendment dated 03-03-2006.

1.4 WAP5 class of locomotives, fitted with Bo-Bo bogies, have been imported from M/S ABB, Switzerland. Outline of the locomotive is shown in RDSO drawing no. SK. EL.4353. The maximum axle load of this locomotive is $19.5 \pm 2\%$. On the basis of satisfactory test results of detailed oscillation trials, as contained in RDSO report nos. MT-88 (June 97) & MT-242 (October 2000), this locomotive has been cleared to run up to a maximum speed of 160 km/h on track maintained to C&M-I, Vol.I standard and upto a maximum speed of 105kmph on track maintained to other than C&M-I, Vol.I standard vide speed certificate nos. SD.WAP5.11 dated 19.6.97 & 28-05-01.

1.5 3100hp WDM3A (earlier name WDM2C) class of locomotive with dual brake system fitted with conventional Co-Co tri-mount bogies and having conical thrust pads in end axle boxes, to RDSO drawing no. 39.01.01 (alt.-b) has been powered with an upgraded fuel efficient engine to develop 3100 hp as against 2600 hp engine. Axle hung nose suspended BHEL make 4906 AZ traction motors have been provided in the locomotive which are geared for maximum operating speed of 120 km/h. On the basis of satisfactory test results of detailed oscillation trials, as contained in RDSO report no. M-280 (April 1972), this locomotive has been cleared to run up to a maximum speed of 120 km/h on track maintained to C&M-I, Vol.I standard and upto a maximum speed of 105kmph on track maintained to other than C&M-I, Vol.I standard vide speed certificate nos. SD.WDM2.11 dated 17.08-2007&13.12.2007.

1.6 3100 hp WDG3A Locomotive (earlier name is WDG2 loco) fitted with high adhesion bogies is manufactured at DLW, Varanasi. General arrangement of the locomotive and its bogie are as per RDSO's drawing nos. 43.01.01 (alt. b) and SK.VL- 033 respectively. Profile with maximum moving dimensions to EDO/T-1043 is shown in sketch no. SK.DL - 4417. The maximum axle load of the locomotive is 20.5t. Based on the sanction of CCRS for dispensing with oscillation trials vide their letter no. Q/17016/1/2006-CCRS dated 28-03-2006, WDG3A class of locomotive has been cleared for operation up to a maximum speed of 105 km/h videspeed certificate no. SD.WDG2.11 dated 28-3-2007 followed by amendment dated 06-11-2009.

1.7 3300 hp WDM3D class of locomotives, fitted with two nos. three axle bolster less high adhesion bogies similar to that of WDG3A locomotive, are manufactured by DLW Varanasi. The general arrangement of the loco and its bogie has been shown in RDSO drawing nos. 53.01.01 (latest Alt.) and drawing no.53.04.01 (latest Alt.) respectively. The maximum axle load of the locomotive is 19.5+2%t. This locomotive is designed for mixed service to run up to a maximum speed of 120 km/h. This locomotive has been cleared to run up to a maximum speed of 105 km/h vide this office letter no. SD.WDM3D.11 dated 27.07-2007.

2.0 Central Railway has proposed to run 25 air braked passenger train (ICF type coaches fitted with screw coupling or AAR 'H' type Tight lock CBC) hauled by single WAP7 / WAP4 / WAG5(A/B/C) / WAG7 / WAP5 / WDM3A / WDG3A and WDM3D locomotive over Maramijhri - Dharkhoh and Chichonda -Teegaon descending the ghat sections of Nagpur division of Central Railway having ruling gradients 1:60 & 1: 70 respectively.

2.1 To establish satisfactory running of 25 air braked ICF type coach (fitted with screw coupling or AAR 'H' type Tight lock CBC) trains hauled by single WAP7 / WAP4 / WAG5(A/B/C) / WAG7/ WAP5 WDM3A / WDG3A and WDM3D locomotives over the Maramijhri - Dharkhoh and Chichonda -Teegaon descending the ghat sections of Nagpur division of Central Railway, controllability including EBD trials have been conducted by Testing Directorate of RDSO and test results as contained in report no. RDSO/2012/TG/MT-1153/F dated 20-01-2012 and amendment no.1 dated 13.2.12. are found satisfactory up to a maximum speed of 75 km/h.

2.2 On the basis of satisfactory test results of controllability & EBD trials of 25 air braked coach train, it is certified that operation of passenger train of 25 air braked ICF type coaches (fitted with screw coupling or AAR 'H' type Tight lock CBC) over Maramijhri - Dharkhoh and Chichonda - Teegaon descending the ghat sections of Nagpur division of Central Railway may be permitted to run at the speeds and condition given below:-

Sl. No.	Train formation	Max. operational speed in (km/h)
1.	WAP7 loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h

2.	WAP4 loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h
3.	WAG5(A/B/C) loco +25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h
4.	WAG7 loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h
5.	WAP5 loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h
6.	WDM3A loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h
7.	WDG3A loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h
8.	WDM3D loco + 25 air braked ICF type coaches fitted screw coupling or AAR'H' type tight lock CBC	75 km/h

2.3 Track

- 2.3.1 The track shall be to a minimum standard of 52 kg rails on sleepers to M+7 density and depth of ballast cushion below sleepers of 250 mm, which may consist of at least 100 mm clean and the rest in caked up condition, on compacted and stable formation.
- 2.3.2 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 road bed is not compacted or there is improper drainage, he may suitably restrict the maximum permissible speed depending upon the local conditions.
- 2.3.3 The maximum permissible speed on curves shall be decided on the basis of the existing provisions of the Indian Railways Permanent Way Manual second print- 2004.

2.4 Bridges

- 2.4.1 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 78.8m (effective) designed for BGML standard loading as per RDSO's drawing no. BA-11154 should be strengthened by providing two additional anchor bolts.
- 2.4.2 Superstructures and bearings of non-standard spans including Arches and sub-structures of all bridges shall be examined under the directions of the Chief Bridge Engineer 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.
- 2.4.3 The clearance is subject to the following parameters:

a) For WAP7 locomotive:

- | | | |
|------|--|-----------------------|
| i) | Maximum axle load | 20.5 ± 2%t |
| ii) | Maximum tractive effort | 32.9 t |
| iii) | Maximum braking force at rail level (regenerative) | 26.5 t |
| iv) | Maximum CG height from rail level | Not exceeding 1830 mm |

b) For WAP4 locomotive:

i)	Maximum axle load	19t
ii)	Maximum tractive effort	30.8t
iii)	Maximum braking force at rail level	22.3t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

c) For WAG5 (A/B/C) locomotive:

i)	Maximum axle load	19.8t
ii)	Maximum tractive effort	33.5t
iii)	Maximum braking force at rail level	21t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

d) For WAG7 locomotive:

i)	Maximum axle load	20.5t
ii)	Maximum tractive effort	44t
iii)	Maximum braking force at rail level	22t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

e) For WAP5 locomotive:

i)	Maximum axle load	19.5t ± 2%
ii)	Maximum tractive effort	26.3t
iii)	Maximum braking force at rail level	16.3t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

f) For WDM3A locomotive:

i)	Maximum axle load	18.8t
ii)	Maximum tractive effort	30.45t
iii)	Maximum braking force at rail level	22t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

g) For WDG3A locomotive:

i)	Maximum axle load	20.5t
ii)	Maximum tractive effort	40.5t
iii)	Maximum dynamic braking force at rail level	21.0t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

h) For WDM3D locomotive:

i)	Maximum axle load	19.5+2%t
ii)	Maximum tractive effort	38.6t
iii)	Maximum dynamic braking force at rail level	17.94t
iv)	Maximum CG height from rail level	Not exceeding 1830 mm

i) For Air braked coaches:

i)	Maximum axle load	16.25t
ii)	Maximum CG height from rail level	Not exceeding 1830mm

2.4.3.1 For WAG7 locomotive, Track on bridges and approaches of BGML spans 4.3m, 13.1m, and 19.4m (all effective) shall be strengthened or modified in such a way to allow for dispersion of longitudinal force as per clause 2.8.3.2 of IRS bridge Rules. In cases where dispersion cannot be allowed as per clause 2.8.3.2 such as due to provision of SEJ in

bridges etc., the Superstructure including bearings and sub-structure shall be checked for longitudinal force without dispersion and certified safe by the Chief Bridge Engineer concerned.

- 2.4.3.2 In case of operation with WDG3A locomotive, track on bridges and approaches of BGML span 4.3m (effective) shall be strengthened or modified in such a way so as to allow for dispersion of longitudinal force as per clause 2.8.3.2 of IRS Bridge Rules. In cases where dispersion cannot be allowed as per clause 2.8.3.2 such as due to provision of SEJ in bridges etc., the bridge superstructure including bearings and sub-structure shall be checked for longitudinal force without dispersion and certified safe by the Chief Bridge Engineer concerned.
- 2.4.4 Zonal Railways shall certify the adequacy of existing bridges for permitting rolling stock based on physical condition of bridges by keeping them under observations considered necessary by the Chief Bridge Engineer of Railway.
- 2.4.5 Location of bridges on which speed restrictions have been imposed shall be notified by the Railway and incorporated in the working timetable.
- 2.4.6 Specific restrictions are applicable as indicated in relevant Speed Certificates of hauling locomotives issued by RDSO.

2.5 Signalling

- 2.5.1 Provision of GR, SR, SEM and all extant instructions issued from time to time, shall be complied with.
- 2.5.2 On the sections where EBD more than 1 km is to be catered for, second distant signal or automatic signaling shall be available failing which suitable speed restriction shall be imposed.
- 2.5.3 In the normal single phase 25 KV AC electrified section where electric locomotive is used, provisions given in para 22.6, 22.7, 22.8, 22.9 & 22.10 of SEM Pt. II regarding maximum permissible length of track circuits, signal feeding, maximum permissible length for operation of Point motor, use of block instruments and use of AFTC/axle counters for higher catenary currents limited to 800A on single track section and 1000A on double track section shall be ensured by the Railway.

2.6 Traction Installation

- 2.6.1 The 25 kV AC regulated OHE shall have swiveling type of cantilever assembly having tension in the conductors, regulated automatically with a presag. The presag of 50/100 mm is on the contact wire for a maximum span of 72 m, proportionately less for smaller spans.

The unregulated DC OHE and unregulated converted AC OHE (from DC OHE) are simple polygonal type. The tensions in the conductors are non regulated. These have speed potential of 120 km/h from design point of view. At locations where DC Section Insulators are installed, the speed shall not be more than 80 km/h.

The speed potential of converted 'Unregulated 25 KV AC Overhead Traction Equipment' remains the same as that of 'Unregulated DC Overhead Traction Equipment.' or as decided by the Chief Electrical Engineer of Railway concerned.

2.6.2 In case of locations where 25 KV AC porcelain section insulators are installed on main line and lies within first 1/10th and 1/3rd of the span, immediately after the OHE structure and the runners are in trailing direction, the maximum speed shall be 120 km/h. At all other locations where 25 KV AC porcelain section insulators are installed.

2.6.3 In 25 kV AC traction area, having regulated OHE or unregulated OHE or converted unregulated OHE (from DC OHE), the CEE of the Railway concerned shall have to ensure that the minimum height of contact wire shall be maintained as under to ensure safe running:

Permitted height of rolling stock (MM)	Minimum height of contact wire in the section (MM)
4420	4690
4270	4540

All other provisions of Chapter V-A, 25 KV AC 50 cycles electric traction of “Schedule of Dimension 1676 mm gauge (BG) revised 2004” along with Addendum & Corrigendum Slips shall be followed.

2.6.4 In addition to the above, the Chief Electrical Engineer of the concerned Railway may impose any temporary speed restriction on the basis of personal knowledge, experience of the Sectional OHE and the field conditions prevailing on a particular section.”

2.7 Rolling Stock

2.7.1 Before initiating operation, CME/CEE of the Railway shall certify the track worthiness and safety of the rolling stocks. He shall also ensure proper maintenance of the locomotives and coaches.

2.7.2 The locomotives and coaches shall have air brake system in proper working order. The locomotives nominated for such operation should have dynamic brake in good working condition.

2.7.3 The locomotives shall be fitted with SA-9 Brakes as per the current practice of operation in the ghat section. Air-flow indicating device shall be in good working order.

2.7.4 About operation of air-braked stock, the instructions contained in RDSO Misc. Report no. MP 572/82, Guide no 11 (Revision -01) Amendment no.1, Jan'2010 and Report no. MP – 1461/93) may be referred.

2.7.5 All the coaches shall be fitted with AAR ‘H’ tight lock CBC.

2.7.6 The automatic brake (A-9) shall be applied for proper holding of the train, if required.

2.7.7 The coaches shall be fitted with composition brake blocks and 95% brake cylinders shall be in operating condition or as per existing rules of above ghat section.

2.8 General

2.8.1 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.


- 2.8.2 The pantograph of WAP7 locomotive in locked down condition and the surge arrestors infringe the Maximum Moving Dimensions of 1929 over non-electrified sections. After removing pantograph pan assembly and two surge arrestors, the profile will infringe the Maximum Moving Dimensions, 1929 but will be within 'X' class loco profile. For movement of the loco in non-electrified territory, 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 the Railway Board and other additional instructions issued by the Zonal Railways for the movement of ODCs. Railway Board have condoned the infringements of WAP7 locomotive vide their letter no. 2000/CEDO/SR/2 dated 17-2-2000.
- 2.8.3 The design of WAP4 locomotive infringes item 9(b), 12 and 13 of Chapter IV (C) of Maximum Moving Dimensions 1929 (Reprint-1973). Railway Board's sanction for the above infringements has been obtained vide their letter No. 96/CEDO/SR/10 dated. 10-5-96.
- 2.8.4 The moving profile of WAG5A/B/C class of locomotives is same as that of WAM4 locomotives. The pantograph of the locomotive in locked down condition infringes Maximum Moving Dimensions 1929 (Reprint-1973) in non-electrified sections. This infringement has been condoned by Railway Board for any movement on non-electrified sections vide their letter No. 89/CEDO/SR/5 dated 18-06-1990.
- 2.8.5 WAG7 locomotive infringes clause 12 and 9 (b) of Chapter IV (C) of maximum moving dimension 1929 (Reprint-1973) as per RDSO Drawing No. SK.EL-4365. These infringements have been condoned by Railway Board vide letter No. 96/CEDO/SR/9 dated 10.5.96.
- 2.8.6 The pantograph of WAP5 locomotive in locked down condition and the surge arrestors infringe the Maximum Moving Dimensions of 1929 (Reprint-1973) over non-electrified sections. After removing pantograph pan assembly and two surge arrestors, the profile will infringe the Maximum Moving Dimensions, 1929 but will be within 'X' class loco profile. For movement of the loco in non-electrified territory, 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 the Railway Board and other additional instructions issued by the Zonal Railways for the movement of ODCs. Railway Board have condoned the infringements of WAP5 locomotive vide their letter no. 95/CEDO/SR/18 dated 14-7-95.
- 2.8.7 The profile of WDM3A locomotive infringes clause 11 (ii) and 12 of Chapter IV (C) of Maximum Moving Dimensions (Reprint-1973) and side slopes at top of the profile to maximum moving dimensions of 1929 (Reprint-1973), which are exactly similar to those of WDM2 locomotive. These infringements have been condoned by Railway Board for WDM2 locomotive vide their letter no. 80/WDO/SR/29 dated 3-12-80.
- 2.8.8 The design of WDG3A locomotive infringes clause 12 of Chapter IV (C) of Maximum Moving Dimensions 1929 (Reprint-1973). This infringement has condoned by Railway Board vide their letter no. 98/CEDO/SR/15 Dated 24-12-98.
- 2.8.9 The design of WDM3D locomotive (earlier named as WDM3C+ locomotive) as given in Sketch no. SK.DL-4518 (alt. b) infringes clauses 11 (ii) and 12 of Chapter IV (C) of

Maximum Moving Dimensions 1929 (Reprint 1973). These infringements have condoned by Railway Board vide their letter no.2002 /CEDO/SR/12 dated 13-11-2002.

2.8.10 Design of AC-3 Tier coach to drawing no. CSC -1704, infringes of Maximum Moving Dimension 1929(Reprint -1973). The infringement involved in design has been condoned by Railway board vide their letter no. 93/CEDO/SR/12 dated. 25.10.93. Railway Board have, however, stipulated that Zonal Railways shall have to take sanction of competent authority both for movement of these coaches as well as for condonation of infringement on their respective as per Railway board letter no. 72/WDO/SR/31 dated 22.02.1974.

2.8.11 Maintenance of ICF AC coaches shall be carried out in accordance with technical pamphlet no. C-7807 (Revision-1) except the paras pertaining to vacuum brake system which have been replaced by air brake system. The air brake system of coaches shall be maintained as per RDSO Technical Pamphlet no.8805.


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