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अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - २२६०११
Government of India Ministry of Railways
Research Design & Standards Organisation
Lucknow - 226 011



An ISO 9001:2000
Organisation

No. SD.INV. 9.3

Dated- 29 -01- 2010

The General Manager (Engg.),
Central Railway,
CST Mumbai - 400 001.

Fax No.022-22697275

Sub: Speed certificate for operation of passenger trains comprising of 18-21 air brake coaches with single WAP4, WAG5/7, WAP5, WDM3A, WDG3A and WDM3D locomotive over the Maramijhri - Dharkhoh and Chichonda - Teegaon ascending the ghat sections of Nagpur division of Central Railway.

WAP5 class of locomotives, with Bo-Bo bogies are imported locomotives from M/S ABB, Switzerland. Outline of the locomotive is as per drawing No. SK. EL.4353. The axle load of the locomotive is $19.5 \pm 2\%$. Based on satisfactory results of oscillation trials conducted on track maintained to other than C&M-I Vol-I standard as contained in this office report no. MT-242 of (October 2000) WAP5 class of locomotive has been cleared for operation upto a maximum speed of 105 km/h on track maintained to other than C&M-I Vol.-I standard vide this office letter no. SD.WAP5.11 dated 28-05-01.

1.1 WAG5A/B/C class of locomotives fitted with standard trimount bogie and TAO-659 traction motor are designed generally for freight train operation. Detailed oscillation trials with this locomotive were conducted on Itarsi- Bhusaval- Igatpuri section upto a maximum speed of 115 km/h and test results as contained in this office report no. M-527 of Dec.'93 are satisfactory. As such WAG5A/B/C class of locomotives have been cleared upto a maximum speed of 105 km/h vide this office letter no. SD.WAG5.11 dated 07-07-1994.

1.2 WAG7 class of locomotives are provided with 5400 kVA high capacity transformers, uprated smoothing reactors (SL30) capable of handling 1300 Amps current and specially designed with high adhesion bogies. Based on the satisfactory results of oscillation trials conducted on track maintained to other than C & M-I, Vol-I standards as contained in this office report no. MT-70 (January'97), this locomotive has been cleared for operation upto a maximum speed of 100 km/h vide speed certificate no. SD.WAG7.11 dated 02-02-2006.

1.3 Based on satisfactory results of oscillation trials conducted on track maintained to other than C&M-I Vol-I standard as contained in this office report no. MT-164 of (Jan' 99) WAP4 class of locomotive has been cleared for operation upto a maximum speed of 105 km/h on track maintained to other than C&M-I Vol.-I standard vide this office letter no. SD.WAP4.11 dated 5-2-99.

1.4 Dual braked WDM3A locomotive to RDSO's drawing no. 39.01.01 (alt.-b) is powered with an upgraded fuel efficient engine developing 3100 hp as against 2600 hp engine of WDM3A(earlier name WDM2C) locomotive. The increased power is obtained by using a highly efficient new generation turbocharger, better fuel injection and piston design, The locomotive is fitted with conventional Co-Co tri-mount bogies, having conical thrust pads in end axle boxes. Axle hung nose suspended BHEL make 4906 AZ traction motors have been provided which are geared for maximum speed of 120 km/h. This locomotive has been

cleared for maximum speed of 105 km/h on track maintained to other than C & M-I, Vol-I standards, vide this office speed certificate no. SD.WDM2.11 dated 13.12-2007.

1.5 3100 hp WDG3A class of locomotive to RDSO's drg. no. 43.01.01 (latest Alt.) fitted with high adhesion bogies to RDSO's drg. no SK.VL-033 are manufactured at Diesel Locomotive Works, Varanasi. The axle load of the locomotive is 20.5t. CCRS vide their letter no. Q/17016/1/2006-CCRS dated 28-03-2006 has accorded the sanction, to issue the speed certificate for operation of WDG3A locomotive upto a maximum speed of 105 km/h without conducting the oscillation trials. Accordingly speed certificate for operation of single/double headed WDG3A locomotive upto a maximum permissible speed of 105 km/h has been issued vide this office letter of even no. dated 28-3-2007.

1.6 DLW, Varanasi, has manufactured 3300/3500hp WDM3E class of locomotives which is re-designated as WDM3D without equalizer, this locomotive has been fitted with high adhesion bogie (HAHS bogie) having axle load to 19.7t. To reduce the un-sprung weight of locomotive and eliminate the problems related to equalizing and compensating mechanisms, a bogie design without equalizing and compensating mechanism has been developed for locomotive. The locomotive is provided with AC-DC transmission and microprocessor control to achieve higher starting tractive effort. General Arrangement of WDM3E locomotive is as per RDSO's drg. no. SKDL-4683 and Bogie General Arrangement is as per RDSO's drg. no. SK.VL- 460.

2. Central Railway has proposed to run (18-21) coaches air braked passenger trains (ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC) hauled by single WAP5, WAG5/7, WAP4, WDM3A, WDG3A and WDM3D locomotives over the Dharkhoh – Maramijhri and Teegaon – Chichonda ascending the Ghat sections of Nagpur Division of Central Railway.

2.1 To establish the satisfactory running of 25 air braked ICF type coaches (fitted with screw coupling or AAR'H' type Tight lock CBC) trains hauled by single WAP7 locomotive over the Dharkhoh – Maramijhri and Teegaon – Chichonda ascending the Ghat sections of Nagpur Division of Central Railway, coupler force trials have been conducted by Testing Directorate of RDSO and test results are found satisfactory up to the speed of 65 Km/h as contained in this office report no. MT-982/F (Rev.-0 dated 27-08-09). On the basis of satisfactory coupler force trials of 25 air braked coaches, Central Railway has also proposed to operate 18-21 coaches trains over above section.

2.2 Based on the above, it is certified that operation of passenger trains comprising of (18-21) air braked ICF type coaches (fitted with screw coupling or AAR 'H' type tight lock CBC) over the Dharkhoh–Maramijhri & Teegaon–Chichonda ascending the Ghat sections of Central Railway may be permitted to run at speeds as given below subject to the following conditions:

Sl. No.	Train formation	Max. Operational Speed in Km/h
1.	WAP5 + 18–21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC .	60
2.	WAG7 + 18–21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC.	60
3.	WAP4 + 18–21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC.	50

4.	WDM3A + 18-21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC.	30
5.	WAG5 + 18-21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC.	30
6.	WDG3A + 18-21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC.	30
7.	WDM3D + 18-21 air braked ICF type coaches fitted with screw coupling or AAR'H' type Tight lock CBC.	30

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 250mm, which may consist of at least 100mm 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 & bearing 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 Foundation Code etc. read with upto- date correction slips.
- 2.4.3 Zonal Railways to certify 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.
- 2.4.4 Location of bridges on which speed restrictions are imposed shall be notified by the Railways and incorporated in the working timetable.
- 2.4.5 This clearance is subject to the following parameters of the rolling stocks:

a) 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 |

- b) For WAG5 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 |
- c) 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 |
- d) 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 |
- e) 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 |
- f) For coaches:
- | | | |
|-----|-----------------------------------|----------------------|
| i) | Maximum axle load | 16.25t |
| ii) | Maximum CG height from rail level | Not exceeding 1830mm |
- g) For WDG3A locomotive:
- | | | |
|------|---|-----------------------|
| i) | Maximum axle load | 20.5t |
| ii) | Maximum tractive effort | 40.5t per loco |
| iii) | Maximum dynamic braking force at rail level | 21.0t per loco |
| iv) | Maximum CG height from rail level | not exceeding 1830 mm |
- h) For WDM3D locomotive:
- | | | |
|------|---|-----------------------|
| i) | Maximum axle load | 19.7t |
| ii) | Maximum tractive effort | 38.6t per loco |
| iii) | Maximum dynamic braking force at rail level | 17.94t per loco |
| iv) | Maximum CG height from rail level | not exceeding 1830 mm |

2.4.6 In case of WAG7 operation:

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 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.

2.5 Signalling:

- 2.5.1 Provisions 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 signalling should be available failing which suitable speed restriction is to 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 OHE shall have swiveling type of cantilever assembly having tension in the conductors regulated automatically with a presag of 50/100 mm. The presag is on the contact wire for a maximum span of 72 m, proportionately less for smaller spans.
- 2.6.2 At locations where 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 trailing direction the maximum speed shall be 120 km/h. At all other locations where porcelain section insulators are installed, the speed shall be limited to 80 km/h.
- 2.6.3 In 25kV AC traction area, the CEE of the 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 of Electrical traction "Schedule of Dimension of 1676 mm gauge (BG) revised 2004" is not violated and strictly followed to ensure its safe running.
- 2.6.4 In addition to the above, the Chief Electrical Engineer may impose any temporary speed restriction based on the conditions prevailing on a particular section.

2.7 Rolling Stock:

- 2.7.1 Before initiating operation, CME/CEE of the railway will certify the track worthiness and safety of the rolling stocks. He will also ensure proper maintenance of the locomotives and coaches.
- 2.7.2 The locomotive and coaches shall have air brake system in proper working order.
- 2.7.3 The load in up grade direction shall be so fixed that continuous speed of locomotives is not allowed to drop below the prescribed limit.
- 2.7.4 Dynamic brakes of all the locomotives should be in proper working order.

8 General:

- 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.
- 8.2 The design of WAP4 locomotive infringes item 9(b), 12 and 13 of Chapter IV (C) of the BG Metric Schedule of Dimensions 1973 (Reprint). Railway Board's sanction for the above infringements has been obtained vide their letter No. 96/CEDO/SR/10 dated. 10-5-96.
- 8.3 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 the moving dimensions of 1929 as per BG Schedule of dimensions (1973) in non-electrified sections. Railway Board have condoned this infringement for any movement on non-electrified sections vide their letter No. 89/CEDO/SR/5 dated 18-06-1990.
- 8.4 WAG7 locomotive infringes clause 12 and 9 (b) of Chapter IV (C) of maximum moving dimension 1929 and other BG schedule of Dimension (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.
- 8.5 The profile of WDM3A locomotive infringes clause 11 (ii) and 12 of Chapter IV (C) of BG Schedule of Dimensions (1973) and side slopes at top of the profile to maximum moving dimensions of 1929, which are exactly similar to those of WDM2 locomotive and Railway Board has condoned these infringements for WDM2 locomotive vide their letter no. 80/WDO/SR/29 dated 3-12-80.
- 8.6 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 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.
- 3.7 Design of AC-3 Tier coach built to CSC 1704 infringes BG Schedule of dimension – 1973 (Revised 2004). 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 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.

- 2.8.8 Maintenance of ICF AC coaches shall be carried out in accordance with technical pamphlet no. C-7807 (Revision-1) except to the paras pertaining to vacuum brake system which has been replaced by air brake system. The air brake system of coaches shall be maintained as per RDSO Technical Pamphlet no.8805.
- 2.8.9 The profile of WDG3A locomotive infringes clause 12 of Chapter IV (C) of BG Schedule of Dimensions 1929 (Reprint 1973/2004). Railway Board have condoned this infringement vide their letter no. 98/CEDO/SR/15 Dated 24-12-98.
- 2.8.10 The profile of WDM3E (re-designated as WDM3D without equalizer) is similar to that of WDM3D locomotive (earlier named as WDM3C+ locomotive) as given in Sketch no. SK.DL-4518 (alt.-c) infringes clauses 11 (ii) and 12 of Chapter IV-C of the BG Metric Schedule of Dimensions 1929 and others of BG Schedule of Dimensions 1973 (Reprint). Railway Board have condoned these infringements vide their letter no.2002 /CEDO/SR/12 dated 13-11-2002.

Encl: Nil.



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Exe. Director Standards (Motive Power)

Copy to:

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Encl: Nil.

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