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सत्यमेव जयते

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

No.MC/DMRC

Dated:22.01.2010

The Managing Director
Delhi Metro Rail Corporation Ltd.
Metro Bhawan,
Barakhamba Road
New Delhi -110001

Subject : Final maximum permissible speed Certificate for SG DMRC RS-3 coaches upto a maximum speed of 85 km/h.

1. Delhi Metro Rail Corporation (DMRC) is procuring 196 coaches from M/s MRMB Consortium for its SG Rail System. Each self-propelled bi-directional train set consists of 4 cars, with two Motor coaches (MC) in between two Driving Trailer coaches (DTC) at either end. Being multiple units, the configuration of train sets can be extended to 6 car formation by adding one Trailer car (TC) & Motor car (MC) unit. The axle load of MC and DTC are 15.787 t and 15.355 t respectively. These coaches are fitted with Schaku coupler, electro pneumatic disc brake blended with electrical regenerative braking system and bolster less air suspension bogies having air suspension at secondary stage and rubber suspension at primary stage. These coaches have been designed and manufactured by M/s MRMB Consortium consisting of M/s Mitsubishi Corporation/Japan, M/s Hyundai ROTEM/Korea, M/s Mitshubishu Electric Corporation /Japan and M/s BEML Ltd./ Bangalore. The design features and layout of DTC, MC and TC are as shown in the drawing nos. GAP00702, GAP00703 and GAP00817 respectively. Axle load capacity of DTC and MC and TC under gross load condition is 16.0t.

1.1 With a view to assess the speed potential of motor and driving trailer coach the detailed oscillation trial were conducted upto a maximum speed of 95 kmph in inflated condition and 90 kmph in deflated secondary spring condition on Mundka – Shivaji Park (up & down) section of DMRC SG network. The results are contained in RDSO Report No. MT-RDSO/2009/TG/MT-1002/F of November 2009. The stock has exhibited satisfactory riding characteristic upto 95 kmph in inflated and 70 kmph in deflated secondary spring condition.

2. Based on the oscillation trials, it is certified that operation of DMRC RS-3 stock in 2 unit configuration for 4 coach train formation; each unit consisting of two coaches viz, one driving trailer coach (DTC) and one motor coach (MC) to Hyundai ROTEM coach layout nos. GAP00702 and GAP00703 for DTC & MC respectively may be permitted to operate upto a maximum speed of 85 kmph in

inflated and 60 kmph in deflated condition on DMRC SG network with a compatible signaling system subject to the following conditions:

2.1 Track

2.1.1 Ballastless Track (Maximum Speed up to 85Kmph): Complete Track structure to be approved by Ministry of Railway (Railway Board) as applied by DMRC vide their letter no. DMRC/20/II-336/2009 dated 8-1-2010.

2.1.2 For track of lower standard than that approved for ballastless portion the concerned Chief Engineer of DMRC shall decide the lower maximum permissible speed on the basis of maintenance conditions.

2.1.3 The maximum permissible speed on curve shall be decided on the basis of provisions of Track Manual of DMRC for SG network.

2.1.4 Chief Engineer DMRC shall decide the frequency of the rail grinding based on close observation of rail condition and defect generation rate in rails.

2.1.5 Ultrasonic testing of rail shall be undertaken before passage of every 40 GMT traffic in test free period and before passage of every 8 GMT after test free period. Stricter test frequency may be applied by Chief Engineer/DMRC based on defect generation rate in rails.

2.1.6 Fresh trials shall be conducted by DMRC when maximum lateral play between rail and wheel reaches its maximum value i.e. 33 mm to validate riding stability and safety and to measure forces in track at rail wheel interface in these conditions. For this purpose, Chief Engineer of DMRC shall ensure that proper record of wear in rail and wheel is kept and timely action is taken.

2.2 Bridges

2.2.1 The foundation, sub-structure, bearing system and superstructure of this section have been designed as per the design basis report issued by DMRC for "MRTS Project for Delhi Phase-2 Elevated viaduct." The clauses in design basis report have been mainly drawn from IRS CBS, IRC and some other international codes. There is no standard drawing of RDSO for standard gauge with 16 t axle load and all the drawing have been finalized by DMRC.

2.2.2 There is no standard drawing issued by RDSO, is available for standard gauge Metro railway. Hence all foundation, substructure, bearing system and superstructure for all type of spans including arch bridges, if any should be examined and certified safe by Chief Engineer/Design, DMRC, Delhi. Suitability and safety of the bridges for all rolling stock shall also be ensured by DMRC.

2.2.3 The Locations of bridges requiring any type of speed restrictions shall be notified by DMRC and incorporated in the working time table of that section.

2.2.4 This clearance is subject to the following parameters :

Maximum axle load of driving trailer coach (DTC)	:	15.355t
Maximum axle load of motor coach (MC)	:	15.787t
Maximum friction braking force of DTC	:	92.11 KN
Maximum friction braking force of MC	:	97.44 KN
Maximum regenerative braking force of MC	:	100.36 KN
Maximum tractive effort per motor coach	:	113.6 KN
CG height from rail level (DMRC Coaches)	:	not exceeding 1600

2.3 Signaling

2.3.1 All necessary precautions shall be taken to ensure safety as well as other operational requirements by DMRC based on the signaling system in force on DMRC SG network.

2.4 Traction Installation

2.4.1 The OHE shall have swiveling type of cantilever assembly having the tension of 1200kgf in the conductors regulated automatically. The contact wire shall have a pre-sag (in mm) of (L/1000) where 'L' is span length in metres and the maximum span length is 54 metres. For OHE of standard other than the mentioned above, the concerned DMRC Chief Electrical Engineer shall decide the maximum permissible speed.

2.4.2 The Chief Electrical Engineer may impose any temporary speed restrictions on the basis of his personal knowledge and experience of the OHE and the conditions prevailing on the particular section.

2.5 General

2.5.1 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.

2.5.2 Any special restriction imposed by CEE of DMRC due to the condition of overhead equipment or any other reasons shall be observed.

2.5.3 The coaches MC/DTC do not infringe the DMRC Schedule of Dimensions for Standard Gauge 1435 mm for underground, Elevated & At Grade and the kinematic profile of rolling stock are within the kinematic envelope of these coaches (passenger multiple units) as shown in Fig. DMSG-1 (TNL) and DMSG-1 and SOD of DMRC for underground, Elevated & At Grade corridors.

2.5.4 In case any secondary air spring of a coach gets deflated during the run, the maximum speed of the train shall be brought down to 60 kmph immediately and the train shall be withdrawn from service and brought for attention, to a depot or taken to a siding, as situation demands, at the earliest opportunity and in any case not later than after completion of its round trip.

2.5.5 In view of rolling stock operation on elevated track in urban areas, high quality regular maintenance and safety audit checks of sub-system like Brakes, Bogie suspension, Roller Bearing and Wheel sets etc should be ensured.

DA: Nil.

(S. Mani)
Executive Director Standard /Motive Power

Copy to:

1. Executive Director, Mech. Engg. (Coaching), Railway Board, New Delhi.
2. Chief Commissioner of Railway Safety, Ministry of Civil Aviation, North Eastern Railway Office Compound, Ashok Marg, Lucknow-226001.

DA: Nil.

(S. Mani)
Executive Director Standard /Motive Power