

S. No. 15

**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)**

No. 2011/Proj./Mumbai Metro/30/6 (Coaches)

New Delhi, dated 05.06.2014

**Managing Director,  
Mumbai Metro One Pvt. Ltd.,  
Mumbai Metro One Depot,  
D. N. Nagar, J.P Road,  
4 Bungalows, Andheri (W),  
Mumbai-400053**

**Sub: Sanction for introduction of operation of Standard Gauge Mumbai Metro One Pvt. Ltd., (MMOPL) Coaches manufactured by M/s. CSR Nanjing Puzhen Rolling Stock Company Limited China (CSRN) with air suspension arrangement at secondary stage to CSRN's Drawing Nos. PMOFD09110010000 (V2.2) [for 'DT' Coaches] and PMOFD09110020000 (V2.2) [for 'M' Coaches) over Mumbai Standard Gauge (SG) system on VAG Corridor.**

**Ref: (i) MMOPL's letter number MMOPL/App/2014/112 dated 18.05.2014  
(ii) RDSO's Interim Speed Certificate number UTHS/56/MMOPL dated 01.04.2014  
(iii) CRS's letter number Q.15014/01/14-15-T.W dated 22.05.2014**



In reference to letter under reference (i), provisional sanction of Ministry of Railways, Railway Board is hereby communicated for running of coaches manufactured by M/s. CSR Nanjing Puzhen Rolling Stock Company Limited China (CSRN) with air suspension arrangement at secondary stage to CSRN's Drawing Nos. PMOFD09110010000 (V2.2) [for 'DT' Coaches] and PMOFD09110020000 (V2.2) [for 'M' Coaches) over Mumbai Standard Gauge (SG) system on VAG Corridor at a maximum permissible operating speed of 50 (FIFTY) kmph subject to terms & conditions as given in RDSO's Interim Speed certificates and amendments as the case may be and Joint Safety Certificate, Track Certificate and Bridge Certificate accompanying the above under reference (ii).

Sanction is further subject to recommendations/suggestions made by Commissioner of Railway Safety and conveyed vide Ministry of Civil Aviation's letter number Q-15014/01/14-15-T.W dated 22.05.2014 and agreed to by the Board, as under:

Contd/-2...

1. It shall be ensured by the Mumbai Metro One Pvt. Ltd. (MMOPL) to get all their Maintenance Manuals and Instructions related to Rolling Stock approved by RDSO (Ministry of Railways) and also to develop a mechanism to get their various maintenance practices audited periodically by RDSO.
2. EIG has accorded approval for commissioning of 25 kvAC OHE on the said section subject to certain conditions. MMOPL should comply with these conditions.

It shall be ensured by MMOPL that gap between emergency walkways and coach are not excessive, for ensuring safety of passengers during emergency evacuation in mid section

  
  
05-06-14  
(Ruth Changsan)  
Dir. /Works (Plg.)  
Railway Board  
Ph. 011-23097061


No. 2011/Proj./Mumbai Metro/30/6 (Coaches)

New Delhi dated 05.06.2014

Copy forwarded for information to:

- (i) The Chief Commissioner of Railway Safety, Ashok Marg, Lucknow-226001 w.r.t his letter number Q.15014/01/14-15-T.W dated 22.05.2014
- (ii) Director General, RDSO, Manak Nagar, Lucknow.

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भारत सरकार

नागर विमानन मंत्रालय

(रेल संरक्षा आयोग)

GOVERNMENT OF INDIA

MINISTRY OF CIVIL AVIATION

(COMMISSION OF RAILWAY SAFETY)

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पूर्वोत्तर रेलवे, मं.रे.प्र. कार्यालय परिसर  
16, अशोक मार्ग, लखनऊ-226001

N.E. Railway, DRM OFFICE CAMPUS  
16, Ashok Marg, Lucknow-226 001

No. Q.15014/01/14-15-T.W.

Date-22-05-2014

सेवा में,  
सचिव (सिविल इंजी.),  
रेल मंत्रालय (रेलवे बोर्ड),  
रेल भवन,  
नई दिल्ली ।

[ध्यानार्थ : ED(W&P)]

विषय: Introduction of operation of Standard Gauge Mumbai Metro One Pvt. Ltd. (MMOPL) coaches manufactured by M/s. CSR Nanjing Puzhen Rolling Stock Company Limited China (CSRN) with air suspension arrangement at secondary stage to CSRN's Drawing Nos. PMOFD09110010000 (V2.2) [for 'DT' Coaches] and PMOFD09110020000 (V2.2) [for 'M' Coaches] over Mumbai Standard Gauge (SG) system on VAG Corridor.

- संदर्भ: रेल संरक्षा आयुक्त, पश्चिम परिमंडल, मुम्बई के
- पत्र सं -42-5/3/180 दिनांक 22.04.2014
  - पत्र सं -42-5/3/216 दिनांक 08.05.2014
  - पत्र सं -42-5/3/240 दिनांक 19.05.2014
  - पत्र सं.42-5/3/245 दिनांक 21.05.2014

The above subjected case, forwarded by Commissioner of Railway Safety, Western Circle, Mumbai vide letters under reference pertains to first time introduction of operation of subject rolling stock over Mumbai Standard Gauge (SG) system to be operated by MMOPL on the basis of Interim Speed Certificate No. UTHS/56/MMOPL, Dated 01-04-2014 issued by RDSO.

Case is hereby forwarded for necessary action for PROVISIONAL running of the above said rolling stock at a maximum permissible operating speed of 50 (FIFTY) kmph with the following conditions:-

- It shall be ensured by the Mumbai Metro One Pvt. Ltd. (MMOPL) to get all their Maintenance Manuals and Instructions related to Rolling Stock approved by RDSO (Ministry of Railways) and also to develop a mechanism to get their various maintenance practices audited periodically by RDSO.

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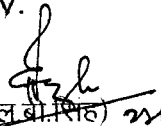
2. EMC test reports are technically scrutinised by the Ministry of Railways and accepted.
3. Railway Board's letter no.2005/Proj./Mumbai/15/1 Vol.II dated 21-05-2013 (signed on 21.05.2014) addressed to MMOPL does not specify what has been cleared. It is not clear from the body of this letter that, what system has been approved by Railway Board to be adopted by MMOPL. Railway Board's clearcut approval detailing the traction system to be adopted on MMOPL is required as has been done in the case of approval of S&T System and Track Structure.
4. EIG has accorded approval for commissioning of 25 kvAC OHE on the said section subject to certain conditions. MMOPL should comply with these conditions.

This issues with the approval of Chief Commissioner of Railway Safety.

संलग्नक: उपरोक्त ।

प्रतिलिपि-

रेल संरक्षा आयुक्त, पश्चिम परिमंडल, मुम्बई

  
(एल बी सिंह) 21/5/14  
उप रेल संरक्षा आयुक्त (सामान्य)  
कृते मुख्य आयुक्त रेल संरक्षा



भारत सरकार  
नागर विमानन मंत्रालय  
(रेल संरक्षा आयुक्त)



पश्चिम परिमंडल, दूसरी मंजिल,  
चर्चगेट स्टेशन उपभवन, एम.के. रोड,  
मुंबई -400020

No.42-5/3/245

Dated : 21.05.2014

The Chief Commissioner of Railway Safety  
Ashok Marg  
**Lucknow – 226 001**

Sub : Sanction for introduction of Standard Gauge Mumbai Metro One Pvt. Ltd. (MMOPL) coaches manufactured by M/s CSR, Nanjing Puzhen Rolling Stock Company Limited China (CSRN) with air suspension arrangement at secondary stage over Mumbai Standard Gauge (SG) system on VAG Corridor..

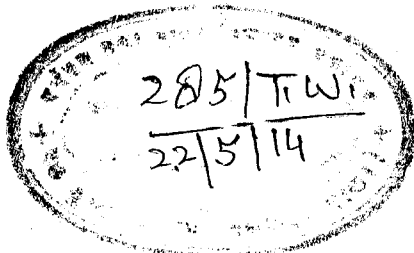
Ref : This office letter No. 42-5/3/180 dated 22.04.2014 and Letter No. 42-5/3/240 dated 19.05.2014

The proposal was scrutinized (after inspection of rolling stocks) as per Rule 24 (6) of The Opening of Metro Railways for Public Carriage of Passengers Rules, 2013 and forwarded vide above referred letters for obtaining sanction from Central Govt.

The inspection report duly signed by the undersigned is now enclosed herewith as desired, please.

**Encl.** 08 pages  
(in 02 sets )

(P.S. Baghel)  
Commissioner of Railway Safety  
Western Circle, Mumbai.



### Inspection Report

Mumbai Metro Standard Gauge (SG) Rolling stock was inspected by CMRS on 18.04.2014 and the observations recorded during the inspection are listed below:

1. Dimensions of Rolling Stock: The dimensions measured at site on Train set 2 as compared to the dimensions listed in the layout drawings are listed below:

DT Coach number: 022D

S.No	Dimension	As per approved Schedule of Dimensions	As per the Layout Drawing No. PM0FD 09110010000 (V2.2) attached with Speed Certificate	Actual measured at site
1.	Height of interior ceiling from the floor level	Not mentioned	2072.5 mm (minimum 2050 mm in specification)	2070 mm
2.	Height of grab railing from the floor level	Not mentioned	1866 mm	1870 mm
3.	Width of Coach on door threshold (Max width of coach)	Max 3210 mm	3206 mm	3206 mm
4.	Height of the seat from the floor	Not mentioned	440 mm	437mm
5.	Length of a bank of 8 seats	Not mentioned	3610 mm	3610mm
6.	Distance of door to door in the open condition	Not mentioned	1400 mm	1404mm
7.	Longitudinal Distance between centre line of two consecutive doors	Not mentioned	5500 mm	5500mm
8.	Length of DT Car (Coupler to coupler)	Max 23700 mm	23700 mm	23690 mm
9.	Distance between bogie centres of bogies of same coach	15000 $\pm$ 250 mm	15000 mm	15002 mm



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Commissioner of Railway Safety  
Western Circle, Mumbai.

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10.	Flange height	Max 36 mm Min 28 mm	As per SOD	28.03 mm
11.	Flange Width	Max 33 mm Min 22 mm	As per SOD	32.78 mm
12.	Height of floor from rail top	Max 1140 mm Min 1100 mm	Nominal 1130 mm	1140 mm (train under tare load)
13.	Wheel Back to back distance	Max 1360 mm Min 1358 mm	As per SOD	1358 mm
14.	Height of pantograph from rail level in drop down condition	Max 4100 mm	4090 mm	4088 mm

M Coach number: 022M

S.No	Dimension	As per approved Schedule of Dimensions	As per the Layout Drawing No. PM0FD 09110020000 (V2.2) attached with Speed Certificate	Actual measured at site
1.	Width of Coach on door threshold (Max width of coach)	Max 3210 mm	3206 mm	3206 mm
2.	Height of the seat from the floor	Not mentioned	440 mm	439 mm
3.	Distance of door to door in the open condition	Not mentioned	1400 mm	1400 mm
4.	Length of M Car (Coupler to Coupler)	Max 22000 mm	22000 mm	21993 mm
5.	Distance between bogie centres of bogies of same coach	15000 $\pm$ 250 mm	15000 mm	15001 mm

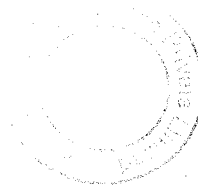


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2. Dead man handle: Operation of dead man handle was demonstrated by MMOPL. It was working satisfactorily.

3. Door Operation: Door opening and closing functions were demonstrated by MMOPL. The interlock of opening of doors with train movement was checked in accordance with the para 1.9.3 of approved Schedule of Dimensions and Sub rule (5) (i) of Rule 30 of Metro Railways General Rules, 2013 and found to be compliant with both the provisions.

In accordance with sub rule (7) of Rule 32 of Metro Railways General Rules, 2013 the automatic opening of doors under Automatic Mode operation was demonstrated at stations by MMOPL. The same was found functioning well.

Internal emergency egress device is provided on all doors for manual opening of the doors from inside in case of emergency. Operation of the egress device was demonstrated by MMOPL to open the door. It was working well.

4. Means of communication between passengers and Train Operator: Means of communication between passengers and the train operator was checked. 5 No.s of Passenger Emergency communication units are provided in each coach. The operation of the same was demonstrated and there was proper communication between dummy passenger and train operator.

5. Fire Prevention measures: Various measures of fire prevention on Rolling stock were inspected.

MMOPL explained that fire retardant material is used on the coaches. MMOPL was asked to demonstrate the same using a sample of interior material. One sample of interior wall insulation was taken from interior panels and the same was lit. The material was found to be fire resistant.

Further, MMOPL explained that train is provided with a Fire alarm system consisting of smoke detectors inside the saloon and driver cab. This system is also mentioned under Annexure XVI of Interim Speed Certificate No, UTHS/56/MMOPL dated 01.04.2014 issued by RDSO. The fire alarm system functionality was demonstrated by MMOPL by producing the smoke. Alarm was sounded in the driver's cab.

Additionally, 02 Nos. of Fire Extinguishers in each saloon beneath the passenger seats are provided with identification labels. Operation of one of the Fire extinguisher was demonstrated by MMOPL.

MMOPL was asked to explain about the procedure to be followed in case of fire. MMOPL explained their procedure that if smoke or fire is reported on a train between



stations, the Train Operator shall inform the Traffic Controller, drive his train to the next station and detain passengers. MMOPL showed their procedure No. D-OP-GEN-S-601, detailing the actions to be taken by various operation staff in case of fire. MMOPL, further, explained that the same is in line with the sub rule (3) of Rule 52 of Metro Railways General Rules, 2013.

MMOPL was asked to provide the additional instruction stickers to be pasted near fire extinguishers for giving the method to use the fire extinguishers so that even passengers are able to use that in case of fire.

6. Unique identification for coaches: On enquiring, MMOPL confirmed that each coach has a unique number for its identification and maintaining its history.
7. Ride Index: Ride index measured by RDSO and provided in the Oscillation Trial report No. RDSO/2014/TG/MT-1319/F Rev 0 was shown by MMOPL. It was further explained that Maximum value of ride index listed under para 6.2 of the said report is 2.17 for vertical riding and 2.21 for lateral riding under speed of 90 kmph as against the criteria of 3.00. It was suggested to buy one portable OMS for measuring of oscillations as per the frequency to be decided by MMOPL.
8. Brake System: The functioning brake system was explained by MMOPL as below:

**Service Brake:** Electro-Pneumatic brake system for Mumbai Metro VAG corridor (Line-1) is electronically controlled system provided with fault diagnosis and fault record functions. Application and release of brake is achieved by Controlling the master controller position (to powering or braking positions) or by Automatic Train Operation (ATO) system. During the process of normal service brake, the electric regenerative braking and friction air braking are blended to meet the requirement of brake demand with preference given to electric regenerative braking. Brake control is applied with jerk control function. If the electric regenerative braking cannot meet the demanded brake force, pneumatic brake automatically compensates for the demand.

**Emergency Brake:** Emergency Brake is controlled by Emergency Brake Hard-wired loop all along the train. The breakage in this loop (resulting in emergency electromagnetic valve de-energization) due to any condition, namely, application of emergency brake push button, train parting, low pneumatic pressure or by Automatic Train Protection etc. results in application of Emergency Brake in all the coaches.

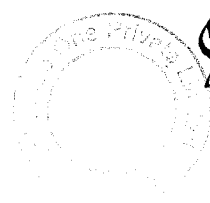
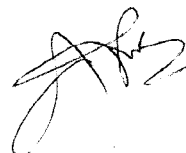
End-to-End trials on the Rolling Stock under inspection were carried out to have general feel of Traction and Braking System. Train was driven in automatic mode with acceleration and braking done by ATO system. The stoppage of train at different stations



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matched with the stopping marker boards provided at respective stations. MMOPL explained that brake system is a proven one from Knorr Bremse, which is being used all around the world.

9. Traction System: MMOPL explained that a proven traction system is provided by Mitsubishi Electric Corporation, Japan.

Further, MMOPL explained the circuit diagram of traction system which also forms Annexure XIII of Interim Speed Certificate No. UTHS/56/MMOPL dated 01.04.2014 issued by RDSO.

10. Facilities for evacuation of passengers in case of Emergencies: It was shown that each passenger saloon door is provided with an emergency egress mechanism. This mechanism can be operated by passengers in case of any emergency to evacuate from the train. After operation of this mechanism, the respective door can physically be opened by pushing the two door leafs apart only if the train is standstill. The detailed procedure (document No. D-OP-GEN-S-602) prepared by MMOPL for the evacuation of passengers in case of emergencies was explained in this regard.

11. Type of Suspension: Suspension of MMOPL rolling stock is helical coil spring at primary stage and air suspension at secondary stage. It was demonstrated by MMOPL that, in line with para 5.3 of Interim Speed Certificate No. UTHS/56/MMOPL dated 01.04.2014 issued by RDSO, in case of deflation of an air spring, alarm message is displayed to train driver in the cab.

12. Type of Coupling/Coupler: MMOPL confirmed and showed that coaches are fitted with Dellner couplers as per drawings included as annexure-X to XII of Interim Speed Certificate No. UTHS/56/MMOPL dated 01.04.2014 issued by RDSO.

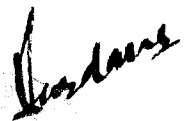
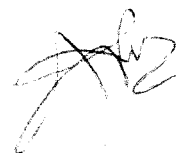
13. MMD infringement and Minimum Ground clearance: MMOPL mentioned that MMD is within the Kinematic Envelope as per approved SOD by Railway Board and minimum ground clearance as per the approved SOD is available.

14. Maintenance standard, pattern and instruction (MI) including examination distance/period and POH: MMOPL explained the maintenance examination frequency for the rolling stock including the POH. Further, it was confirmed by MMOPL that competent maintenance staff is available for the rolling stock maintenance and the suitable maintenance facilities are available.



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15. Noise level and other environmental issues: Noise was measured in stationary condition. The noise level was 66 dB, within the permissible limits.

16. Safety features with details (speedometer, VCD, Air drier, flasher, head light, ACD, online monitoring of Rolling stock health): Train Control and Management System screen provided in the driver's cab displays the health of various systems on the rolling stock.

17. Standard composition of train: MMOPL explained that Standard composition of train is 4 cars initially and later on to be expandable to 6 cars. The current composition of the train is as below:

DT-M-M-DT,


Where: DT- Driving Trailer Car and M- Motor Car

18. Detachment and attachment procedures in emergency: MMOPL explained that procedure prepared in line with Rule No. 50 of Metro Railways General Rules, 2013 shall be followed.




19. Equipment failure data: Data is available on Train Control and Management System.

20. System of Operation and Train Control: MMOPL apprised that the system of Operation is as per Metro Railways General Rules 2013, which is briefly described below:

- Continuous Automatic Train control system has been provided on Versova – Andheri - Ghatkopar section for movement of trains between stations and between the depot and running lines.
- The Continuous Automatic Train Control system works on the principle of target speed with cab signals, by means of continuous transmission of data from track to train through Coded Audio Frequency Track Circuit, ensuring safe movement of trains by continuously generating a safe operating envelope defined by the limit of movement authority and the maximum safe speed.
- The continuous Automatic Train Control system provides the following modes of train operation
  - a. Automatic Mode (AM) for Automatic Train Operation (ATO).
  - b. Supervised Manual Mode (SM) /Coded Manual Mode (ATP) Mode.
  - c. Restricted Manual (RM) Mode.

  
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d. Automatic Reverse (AR) Mode.

e. Cut-Out (CO) Mode.(via ATP Fault switch operation on Rolling Stock)

21. Additional parameters of rolling stock:

S.No.	Description	Confirmation by MMOPL
1	Power rating hauling capacity (load chart)	Load Chart is attached as annexure XVII of Interim Speed Certificate No. UTHS/56/MMOPL dated 01.04.2014 issued by RDSO.
2	Maximum tractive effort during starting / running.	11.776 tonnes
3	Hourly rating, continuous rating, Maximum permissible speed	Continuous rating of traction motor is 220 kW and one hour rating is 240kW. Maximum permissible speed of rolling stock is 80kmph and design speed is 90 kmph.
4	Safety features/equipments Speed recording, flasher light, Air drier, Emergency brake, WSP, headlights and other prescribed safety equipments, brake equipments.	Provided
5	Dimensional features - Locomotive diagrams giving full particulars of axle loads, wheel spacing length, over buffers and other principal dimensions of the locomotive for which sanction is required.	Layout of DT and M car is part of Annexure-I and II of Interim Speed Certificate No. UTHS/56/MMOPL dated 01.04.2014 issued by RDSO.
6	Layout of drivers cab and equipment	Same as above
7	Brake system, Emergency braking system and hand brake/parking brake system.	Provided. Parking brake is provided. Parking brake is spring applied and air released.
8	Emergency braking distance/ Normal braking force at rail level per axle.	Emergency Brake Distance: less than or equal to 206m at level tangent track.
9	Maximum Axle load.	17 tonnes
10	Noise and temperature level in the cab.	Within limits






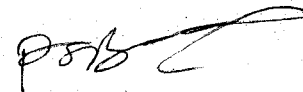
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Western Circle, Mumbai.



11	The visibility of signal from either side of the cab	Good
12	System of crew, guard communication.	Not applicable
13	Condition of Multiple, tripple head operation.	Not applicable
14	Precautions to be taken by crew during loco failure and restriction in trouble shooting that infringe safety in train operation.	As per Rule 30 of Metro Railway General Rules, 2013
15	Injury free features in the cab area	Ergonomic design of cab.
16	Number of members of crew	1

  
**(P. S. Baghel)**  
 Commissioner of Railway Safety  
 Western Circle. Mumbai.