

Documents required for issue of speed certificate of Rolling Stock – (Rolling Stock – Mechanical)

1. Brake System

- i. System description of Air supply and Brake system, Standards followed.
- ii. Train Brake Calculation including Emergency braking distance and details
- iii. Technical details of Air Compressor as supplied by OEM (CFM, Max. Pressure, Operating pressure, Cut-in and Cut-out pressure etc.)
- iv. Air Consumption Calculation
- v. Brake and Piping diagram.
- vi. Wheel slip and slide protection document

2. Bogie System

- i. System description of Bogie
- ii. Drawings and Design Data for Bogie
- iii. Finite Element Analysis Report of Bogie Frame duly accepted and signed by Rolling Stock Head
- iv. Fatigue test data of bogie frame and endurance parameters calculations
- v. Thermal Calculation of Wheel
- vi. Axle Strength Calculation-Powered Axles
- vii. Axle Strength Calculation- non-Powered Axles
- viii. Life rating calculation of Axle box bearing
- ix. Suspension drawing and design parameters
- x. Driving Motor Bogie assembly drawing
- xi. Motor Bogie assembly drawing
- xii. Trailer Bogie assembly drawing
- xiii. Driving Motor (DMC) wheel set assembly drawing
- xiv. Wheel drawing for all type of Coaches
- xv. Motor Coach (MC) wheelset assembly drawing
- xvi. Trailer Coach (TC) wheelset assembly drawing

3. Vehicle Dynamic Analysis on Track Data as Specified by Metro Administrations- Vehicle Model

- i. Natural frequencies of the suspension system (consisting of all the springs and Dampers)
- ii. Stability / Safety of bogie (*Conforming to the Limiting value $\Delta Q/Q \leq 0.5$ and $Y_{rms}/Q \leq 1$ (Results of simulation software) up to design speed with AW0 and AW4 load at critical curves in Inflated and Deflated Secondary spring condition*)
- iii. Wheel / track off-loading
- iv. Bogie rotational resistance calculation results
- v. Wheel wear index at the tread and flange
- vi. Lateral force and derailment quotient
- vii. Ride index
- viii. Acceleration values of car body and bogie frame
- ix. Criteria for assessment of riding behavior of vehicle
- x. Kinematic Envelope (KE) Calculation

4. Finite Element Analysis of Car body structure as per manufacturer

5. Relative movement between coaches/coach and bogie

- i. Coupler Movement Calculation
- ii. Gangway Movement Calculation for specified radius
- iii. Calculation of Relative Movements between coach and bogie on different degrees of curvature

6. Passenger Saloon Door description & Drawing

7. Coupler – Technical description

- i. Front Automatic Coupler drawing
- ii. Intermediate Automatic Coupler drawing
- iii. Semi-Permanent Coupler half (with GH) drawing
- iv. Semi-Permanent Coupler half (with Rigid Bar) drawing
- v. Semi-Permanent Coupler drawing

8. Fire Safety System

- i. Fire load calculation: Design calculation of Fire load above & below body frame
- ii. Fire Protection System & compliance to relevant International Standards (duly accepted and signed by Rolling Stock Head)
- iii. Measures for Emergency Evacuation of Passengers

9. Crashworthy Simulation as per EN 15227 and GMRT 2100 (duly accepted and signed by Rolling Stock Head)

10. Description of Metro Coaches and Pay load calculation

- i. Layout of train formation
- ii. Layout of Driving Motor/Driving Trailer Coach
- iii. Layout of Motor Coach
- iv. Layout of Trailer Coach

11. Weight Particulars of Stock

12. Test Procedure of various systems to be given for information:

- i. Test Procedure of Dynamometer test
- ii. Test Procedure of Brake caliper unit
- iii. Test Procedure of Static and Fatigue tests of bogie frame
- iv. Test Procedure of Bogie Rotational Resistance test
- v. Procedure of Oscillation trials
- vi. Test Procedure of Wheel offloading test
- vii. Test Specification of Coupler
- viii. Test Procedure of Wheel
- ix. Test Procedure of Wheel set
- x. Test Procedure of Solid Axle

13. Detailed list of Sub Documents of Annexure A as per On-Line Portal:

S. No.	Doc. No.	Document Name	Type
1	A.0	Summary Sheet	Form
2	A.0.1	ERTS (Employers Requirement Technical Specification)	PDF
3	A.0.2	Compliance of RDSO's observations (from 1st round onwards to be given juxtapose)	PDF
4	A.1	System description of Air Supply and Brake system, standards followed	PDF
5	A.1.1	Train Brake Calculation including Emergency braking distance and details	PDF
6	A.1.2	Technical details of Air Compressor as supplied by OEM (CFM, Max. Pressure, Operating pressure, Cut-in and Cut-out pressure etc.)	PDF
7	A.1.3	Air Consumption Calculation	PDF
8	A.1.4	Brake and Piping diagram	PDF
9	A.1.5	Wheel slip and slide protection document	PDF
10	A.2	System description of Bogie	PDF
11	A.2.1	Drawings and Design Data for Bogie	PDF
12	A.2.2	Finite Element Analysis Report of Bogie Frame (duly accepted and signed by Rolling Stock Head)	PDF
13	A.2.3	Fatigue test data of bogie frame & endurance parameters calculations	PDF
14	A.2.4	Thermal calculation of wheel	PDF
15	A.2.5	Axle strength calculation-Powered axles	PDF
16	A.2.6	Axle strength calculation: non-Powered axles	PDF
17	A.2.7	Life rating calculation of axle box bearing	PDF
18	A.2.8	Suspension drawing and design parameters	PDF
19	A.2.9	Driving Motor Bogie assembly drawing	PDF
20	A.2.10	Motor Bogie assembly drawing	PDF
21	A.2.11	Trailer Bogie assembly drawing	PDF
22	A.2.12	Driving Motor (DMC) wheel set assembly drawing	PDF
23	A.2.13	Wheel drawing for all type of Coaches	PDF
24	A.2.14	Motor Coach (MC) wheelset assembly drawing	PDF
25	A.2.15	Trailer Coach (TC) wheelset assembly drawing	PDF
26	A.3	Vehicle Dynamic Analysis on Track Data as Specified by Metro Administration - Vehicle Model	PDF
27	A.3.1	Natural frequencies of the suspension system (consisting of all the springs and Dampers)	PDF
28	A.3.2	Stability / Safety of bogie (<i>Conforming to the Limiting value $\Delta Q/Q \leq 0.5$ and $Y_{rms}/Q \leq 1$ (Results of simulation software) up to design speed with AW0 and AW4 load at critical curves in Inflated and Deflated Secondary spring condition</i>)	PDF
29	A.3.3	Wheel/track off-loading	PDF
30	A.3.4	Bogie rotational resistance calculation results	PDF
31	A.3.5	Wheel wear index at the tread and flange	PDF
32	A.3.6	Lateral force and derailment quotient	PDF
33	A.3.7	Ride index (please upload the document)	PDF
34	A.3.8	Acceleration values of car body and bogie frame	PDF
35	A.3.9	Criteria for assessment of riding behavior of vehicle	PDF
36	A.3.10	Kinematic Envelope (KE) Calculation	PDF
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