

NHSRCL-CO/MA/RS/01/IHSRS/2434/.1/OHQ16980

Date: 20.09.2024

General Manager,  
Integral Coach Factory,  
Chennai-600038.

**Sub:** Changelog of the Standards and Specifications for "250 KMPH HIGH SPEED TRAINSET" from R03 to R04.

**Ref:**

- (i) Workshop at BEML dated 16.09.2024.
- (ii) NHSRCL letter no. NHSRCL-CO /MA /RS /01/ IHSRS /2434 /.1/ OHQ16602 dated 16.08.2024.
- (iii) ICF Letter No. MD/D/Trainset/168/RBContract/186F dated 06.08.2024.
- (iv) NHSRCL letter no. NHSRCL-CO /MA /RS /01/ IHSRS /2434 /.1/ OHQ16287 dated 18.07.2024.
- (v) ICF Letter No. MD/D/Trainset/RB CONTRACT/186G dated 10.07.2024.

1. NHSRCL vide letter ref. (ii), above has communicated the SS R03 to ICF in response to the ICF letter at ref. (iii) to enhance the speed potential of the proposed development of indigenous Rolling Stock.
2. Further, a Workshop on Project Failure Analysis was organized at BEML premises which was attended by RB, NHSRCL, BEML, Medha and EC Engineering, during which certain aspects of the SS were deliberated and opined to change accordingly.

In view of the above Workshop, certain technical aspects were relooked into, and necessary modifications have been made to the Specifications and Standards. The changelog of the clauses is attached for ICF consideration.

3. Any modifications that ICF may wish to make in the specifications, may please be done in consultation with NHSRCL.

**Encl: As mentioned above.**



*Md. Manzar*  
(Md. Manzar Hussain)  
Executive Director / RS

**Copy to:** DRS, DGM/CC to MD/NHSRCL – for kind information please.

**Modifications done in 5101705 Spec: ICF/MD/SPEC-447, Issue Status-01, dated 05.09.2024**

The list of clauses proposed for modifications are as mentioned below:

SN	Clause No.	Original	Revised
1.	3.9.3		<b>(new Clause 3.9.3 to be added after Clause 3.9.2)</b> <b>The horizontal and vertical gap between the floor and the platform, shall be governed in accordance with TSI PRM.</b>
2.	4.1	Notes: <ul style="list-style-type: none"> <li>For any infringement with MMD (Annexure II), Supplier shall establish by technical analysis that such infringement shall not have any effect on safety of Train &amp; fixed infrastructure.</li> <li>No part of the Train, except the wheels, shall be within the limits specified in <u>Annexuure-1</u> when the wheels are at their minimum permissible diameter and the Cars are loaded.</li> </ul>	Notes: <ul style="list-style-type: none"> <li>For any infringement with MMD (Annexure II), Supplier shall establish by technical analysis that such infringement shall not have any effect on safety of Train &amp; fixed infrastructure.</li> <li>No part of the Train, except the wheels, shall be within the limits specified in <b>Annexure-II</b> when the wheels are at their minimum permissible diameter and the Cars are loaded.</li> </ul>
3.	4.5.4	Train <u>shall be capable of achieving</u> a minimum average acceleration of 0.54 m/s <sup>2</sup> for speed not less than 75 kmph, subject to the requirements with respect to jerk rate specified in Clause 4.7 of these Specification and Standards.	<b>It is preferred that the Train achieves</b> a minimum average acceleration of 0.54 m/s <sup>2</sup> for speed not less than 75 kmph, subject to the requirements with respect to jerk rate specified in Clause 4.7 of these Specification and Standards. <b>Details will be discussed during design stage.</b>
4.	4.6.3	<u>Train shall a chieve a uniform full-service braking across the whole speed range from 0 to 249 kmph. The full-service brake shall not achieve deceleration of greater than 1.2 m/s<sup>2</sup> at any speed.</u>	<deleted>
5.	4.12.3	The tare weight of the Cars shall be optimized such that under the exceptional payloads, defined in EN 15663 'as fully seated and 2-4 standing passengers/m <sup>2</sup> ', Train shall be met with <u>all required performances and safety requirements (including maximum axle load requirements).</u>	The tare weight of the Cars shall be optimized such that under the exceptional payloads, defined in EN 15663 'as fully seated and 2-4 standing passengers/m <sup>2</sup> ', Train shall be met with maximum axle load requirements.
6.	4.15	<u>Coupling within Train</u>	<b>Coupling Requirements</b>
7.	4.15.1.	Couplers having mechanical, pneumatic and electrical coupling shall be provided between all the Cars. The couplers shall have sufficient mechanical strength for loads from car body and shall be capable of absorbing the	Couplers having mechanical, pneumatic and electrical coupling shall be provided between all the Cars. The couplers shall have sufficient mechanical strength for loads from car body and shall be capable of

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		impacts. Each Basic Unit shall have automatic coupler with electrical head at end to facilitate automatic coupling and uncoupling of the Basic Unit.	absorbing the impacts.
8.	4.15.4		<b>(new Clause 4.15.4 to be added after Clause 4.15.3)</b> <b>There shall be an aesthetic nose cover complimenting the aerodynamic performance of the Train, enclosing the auto-coupler and shall open/ close automatically without manual intervention in case of coupling/ de-coupling respectively.</b>
9.	4.5.7	Supplier shall submit the RMS current values of traction motor and temperature rise of propulsion equipment for a 8 Car rake operation for repeated all-out cycles of 30 km with a dwell time of <u>30</u> seconds up to stabilization of temperatures of all propulsion equipment. The R.M.S. (root mean square) loading of the traction motor with regenerative braking in use for all out running as mentioned herein shall not exceed the continuous rating of the traction motor.	Supplier shall submit the RMS current values of traction motor and temperature rise of propulsion equipment for a 8 Car rake operation for repeated all-out cycles of 30 km with a dwell time of <b>60</b> seconds up to stabilization of temperatures of all propulsion equipment. The R.M.S. (root mean square) loading of the traction motor with regenerative braking in use for all out running as mentioned herein shall not exceed the continuous rating of the traction motor.
10.	4.16.1	General The noise levels emitted from the Train shall be as low as possible and the Train shall be designed to prevent drumming, rattles or vibrations throughout the design life of the Vehicles. All noise levels specified below are in decibels referred to 20 micro-Pascal as measured with “A” weighting network of standard type 1 sound level meter with time weighting F.	General The noise levels emitted from the Train shall be as low as possible and the Train shall be designed to prevent drumming, rattles or vibrations throughout the design life of the Vehicles. All noise levels specified below are in decibels referred to 20 micro-Pascal as measured with “A” weighting network of standard type 1 sound level meter with time weighting F. <b>The targets specified for various conditions mentioned in this clause are for reference purposes only.</b>
11.	4.16.5	Limits of Passing - by Noise The limiting value for noise emission of the Cars shall be $L_{pAeq,Tp} \leq 93$ dBA at a distance of 7.5 m from the center line of the track, 1.2 m and 3.5 m above the upper surface of the rails at maximum service/operational speed. The measurement shall be carried out in accordance with the standard EN ISO	Limits of Passing - by Noise The limiting value for noise emission of the Cars shall be $L_{pAeq,Tp} \leq \mathbf{95}$ dBA at a distance of 7.5 m from the center line of the track, 1.2 m and 3.5 m above the upper surface of the rails at maximum service/operational speed. The measurement shall be carried out in

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		3095.	accordance with the standard EN ISO 3095.																																																	
12.	5.39.2	<p>The Car(s) shall include environment friendly toilet (bio digester / bio toilet with vacuum evacuation) systems of a modular design, spacious, environment &amp; user friendly and easily maintainable. The environment friendly toilet (bio digester / bio toilet) shall treat the human waste by biological degradation (aerobic/anaerobic) and shall confirm the effluent discharge quality to the existing norms applicable by Central Pollution Control Board (CPCB) or any other authority applicable in India.</p>	<p>The Car(s) shall include environment friendly toilet (bio digester / bio toilet with vacuum evacuation) systems of a modular design, spacious, environment &amp; user friendly and easily maintainable. The environment friendly toilet (bio digester / bio toilet) shall treat the human waste by biological degradation (aerobic/anaerobic) and shall confirm the effluent discharge quality to the existing norms applicable by Central Pollution Control Board (CPCB) or any other authority applicable in India.</p> <p><b>Alternatively, proven vacuum toilet with suitable capacity of waste retention tank may be proposed. Suitable connectors for waste removal shall be supplied and the details shall be discussed during design stage.</b></p>																																																	
13.	Annexure-IV	<p>Mandatory tests as per EN14363</p> <table><thead><tr><th>S.No.</th><th>Test Type</th><th></th><th>Limit value (Locomotives, Traction units, Passenger Cars)</th><th>Test procedure</th></tr></thead><tbody><tr><td>1</td><td>Wheel off-loading</td><td><math>\Delta Q/Q</math></td><td>0.6</td><td>Para 6.1.5 &amp; Para A.9 of EN14363:2016</td></tr><tr><td>2</td><td>Sum of guiding forces of left and right wheel</td><td><math>\Sigma Y_{j,max}</math> (<math>Y_{j1} + Y_{j2}</math>)</td><td><math>k_1</math> (10 kN + <math>P_{F0}/3</math>) <math>k_1 = 1.0</math> where <math>P_{F0}</math>= nominal static vertical wheelset force</td><td>Table 4 of EN14363</td></tr><tr><td>3</td><td>Derailment coefficient</td><td>(<math>Y/Q</math>)<sub>j,a,max</sub></td><td><math>\leq 0.8^a</math></td><td>Para 6.1 of EN14363:2016</td></tr><tr><td>4</td><td>Lateral axle box force</td><td><math>H_{j,max}</math></td><td><math>k_2</math> (10 kN + <math>P_{F0}/3</math>), <math>k_2 = 0.90</math></td><td>Table 4 of EN14363</td></tr></tbody></table>	S.No.	Test Type		Limit value (Locomotives, Traction units, Passenger Cars)	Test procedure	1	Wheel off-loading	$\Delta Q/Q$	0.6	Para 6.1.5 & Para A.9 of EN14363:2016	2	Sum of guiding forces of left and right wheel	$\Sigma Y_{j,max}$ ( $Y_{j1} + Y_{j2}$ )	$k_1$ (10 kN + $P_{F0}/3$ ) $k_1 = 1.0$ where $P_{F0}$ = nominal static vertical wheelset force	Table 4 of EN14363	3	Derailment coefficient	( $Y/Q$ ) <sub>j,a,max</sub>	$\leq 0.8^a$	Para 6.1 of EN14363:2016	4	Lateral axle box force	$H_{j,max}$	$k_2$ (10 kN + $P_{F0}/3$ ), $k_2 = 0.90$	Table 4 of EN14363	<p>Mandatory tests as per EN14363</p> <table><thead><tr><th>S.No.</th><th>Test Type (As per EN14663)</th><th></th><th>Limit value</th></tr></thead><tbody><tr><td>1</td><td>Wheel off-loading</td><td><math>\Delta Q/Q</math></td><td><math>\leq 0.6</math></td></tr><tr><td>2</td><td>Sum of guiding forces of left and right wheel</td><td><math>\Sigma Y_{j,max}</math> (<math>Y_{j1} + Y_{j2}</math>)</td><td><math>\leq (10 \text{ kN} + P_{F0}/3)</math> where <math>P_{F0}</math>= nominal static vertical wheelset force</td></tr><tr><td>3</td><td>Derailment coefficient</td><td>(<math>Y/Q</math>)<sub>j,a,max</sub></td><td><math>\leq 0.8</math></td></tr><tr><td>4</td><td>Lateral axle box force</td><td><math>H_{j,max}</math></td><td><math>\leq 0.9</math> (10 kN + <math>P_{F0}/3</math>), where <math>P_{F0}</math>= nominal static vertical wheelset force</td></tr><tr><td>5</td><td>Lateral acceleration on bogie frame above</td><td>(only bogie vehicles)</td><td><math>\leq 12 \text{ m/s}^2 - (m^+ / 5 \text{ t}) \cdot \text{m/s}^2</math> where <math>m^+</math> is mass of</td></tr></tbody></table>	S.No.	Test Type (As per EN14663)		Limit value	1	Wheel off-loading	$\Delta Q/Q$	$\leq 0.6$	2	Sum of guiding forces of left and right wheel	$\Sigma Y_{j,max}$ ( $Y_{j1} + Y_{j2}$ )	$\leq (10 \text{ kN} + P_{F0}/3)$ where $P_{F0}$ = nominal static vertical wheelset force	3	Derailment coefficient	( $Y/Q$ ) <sub>j,a,max</sub>	$\leq 0.8$	4	Lateral axle box force	$H_{j,max}$	$\leq 0.9$ (10 kN + $P_{F0}/3$ ), where $P_{F0}$ = nominal static vertical wheelset force	5	Lateral acceleration on bogie frame above	(only bogie vehicles)	$\leq 12 \text{ m/s}^2 - (m^+ / 5 \text{ t}) \cdot \text{m/s}^2$ where $m^+$ is mass of
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					where PF0= nominal static vertical wheelset force			axle box		bogie in Ton
		5	Lateral acceleration on bogie frame above axle box	(only bogie vehicles)	12 m/s <sup>2</sup> – (m <sup>+</sup> / 5 t) · m/s <sup>2</sup> where m <sup>+</sup> is mass of bogie in Ton		6	Lateral acceleration on vehicle body above running gear		Test zone 1, 2: 3.0 m/s <sup>2</sup> <sup>a</sup> Test zone 3: 2.8 m/s <sup>2</sup> <sup>a</sup> Test zone 4: 2.6 m/s <sup>2</sup> <sup>a</sup> <b>However, preferably it shall be ≤ 0.15 g (Peak to Peak) or lower [0 to 20 Hz]</b>
		6	Lateral acceleration on vehicle body above running gear		Test zone 1, 2: 3.0 m/s <sup>2</sup> <sup>b</sup> Test zone 3: 2.8 m/s <sup>2</sup> <sup>b</sup> Test zone 4: 2.6 m/s <sup>2</sup> <sup>b</sup>		7	Vertical acceleration on vehicle body above running gear		≤ 0.30 g (Peak to Peak) or lower [0 to 20 Hz] ≤ 0.2 g (preferable)
		7	Vertical acceleration on vehicle body above running gear		<u>3.0 m/s<sup>2</sup></u> <u>single suspension or deflated</u> <u>air spring: 5.0 m/s<sup>2</sup></u>		8	<b>Longitudinal acceleration on vehicle body above running gear</b>		≤ 0.10 g (Peak to Peak) or lower [0 to 15 Hz] (preferable)
		8	Bogie Rotational Resistance		Static test: Limit 0.1 for a rotational speed of 1deg/sec	6.1.5.3.3 of EN14363	9	Bogie Rotational Resistance		Static test: Limit 0.1 for a rotational speed of 1deg/sec
		<sup>a</sup> In transition curves it is recognized that higher values than 0.8 may be encountered. The maximum limit value of 1.2 shall be respected, where 0.8 is exceeded. Each case shall be investigated and justified. <sup>b</sup> In some cases for partial on-track tests with the simplified measuring method a modified limit value shall be calculated as per EN14363.					10	<b>Mean Ride comfort (EN 12299)</b>	N <sub>mv</sub>	≤ 2 (comfortable)
							<sup>a</sup> In some cases for partial on-track tests with the simplified measuring method a modified limit value shall be calculated as per EN14363.			