



General Bid Bulletin No. 28
07 October 2021

IFB No. 21-031-4

**THE MALOLOS-CLARK RAILWAY PROJECT AND
THE NORTH SOUTH RAILWAY PROJECT-SOUTH LINE (COMMUTER)
PACKAGE CP NS-03: ROLLING STOCK-LIMITED EXPRESS TRAINSETS**

This General Bid Bulletin is issued to amend/clarify certain provisions in the Bidding Documents for the abovementioned project. Please refer to the attached Annexes of this General Bid Bulletin duly approved by the end-user and co-implementer for details:

1. **Annex "A"** –Answers to Queries from Prospective Bidders including clarifications to the Bidding Documents;
2. **Annex "B"**– Revisions to the Bidding Documents; and
3. **Annex "B – 1"** – Revised pages/amendments and final form as revised/amended.

All other portions of the Bidding Documents affected by these revisions, amendments and/or clarifications shall be made to conform to the same.

Revisions/amendments/clarifications made herein shall be considered an integral part of the Bidding Documents for this project.

For your information and guidance.

For the Bids and Awards Committee IV:

SIGNATURE REDACTED

JOSEPH CONRAD D. DUEÑAS

Chairperson

Annex A

PACKAGE CP NS-03: ROLLING STOCK - LIMITED EXPRESS TRAINSETS
General Bid Bulletin No. 28
Annex A

Item No.	Volume Section No. Page No. Clause No. / Title Reference Text	Clarification Request	Proposed Revised Text (if any)	Response
1.	General Bid Bulletin No.24 Item 46-3 PC-11 Attachment 2 TIME FOR ACCESS TO THE SITE	<p>Responding to the Employer’s reply in General Bid Bulletin No.24 dated 9 September 2021, the Bidder would like the Employer to further clarify if the Contractor is required to conduct the testing and commissioning including type tests, integrated testing & commissioning and 1,500 km of FFR for the following phases.</p> <p>1) between CIA and Solis *The Bidder assumes that the mainline between CIA and Solis will be available after 34 months from the Commencement Date based on the latest Access Date provided under GBB #17 (AD 3). This section of the mainline shall be used by the Contractor for the Type Test, testing & commissioning including ITC and FFR of the entire fleet.</p> <p>2) between Solis and Buendia * It is noted that the mainline between Buendia and CIA will be available for the Trial Operation with 3 Train Sets after 56 months from the Commencement Date based on the</p>	N/A	<p>AD 4 will not be changed.</p> <p>Please refer to GBB17. The AD 3- access to the mainline for On-Site Testing and Commissioning in on month 34.</p> <p>Therefore, if necessary, the contractor will coordinate with others interface Contractor and the O&M Concessionaire in order to conduct Testing and Commissioning after 34months before AD 4 (56 months of Trial operation).</p>

		<p>latest Access Date provided under GBB #17 (AD 4). This means that testing & commissioning including ITC of 7 Train Sets on the mainline between Buendia and Solis will not have been conducted prior to the Trial Operation and therefore, we assume that the Bidder is required to conduct testing & commissioning including ITC of 7 Train Sets on this section separately.</p> <p>3) between Buendia and Alabang *It is noted that the whole mainline from Calamba to CIA will be available after 74 months from the Commencement Date based on the latest Access Date provided under GBB #17 (AD 5), which is 16 months after the scheduled commencement date of revenue service. This means that testing & commissioning including ITC and Trial Operation of 7 Train Sets on the mainline between Buendia and Alabang will not have been conducted when the whole mainline becomes available and therefore, we assume that the Bidder is required to conduct testing & commissioning including ITC and the Trial Operation of 7 Train Sets on this section separately.</p> <p>The Bidder humbly requests the Employer to clarify the aforementioned.</p> <p>Additionally, in case that the respective phases are required, to minimize the schedule and cost impacts, the Bidder requests the Employer to change AD4</p>		
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		indicated in 2) above from 56 months to 51 months so that the Contractor can sequentially conduct the testing & commissioning including ITC of 7 Train Sets on the mainline of 1) and 2) above prior to the commencement of Trial Operation.		
2.	General Bid Bulletin No.24 Item 46-3 PC-11 Attachment 2 TIME FOR ACCESS TO THE SITE	In connection with the above, the Employer mentioned in the said GBB that "TOC will not be issued if the testing activities were not completed due to Contractor's phasing testing arrangement". However, as you are aware, since the above mentioned situations will not be caused by the Contractor and access to each section of the mainline is beyond the Contractor's control, TOC of each Train Set should be issued respectively upon completion of testing & commissioning including ITC and FFR of each Train Set on the mainline between CIA and Solis. For the avoidance of misunderstanding and in order to clarify the above, the Bidder respectfully requests the Employer to specify the condition for issuance of TOC based on the above understanding in the Bid Documents.	N/A	Please refer to GBB 24 – Annex B item 34. Clause 20.5.7 stated that the Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the successful completion of FFR. Please refer to ERT clause 20.5 on the condition of issuance of the TOC. On the matter of track access date, a conditional taking over will be given by the Employer in order to ensure that the Contractor will provide the necessary verification of integration testing requirement on all respective track operational sections.

3.	<p>General Bid Bulletin No.24 ERT-136</p> <p>20.5.6 The Contractor shall ensure proper wheel profiling after the Trial Running completed and compensation on wheel to be profiled due to failure during TNC.</p>	<p>The new conditions are added as per the General Bid Bulletin No.24 dated 9 September 2021.</p> <p>Since the Bidder cannot find the abbreviation of "TNC" provided in Table A.2 of ERG Appendix A, the Bidder would like to clarify the abbreviation.</p> <p>In addition, although the Bidder understands that the wheel profiling is necessary at the timing of, such as the occurrence of wheel flat, the Contractor cannot operate the underfloor wheel lathe in the Depot owned by the Employer. For the reasons above, since the Bidder believes that the wheel profiling shall be conducted by the Employer, please delete this requirement.</p>	N/A	<p>Clause 20.5.6 has been updated to reflect the phase of integrated testing and commissioning.</p> <p>This requirement will not be deleted. Contractor will define this requirement together with the interface and integration requirement which to be demonstrated during project implementation.</p>
4.	<p>General Bid Bulletin No.24 ERT-76 9.6.14</p> <p>ERT-86 11.1.6</p>	<p><i>The mechanism of brake force/vehicle weight adjustment employment shall ensure a full proportional adjustment is achieved through the braking range between Tare Loading (W0) and Dense Crush Loading conditions (W3).</i></p> <p><i>Load weighing shall be provided for all car weights up to crush loading condition W3. The failure of electric braking to provide the requested performance shall initiate supplemental friction braking.</i></p> <p>In accordance with General Bid Bulletin No.24 dated 9 September 2021, the Bidder noted that the crush loading condition has been changed from W2 to W3.</p>	<p>9.6.14</p> <p>The mechanism of brake force/vehicle weight adjustment employment shall ensure a full proportional adjustment is achieved through the braking range between Tare Loading (W0) and Dense Crush Loading conditions (W32).</p> <p>Load weighing shall be provided for all car weights up to W2 crush-loading condition W3.</p> <p>The failure of electric braking to provide the requested performance shall initiate</p>	<p>Please see the updated clause 11.1.6, 9.6.14 and 9.6.15 section in Annex B.</p>

		<p>However, since the changed loading condition is inconsistency in the other requirements, please amend this requirement as provided.</p> <p>The Bidder understand that the loading condition of W2 or pay load of 7t/car is a condition for performance requirements such as traction and braking performance, and W3 is a condition for strength requirements such as carbody and bogie.</p>	supplemental friction braking.	
5.	<p>General Bid Bulletin No.24 Item 12&54 ERG-64 8.10.11.1</p> <p>General Bid Bulletin No. 18 PC-8 Attachment 1 SUMMARY OF KEY DATES</p>	<p><i>Each consist shall be able to operate for 19 hours a day, 7 days a week, with engineering downtime of 5 hours a day.</i></p> <p><i>The period of the Trial Operation: 3 months</i></p> <p><i>The mainline access will be provided to the Contractor on case by case basis. Utterly, the priority will be given to the commercial service operation than the testing and commissioning activities. In addition, the engineering downtime of 5 hours a day possibly be provided to the Contractor depending on Operator approval for the mainline access.</i></p> <p><i>KD6: 57 months</i> <i>KD8: 58 months</i></p> <p>In accordance with General Bid Bulletin No.24 dated 9 September 2021, the Bidder noted that only 5 hours a day may be provided for the Testing and Commissioning including ITC and</p>	N/A	Please see the response provided in item #1.

		<p>FFR of the Limited Express Trains, which, as you are aware, brings significant schedule and cost impacts on this Package CP NS-03., and so, the schedule requirements of KD 6 and KD8 could not be achievable under such circumstances..</p> <p>Responding the Employer's reply, the Bidder has further concern about the availability of mainline, the related equipment at site and so on to achieve the KD6 under such circumstance restricted to the availability of the said equipment.</p> <p>Additionally, the Bidder is very concerned about the response provided GBB #24 because we believe that any testing and commissioning including ITC and FFR during midnight is strictly prohibited by national and local government agencies and regulations. For that reason, we assume that there is no opportunity for the Contractor to conduct the testing and commissioning as far as the priority will be given to the commercial service operation.</p> <p>Due to the above mentioned multiple factors which are beyond the Contractor's control, the Bidder requests the Employer to provide sufficient dedicated time window of at least 8 hours during daytime for testing and commissioning of the Limited Express Trains on the mainline so that the Bidder can establish the schedule and meet the required schedule.</p>		
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<p>6.</p>	<p>Volume II Section VI ERT-60 7.1.2 Side door</p>	<p><i>Updated clause as per GBB-24</i> <i>7.1.2 Two (2) electrically or pneumatically operated doors shall be provided on each side of every car. All doorways shall have a clear opening of 900 mm, as minimum, (1300mm is preferred as this allows 2 streams of passengers to alight/board simultaneously see TCRP report 13) and a clear height of 1850 mm.</i></p> <p>Up until 30 years ago predominantly pneumatic doors were used. However, since that time worldwide almost all (far more than 95%) new trains are equipped with electric doors.</p> <p>This has several reasons, the main being lower maintenance cost (over the full lifetime of train, LCC cost of electric drive is approx. 50% lower than pneumatic drive), higher reliability especially in respect of obstruction detection. Obstruction detection functions (force and speed control) is integrated into the electric drive system while their integration into pneumatic drive systems entails the addition of low reliability components.</p> <p>The Bidder has concerns that the Employer/Engineer would accept for his new state of the art Limited Express trains an outdated pneumatic operated door system and accepting above described disadvantages.</p>	<p>7.1.2 Two (2) electrically or pneumatically operated doors shall be provided on each side of every car. All doorways shall have a clear opening of 900 mm, as minimum, (1300mm is preferred as this allows 2 streams of passengers to alight/board simultaneously see TCRP report 13) and a clear height of 1850 mm.</p>	<p>The clause will not be updated. The Employer will consider either electric or pneumatic door operated system in this tender.</p>
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7.	<p>Volume II Section VI ERT-105 Signaling System 17.1.2 17.1.3</p>	<p><i>17.1.1 This Clause describes the interface requirements as required for the CP NS-03 (Rolling Stock) Contractor with the Signaling Contractors of CP NS-01 and CP-04 (if necessary).</i></p> <p><i>17.1.2 The fleet shall be equipped with ETCS Level 2 on-board equipment which is envisioned to operate seamlessly in the entire alignment of Clark to Calamba, as NSCR will be similarly fitted with ETCS equipment.</i></p> <p><i>17.1.3 All associated Contractors shall ensure that all requirements of the specification pertaining to interfaces are comprehensively fulfilled.</i></p> <p>Seamless integration of ETCS Level 2 on-board equipment and coordination related interfaces require a substantial amount of expertise and experience of CP NS-03 Contractor.</p> <p>Should a potential Bidder lack the experience and not being able to prove such experience with references of previous successful integration of ETCS Level 2 on-board equipment in other projects, this could result in a substantial risk for the overall success of the NSCR project.</p>	<p>17.1.3 All associated Contractors shall be able to <u>adequately prove they have already successfully completed implementation and integration of ETCS Level 2 systems</u> and ensure that all requirements of the specification pertaining to interfaces are comprehensively fulfilled.</p>	<p>The clause will not be updated. Bidder experience will be evaluated through the submission of form EXP-1, EXP-2(a) and EXP-2(b)</p>
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<p>8.</p>	<p>Volume II Section VI ERT-147 Fleet defects (Pattern Failures) 22.7.4.1</p>	<p><i>Updated clause GBB2#78 and GBB24#3</i></p> <p><i>The occurrence of independent failures with the same root cause of the same warranted item during the Defect Notification Period and within a six (6) month consecutive moving window, that exceeds more than 10% percent, or at least three (3) of the total number of identical items supplied may be declared a fleet defect or pattern failure.</i></p> <p>The Bidder understands both conditions "10%" and "at least 3" apply to declare fleet defect. With a fleet of only seven Limited Express Trains, otherwise any defect on one single component mounted only once on a train would be a fleet defect. On the other hand, components which are installed in a large quantity (>100) on one trainset, already the failure of 3 (<<<10%) could be declared a fleet defect.</p> <p>The Bidder's previous proposal (GBB2 #78) was commented as ACCEPTED.</p>	<p>The occurrence of independent failures with the same root cause of the same warranted item during the Defect Notification Period and within a six (6) month consecutive moving window, that exceeds more than 10% percent, or <u>and</u> at least three (3) of the total number of identical items supplied may be declared a fleet defect or pattern failure</p>	<p><i>GBB2#78</i> - Employer responded that the bidder proposal for amendment was accepted. Clause 22.7.4.1 was amended according to the current requirement sentence:</p> <p>"The occurrence of independent failures with the same root cause of the same warranted item during the Defect Notification Period and within a six (6) month consecutive moving window, that exceeds more than 10% percent, or at least three (3) of the total number of identical items supplied may be declared a fleet defect or pattern failure."</p> <p>This clause will not be further updated.</p> <p>The Contractor will defined the criteria of fleet defect; either 10% or at least 3 (within a</p>
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				six (6) month consecutive moving window) in the System Assurance Management Plan. (RAMS demonstration plan).
9.	Volume II Section VI 8.4 8.4.1 ...item 8.4.8	<i>Risk mitigation strategy</i> A calibration of the risk acceptance table (from EN 50126) might be necessary to meet other requirements of the Employer. The Bidder would like to seek clarification on the definition of the following consequences and frequency categories, and please confirm that this definition according to EN 50126 will be used: 1. Catastrophic -> Multiple fatalities? 2. Critical -> at least one fatality? 3. Marginal -> severe injuries? 4. Insignificant -> minor injury? 5. Incredible 6. Improbable 7. Remote 8. Frequent	N/A	Please refer to GBB No. 24 – Sample risk matrix, frequency of occurrence and severity of the consequences, Sample Classes of frequency of occurrence of hazards and Sample Classes of hazard severity were provided.

<p>10.</p>	<p>Volume II Section VI ERG-59 8.5.3 Top Safety Targets</p>	<p>8.5.3 Top Safety targets</p> <p><i>The global Risk Criteria under normal and/or degraded mode operations shall be as specified in the following Table:</i></p> <table border="1" data-bbox="517 376 1064 491"> <thead> <tr> <th rowspan="2">Classification on Individual</th> <th colspan="2">Individual Risk Design Safety Value (probability of death per year)</th> </tr> <tr> <th>Limit of Tolerability (LOT)</th> <th>Limit of Acceptability (LOA)</th> </tr> </thead> <tbody> <tr> <td>Passenger</td> <td>10E-6</td> <td>10E-8</td> </tr> <tr> <td>Public</td> <td>10E-6</td> <td>10E-8</td> </tr> <tr> <td>Employee</td> <td>2x10E-5</td> <td>10E-7</td> </tr> </tbody> </table> <p style="text-align: center;">Global Risk Criteria</p> <p>8.5.3.2 <i>At subsystem level, any wrong side failure of key safety critical subsystems must be shown to be better than 10⁻⁹ per hour and the specific safety targets that are identified for each subsystem in the following sections shall be achieved.</i></p> <p>8.5.3.3 <i>Where equipment is installed to provide safety critical function for multiple location the wrong side failure of equipment must be shown to be better than 10⁻¹⁰ per hour.</i></p> <p>The bidder proposes to use the Risk Criteria according to EN 50126 as defined in Clause 8.4. There may be some calibration of the risk acceptance table (from EN 50126) necessary to meet other requirements of the Employer.</p> <p>The Safety levels of equipment shall be defined according to safety analysis.</p>	Classification on Individual	Individual Risk Design Safety Value (probability of death per year)		Limit of Tolerability (LOT)	Limit of Acceptability (LOA)	Passenger	10E-6	10E-8	Public	10E-6	10E-8	Employee	2x10E-5	10E-7	<p>8.5.3 Top Safety targets</p> <p><u>The Safety targets of equipment shall be defined according to the results of the safety analysis and according to the risk acceptance table defined in chapter 8.4 (according to EN 50126).</u></p> <p>The global Risk Criteria under normal and/or degraded mode operations shall be as specified in the following Table:</p> <table border="1" data-bbox="1144 571 1691 686"> <thead> <tr> <th rowspan="2">Classification on Individual</th> <th colspan="2">Individual Risk Design Safety Value (probability of death per year)</th> </tr> <tr> <th>Limit of Tolerability (LOT)</th> <th>Limit of Acceptability (LOA)</th> </tr> </thead> <tbody> <tr> <td>Passenger</td> <td>10E-6</td> <td>10E-8</td> </tr> <tr> <td>Public</td> <td>10E-6</td> <td>10E-8</td> </tr> <tr> <td>Employee</td> <td>2x10E-5</td> <td>10E-7</td> </tr> </tbody> </table> <p style="text-align: center;">Global Risk Criteria</p> <p>8.5.3.2 At subsystem level, any wrong side failure of key safety critical subsystems must be shown to be better than 10⁻⁹ per hour and the specific safety targets that are identified for each subsystem in the following sections shall be achieved.</p> <p>8.5.3.3 Where equipment is installed to provide safety critical function for multiple location the wrong side failure of equipment must be shown to be better than 10⁻¹⁰ per hour.</p>	Classification on Individual	Individual Risk Design Safety Value (probability of death per year)		Limit of Tolerability (LOT)	Limit of Acceptability (LOA)	Passenger	10E-6	10E-8	Public	10E-6	10E-8	Employee	2x10E-5	10E-7	<p>The clauses will not be revised/deleted. The top safety target is required to deduce the safety target for the individual functional unit i.e. Activation, Supervision, Protection, Deactivation. With the results of the risk analysis, the Contractor can then assign safety integrity levels and draw conclusions for the development of their systems accordingly.</p>
Classification on Individual	Individual Risk Design Safety Value (probability of death per year)																															
	Limit of Tolerability (LOT)	Limit of Acceptability (LOA)																														
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Annex B

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ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
Volume II Part 2 – Employer’s Requirements		
1	Item 26 GBB 24 11.1.6 ERT-81	Updated clause 11.1.6: Load weighing shall be provided for all car weights up to loading condition W2. The failure of electric braking to provide the requested performance shall initiate supplemental friction braking.
2	9.6.14, 9.6.15 ERT-76	Updated clause 9.6.14: The mechanism of brake force/vehicle weight adjustment employment shall ensure a full proportional adjustment is achieved through the braking range between Loading at W0 and Loading at W2. Updated clause 9.6.15: The method by which the passenger load-sensing signal is processed shall be arranged to ensure that absence of the signal, for any reason, shall result in a brake force being applied corresponding to (W2) loading or the W0 loading condition on that Vehicle.
3	GBB No. 24 Annex B Item 34 20.5.6	Updated clause 20.5.6:

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ITEM NO.	REFERENCE/CLAUSE/ SECTION	REVISIONS / AMENDMENTS
		The Contractor shall ensure proper wheel profiling after the Trial Running completed and compensation on wheel to be profiled due to failure during the Integrated Testing and Commissioning.

Annex B – Attachment 1

- 11.1.5 An additional simulation is required for which the Contractor shall use an “Constant speed” operation for simulation purposes.
- 1) The Contractor will determine the travel time and average speed based on the provided track alignment data for an “Constant speed” simulation.
 - 2) The data of radius of curves, curve lengths and speed limits at curves is available in Appendix K.
 - 3) All other simulation parameters not included in the listed conditions shall in compliance with the Employer’s Requirements.
- 11.1.6 Load weighing shall be provided for all car weights up to ~~crush~~ loading condition W2. The failure of electric braking to provide the requested performance shall initiate supplemental friction braking.
- 11.1.7 The traction power circuit shall be cut out if pressure of main reservoir is below the minimum required working pressure. In this case, the emergency brake shall be operated at the same time, and the line breaker (LB) shall be open when the emergency brake is operated.
- 11.1.8 The propulsion system design shall automatically compensate for wheel diameter variations between axles on the same car of no less than 6 mm. The Contractor shall incorporate the function that each car wheel diameter is input from the TMS. If this function is not used or incorrectly used, the propulsion system shall operate recognizing the wheel diameter as 820 mm.
- 11.1.9 The Contractor shall be required to perform a combined propulsion system test in accordance with a procedure which shall be reviewed by the Engineer. This test shall consist of the performance of the entire propulsion system, including the power conversion equipment (PCE), traction motors and associated cabling. The temperature of critical components, amongst other parameters, shall be monitored to gauge suitability for the intended service.
- 11.1.10 The equipment to be supplied shall require minimal maintenance, and any items requiring periodic attention shall not require such at intervals less than monthly.
- 11.1.11 The propulsion system shall be provided by a supplier having had a minimum of 5 years of demonstrable experience in supplying service-proven, considerably reliable 3-phase AC propulsion equipment in a similar operating environment to that in Manila.
- 11.1.12 The speed sensor-less control system shall be supplied. During initiation of acceleration or deceleration (regenerative braking), speed estimation shall be completed successfully within 200ms after motor current begins to flow. In particular, even in the case of the low-speed range and the recession started, speed estimation shall be completed successfully, to avoid unnecessary vibration, worsening of ride and protection operation for example, overcurrent of motor, failure of speed estimation or detection of recession shall not be happened. Speed sensor for backup shall be incorporated in the train line, which may be used. During vehicle is traveling in the opposite direction to the command direction in the range of 0 to 5 km / h, the train shall be able to start normally without vibration and protection operation etc.
- 11.1.13 For the parts that shall be considered exothermic, thermal simulation shall be performed, e.g., switching device module, HSCB, LB, and main circuit wires. This simulation shall be performed based on the run curve at the most severe riding rate, taking into account the heat dissipation environment inside the box. Simulation results shall be validated during testing and commissioning with and without load.

speed” operation for simulation purposes.

- 1) The Contractor will determine the travel time and average speed based on the provided track alignment data for an “Constant speed” simulation.
- 2) The data of radius of curves, curve lengths and speed limits at curves is available in Appendix K.
- 3) All other simulation parameters not included in the listed conditions shall in compliance with the Employer’s Requirements.

11.1.6 Load weighing shall be provided for all car weights up to loading condition W2. The failure of electric braking to provide the requested performance shall initiate supplemental friction braking.

11.1.7 The traction power circuit shall be cut out if pressure of main reservoir is below the minimum required working pressure. In this case, the emergency brake shall be operated at the same time, and the line breaker (LB) shall be open when the emergency brake is operated.

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11.1.10 The equipment to be supplied shall require minimal maintenance, and any items requiring periodic attention shall not require such at intervals less than monthly.

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11.1.12 The speed sensor-less control system shall be supplied. During initiation of acceleration or deceleration (regenerative braking), speed estimation shall be completed successfully within 200ms after motor current begins to flow. In particular, even in the case of the low-speed range and the recession started, speed estimation shall be completed successfully, to avoid unnecessary vibration, worsening of ride and protection operation for example, overcurrent of motor, failure of speed estimation or detection of recession shall not be happened. Speed sensor for backup shall be incorporated in the train line, which may be used. During vehicle is traveling in the opposite direction to the command direction in the range of 0 to 5 km / h, the train shall be able to start normally without vibration and protection operation etc.

11.1.13 For the parts that shall be considered exothermic, thermal simulation shall be performed, e.g., switching device module, HSCB, LB, and main circuit wires. This simulation shall be performed based on the run curve at the most severe riding rate, taking into account the heat dissipation environment inside the box. Simulation results shall be validated during testing and commissioning with and without load.

11.1.14 The design life of the main circuit semiconductors shall be 30 years or more, PECE and

- 5) The fault diagnosis function shall be compatible with the TMS to enable fault log information to be accessed through the TMS. A comprehensive set of indications shall be available on the BCU to display major faults. The fault indications shall be electrically latched when the faults are detected and shall illuminate whenever the supply to the electronics is switched on. The information contained within the fault log shall be stored on non-volatile memory;
- 9.6.2 In case of brake shortage during braking by ATP, the vehicle with brake shortage shall apply emergency brake. Also, in case of unloosening brake, braking system shall be equipped with the function forcibly to loosen the brake by remote operation from the cab;
- 9.6.3 In case of unloosening brake, acceleration command shall be cut off. However, in this function a short circuit switch shall be equipped.
- 9.6.4 The friction brake at zero speed shall be interlocked with the door control system. When all the doors are not closed, the brake shall not be loosened.
- 9.6.5 When the braking torque of the train-set is insufficient due to a breakdown of the BCU, brake release at the trouble of brake un-releasing, etc., the required braking torque of the train-set shall be ensured in conjunction with the train-set brake torque control function of the TMS. This compensate range shall be correspond to the emergency brake force at loaded rate at 7t/car.
- 9.6.6 When a failure occurs that the brake does not loosen, the brake shall be remotely released from the crew cab.
- 9.6.7 Gradient starting brake function shall be provided.
- 9.6.8 Braking in ATO mode and manual mode shall be provided. In the ATO mode, at least 31 steps of brake step shall be transmitted with TMS.
- 9.6.9 The braking system shall able to prevent changes in braking force which may due to changes of load detection curve or while the train is in motion.
- 9.6.10 In case door is open, service brake shall not be released. However, depot operation may permit the brake release whilst open door with the available of bypass switch which shall secured in the driver cab.
- 9.6.11 In case ATP is cut off, maximum service brake or emergency brake shall be actuated when train speed exceed 25km/h.
- 9.6.12 The associated brake unit shall contain all the pneumatic items necessary to control all applications of the friction service brakes and emergency brakes on that Vehicle. The emergency brake control valves independent of the service brake control valves shall be controlled directly from the emergency brake train control lines. The friction emergency brake shall be fail-safe and of "energize to release" type.
- 9.6.13 The emergency brake loop shall be a high integrity fail-safe hard-wired circuit and shall in no way be allowed to be bypassed due to an error in operation.
- 9.6.14 The mechanism of brake force/vehicle weight adjustment employment shall ensure a full proportional adjustment is achieved through the braking range between ~~Fare-Loading at (W0)~~ and ~~Dense-Crush-Loading at conditions-(W23)~~.
- 9.6.15 The method by which the passenger load-sensing signal is processed shall be arranged to ensure that absence of the signal, for any reason, shall result in a brake force being applied corresponding to ~~a-Dense-Crush-(W23) loading or the W0 loading~~ condition on that Vehicle.
- 9.6.16 Abnormal high/low brake cylinder pressure shall be detected, this includes malfunction

- 9.6.2 In case of brake shortage during braking by ATP, the vehicle with brake shortage shall apply emergency brake. Also, in case of unloosening brake, braking system shall be equipped with the function forcibly to loosen the brake by remote operation from the cab;
- 9.6.3 In case of unloosening brake, acceleration command shall be cut off. However, in this function a short circuit switch shall be equipped.
- 9.6.4 The friction brake at zero speed shall be interlocked with the door control system. When all the doors are not closed, the brake shall not be loosened.
- 9.6.5 When the braking torque of the train-set is insufficient due to a breakdown of the BCU, brake release at the trouble of brake un-releasing, etc., the required braking torque of the train-set shall be ensured in conjunction with the train-set brake torque control function of the TMS. This compensate range shall be correspond to the emergency brake force at loaded rate at 7t/car.
- 9.6.6 When a failure occurs that the brake does not loosen, the brake shall be remotely released from the crew cab.
- 9.6.7 Gradient starting brake function shall be provided.
- 9.6.8 Braking in ATO mode and manual mode shall be provided. In the ATO mode, at least 31 steps of brake step shall be transmitted with TMS.
- 9.6.9 The braking system shall able to prevent changes in braking force which may due to changes of load detection curve or while the train is in motion.
- 9.6.10 In case door is open, service brake shall not be released. However, depot operation may permit the brake release whilst open door with the available of bypass switch which shall secured in the driver cab.
- 9.6.11 In case ATP is cut off, maximum service brake or emergency brake shall be actuated when train speed exceed 25km/h.
- 9.6.12 The associated brake unit shall contain all the pneumatic items necessary to control all applications of the friction service brakes and emergency brakes on that Vehicle. The emergency brake control valves independent of the service brake control valves shall be controlled directly from the emergency brake train control lines. The friction emergency brake shall be fail-safe and of "energize to release" type.
- 9.6.13 The emergency brake loop shall be a high integrity fail-safe hard-wired circuit and shall in no way be allowed to be bypassed due to an error in operation.
- 9.6.14 The mechanism of brake force/vehicle weight adjustment employment shall ensure a full proportional adjustment is achieved through the braking range between Loading at W0 and Loading at W2.
- 9.6.15 The method by which the passenger load-sensing signal is processed shall be arranged to ensure that absence of the signal, for any reason, shall result in a brake force being applied corresponding to (W2) loading or the W0 loading condition on that Vehicle.
- 9.6.16 Abnormal high/low brake cylinder pressure shall be detected, this includes malfunction of sensors etc., for the alarm to the operation/maintenance personnel. The brake shall be able to be isolated during operation in order to resume train motion or at the depot. The detection thresholds shall be set to avoid a misdetection at any situation. This applies to the abnormal air spring pressure detection as well.
- 9.6.17 In case of sensors malfunction, the braking control system shall not cause any damages to the wheel due to slip, abnormal high pressure, etc.- The braking control scheme during sensors malfunction shall be provided to Engineer review during.

- 14) Cab controls, functions and indications;
- 15) Door control and functionality, per door and all doors;
- 16) Signaling system operation;
- 17) Safety critical functions; and
- 18) Any other routine test demonstrating fulfilment of the requirements of the interface specifications.

20.4.3.2 Commissioning shall be carried out on all consists supplied under this Contract. For each consist delivered to the Site, the Contractor shall establish an open actions list. The open actions list shall record all actions to be carried out on the train consist and shall be supplemented as additional actions become known. These shall include:

- 1) Type, routine, integration and commissioning tests;
- 2) Fault correction and equipment repairs; and
- 3) Fleet modifications and defect rectification.

20.5 Integrated Testing and Commissioning

20.5.1 During Integrated Testing and Commission of the railway, the CP NS-01 is the lead Contractor responsible for the test’s plans, monitoring and test reports, with all interfacing Contractors supporting these activities accordingly.

20.5.2 The CP NS-03 and the CP NS-01 Contractors shall coordinate and submit the following Integrated Testing and Commissioning (ITC) deliverables:

- 1) Production of an ITC plan, for inspection and testing of equipment that interfaces with other contracts;
- 2) Coordination with interfacing parties regarding the requirements relating to interface testing;
- 3) Production of a test schedule of tests, providing full details of all tests to be carried out under the Contract; and

4) Testing procedures to be presented to the Engineer for review.

20.5.3 All trains shall undergo Fault Free Running during the integrated testing and commissioning. Each train is required to complete 1,500 km fault-free operation on the Main Line. Any issue occurred during trial running shall be fully resolved before restarting the trial run.

20.5.4 In the event major failure occurred during the trial running, the trial run mileage shall be re-started from zero after the rectification is completed. For minor failure, the trial run mileage shall be continued after the rectification is completed.

20.5.5 The Contractor shall propose the failure criteria in the Testing and Commissioning plan for review and given notice of no objection by the Engineer.

20.5.6 The Contractor shall ensure proper wheel profiling after the Trial Running completed and compensation on wheel to be profiled due to failure during TNC the Integrated Testing and Commissioning.

20.5.7 The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the successful completion of FFR.

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20.6 **Trial Operations**

20.6.1 The objective of Trial Operations, is that operational readiness is verified, meaning that full training of operational staff including drivers, emergency-service personnel and