

**MINAS DE BENGGA, LDA. (“MBL”)  
TETE, MOZAMBIQUE  
Global Tender  
Ref: NoTE148/MBL/LOCO/BPROJ/2024  
Date:11/11/2024**

**BIDDING DOCUMENTS FOR**  
**PROCUREMENT OF 5 (FIVE) CAPE GAUGE DIESEL ELECTRIC**  
**LOCOMOTIVES**  
**WITH**  
**PROVISION FOR PREVENTIVE MAINTENANCE SERVICES INCLUDING**  
**CONSUMABLE SPARES AT SITE FOR A PERIOD OF TWO (2) YEARS**

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# SECTION-I INSTRUCTION TO BIDDERS

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## Instructions to Bidders (ITB)

### A. Introduction

<b>1. Requirement</b>	1.1 Procurement of 5 (Five) new CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES for haulage of Coal with Provision for Preventive Maintenance Services including consumables spares at site for a period of Two (2) years extendable by further period of 3 (Three) Years
<b>2. Eligible Bidders</b>	<p>2.1 This Invitation for Bids is open to all Manufacturers/suppliers with manufacturers authorized certification. Additional requirements shall be as defined in the Bid Data Sheet.</p> <p>2.2 A Bidder shall not have a conflict of interest. Any Bidder found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:</p> <ul style="list-style-type: none"> <li>i) directly or indirectly controls, is controlled by or is under common control with another Bidder; or</li> <li>ii) receives or has received any direct or indirect subsidy from another Bidder; or</li> <li>iii) has the same legal representative as another Bidder; or</li> <li>iv) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Purchaser regarding this bidding process; or</li> <li>v) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or</li> <li>vi) or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or</li> <li>vii) or any of its affiliates has been hired (or is proposed to be hired) by the Purchaser or Borrower for the Contract implementation; or</li> <li>viii) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the ITB 1.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; to the Purchaser, as the Purchaser shall reasonably request.</li> <li>ix) has a close business or family relationship with a professional staff of the Purchaser who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Borrower throughout the procurement process and execution of the contract.</li> </ul>

	<p>2.3 Bidders shall not be under a declaration of ineligibility or for corrupt and fraudulent practices</p> <p>2.4 Bidders shall certify that they are not blacklisted or debarred by any multilateral agency or in the country of the Borrower.</p> <p>2.5 A Bidder shall provide such evidence of eligibility satisfactory to the Purchaser, as the Purchaser shall reasonably request.</p>
<b>3. Eligible Goods and Services</b>	<p>3.1 All the Goods and Related Services to be supplied under the Contract shall have their country of origin in an eligible country.</p> <p>3.2 For purposes of this ITB (Instructions to Bidders), the term “goods” includes commodities, raw material, machinery, equipment, and industrial plants; and “related services” includes services such as insurance, installation, training, and initial maintenance.</p> <p>3.3 The term “origin” means the country where the goods have been mined, grown, cultivated, produced, manufactured or processed; or, through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.</p> <p>3.4 The nationality of the firm that produces, assembles, distributes, or sell Goods shall not determine their origin.</p>
<b>4. Cost of Bidding</b>	<p>4.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser named in the Bid Data Sheet, hereinafter referred to as “the Purchaser,” will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.</p>
<b>B. The Bidding Documents</b>	
<b>5. Content of Bidding Documents</b>	<p>5.1 The goods required, bidding procedures, and contract terms are prescribed in the bidding documents. In addition to the Invitation for Bids, the bidding documents include:</p> <ul style="list-style-type: none"> <li>Section I - Instructions to Bidders (ITB)</li> <li>Section II - Bid Data Sheet (BDS)</li> <li>Section III - Evaluation and Qualification Criteria for Eligibility</li> <li>Section IV - General Conditions of Contract (GCC)</li> <li>Section V - Special Conditions of Contract (SCC)</li> <li>Section VI - Schedule of Requirements</li> <li>Section VII - Technical Specifications</li> <li>Section VIII – Preventive Maintenance (Incidental Service) Requirements</li> <li>Section IX – Sample Forms: <ul style="list-style-type: none"> <li>Bid Form and Price Schedules</li> <li>Bid Security Form</li> <li>Contract Form</li> <li>Performance Security Form</li> <li>Bank Guarantee for Advance Payment Form</li> <li>Manufacturer’s Authorization Form</li> <li>Evaluation Forms</li> </ul> </li> </ul>

	<p>5.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or to submit a bid not substantially responsive to the bidding documents in every respect will be at the Bidder's risk and may result in the rejection of its bid.</p>
<p><b>6. Clarification of Bidding Documents</b></p>	<p>A prospective Bidder requiring any clarification of the bidding documents may notify the Purchaser in writing at the Purchaser's address indicated in the <b>Bid Data Sheet</b> or by electronic mail. The Purchaser will respond in writing to any request for clarification of the bidding documents which it receives no later than seven (7) days prior to the deadline for the submission of bids prescribed in ITB Clause 19.1. Written copies of the Purchaser's response (including an explanation of the query but without identifying the source of inquiry) will be clarified individually or informed in the form of corrigendum/amendment and uploaded in the website.</p>
<p><b>7. Amendment of Bidding Documents</b></p>	<p>7.1 At any time prior to the deadline for submission of bids, the Purchaser, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, may modify the bidding documents by amendment.</p> <p>7.2 Any modification in the bidding document will be notified through Corrigendum/amendment and uploaded at website.</p> <p>7.3 In order to allow prospective bidders reasonable time in which to take the amendment into account in preparing their bids, the Purchaser, at its discretion, may extend the deadline for the submission of bids.</p>

### C. Preparation of Bids

<p><b>8. Language of Bid</b></p>	<p>8.1 The bid prepared by the Bidder, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, shall be written in the language specified in the Bid Data Sheet. Supporting documents and printed literature furnished by the Bidder may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the <b>Bid Data Sheet</b>, in which case, for purposes of interpretation of the Bid, the translation shall govern.</p>
<p><b>9. Documents Comprising the Bid</b></p>	<p>9.1 The bid prepared by the Bidder shall comprise the following components:</p> <ul style="list-style-type: none"> <li>(a) a Bid Form and a Price Schedule completed in accordance with ITB Clauses 10, 11, and 12;</li> <li>(b) documentary evidence established in accordance with ITB Clause 13 that the Bidder is eligible to bid and is qualified to perform the contract if its bid is accepted;</li> </ul>

	<p>(c) documentary evidence established in accordance with ITB Clause 14 that the goods and ancillary services to be supplied by the Bidder are eligible goods and services and conform to the bidding documents; and</p> <p>(d) Bid security furnished in accordance with ITB Clause 15.</p>
<b>10. Bid Form</b>	10.1 The Bidder shall complete the Bid Form along with all the annexures and acknowledgement/proof of online price bid indicating the goods to be supplied, a brief description of the goods, the country of origin and quantity.
<b>11. Bid Prices</b>	<p>11.1 The Bidder shall fill the appropriate Prices in the website <a href="http://www.buyjunction.com">www.buyjunction.com</a> as detailed in Bid Data Sheet and total bid price of the goods it proposes to supply under the contract.</p> <p>11.2 Prices indicated on the Price Schedule shall be entered separately. The price of the goods shall be quoted <b>CIF- Beira</b> (wherein land transport, maritime shipping and insurance will be at Supplier's Cost), as specified in the <b>Bid Data Sheet</b>.</p> <p>11.3 The terms <b>CIF</b>, shall be governed by the rules prescribed in the current edition of <i>Incoterms</i> published by the International Chamber of Commerce, Paris.</p> <p>11.4 The Bidder's separation of price components in accordance with ITB Clause 11.2 above will be solely for the purpose of facilitating the comparison of bids by the Purchaser and will not in any way limit the Purchaser's right to contract on any of the terms offered.</p> <p>11.5 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account, unless otherwise specified in the Bid Data Sheet. A bid submitted with an adjustable price quotation will be treated as nonresponsive and will be rejected, pursuant to ITB Clause 24</p>
<b>12. Bid Currencies</b>	Prices shall be quoted in USD.
<b>13. Documents Establishing Bidder's Eligibility and Qualification</b>	<p>13.1 Pursuant to ITB Clause 9, the Bidder shall furnish, as part of its bid, documents establishing the Bidder's eligibility to bid and its qualifications to perform the contract if its bid is accepted.</p> <p>13.2 The documentary evidence of the Bidder's eligibility to bid shall establish to the Purchaser's satisfaction at the time of submission of its bid.</p> <p>13.3 The documentary evidence of the Bidder's qualifications to perform the contract if its bid is accepted shall establish to the Purchaser's satisfaction:</p> <p>(a) that, in the case of a Bidder offering to supply goods under the contract which the Bidder did not manufacture or otherwise produce, the Bidder has been duly authorized by the goods' Manufacturer or producer to supply the goods in the Purchaser's country;</p>

	<p>(b) that the Bidder has the financial, technical, and production capability necessary to perform the contract;</p> <p>(c) Bidder meets each of the qualification criteria specified in Section III, Evaluation and Qualification Criteria.</p> <p>(d) that, in the case of a Bidder not doing business within the Purchaser's country, the Bidder is or will be (if awarded the contract) represented by an Agent in that country equipped, and able to carry out the Supplier's maintenance, repair, and spare parts-stocking obligations prescribed in the Conditions of Contract and/or Technical Specifications; and</p>
<b>14. Documents Establishing Goods' Eligibility and Conformity to Bidding Documents</b>	<p>14.1 Pursuant to ITB Clause 9, the Bidder shall furnish, as part of its bid, documents establishing the eligibility and conformity to the bidding documents of all goods and services which the Bidder proposes to supply under the contract.</p> <p>14.2 The documentary evidence of the eligibility of the goods and services shall consist of a statement in the Price Schedule of the country of origin of the goods and services offered which shall be confirmed by a certificate of origin issued at the time of shipment.</p> <p>14.3 The documentary evidence of conformity of the goods and services to the bidding documents may be in the form of literature, drawings, and data, and shall consist of:</p> <p>(a) a detailed description of the essential technical and performance characteristics of the goods;</p> <p>(b) a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the goods for a period to be specified in the Bid Data Sheet, following commencement of the use of the goods by the Purchaser; and</p> <p>(c) an item-by-item commentary on the Purchaser's Technical Specifications demonstrating substantial responsiveness of the goods and services to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.</p> <p>14.4 For purposes of the commentary to be furnished pursuant to Clause 14.3(c) above, the Bidder shall note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated by the Purchaser in its Technical Specifications, are intended to be descriptive only and not restrictive. The Bidder may substitute alternative standards, brand names, and/or catalogue numbers in its bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.</p>

<b>15. Bid Security</b>	<p>15.1 Pursuant to ITB Clause 9, the Bidder shall furnish, as part of its bid, a bid security in the amount specified in the <b>Bid Data Sheet</b>.</p> <p>15.2 The bid security is required to protect the Purchaser against the risk of Bidder's conduct which would warrant the security's forfeiture, pursuant to ITB Clause 15.7.</p> <p>15.3 The bid security shall be in the currency of US Dollar and the bid shall be in one of the following forms:</p> <p>(a) Direct transfer to MBL Account  Account Details:  Bank Name: Millennium BIM (Banco Internacional De Moçambique)  Branch Name: Head Office  Account Holder Name: Minas de Benga, Limitada  Account Number: 258385109  IBAN Number: MZ59000100000025838510957  NIB: 000100000025838510957  BIC(SWIFT): BIMOMZMXXXX</p> <p>(b) a bank guarantee;  valid for thirty (30) days beyond the validity of the bid.</p> <p>15.4 Any bid not secured in accordance with ITB Clauses 15.1 and 15.3 will be rejected by the Purchaser as nonresponsive, pursuant to ITB Clause 24.</p> <p>15.5 Unsuccessful bidders' bid security will be discharged or returned as promptly as possible but not later than thirty (30) days after the expiration of the period of bid validity prescribed by the Purchaser pursuant to ITB Clause 16.</p> <p>15.6 The successful Bidder's bid security will be discharged upon the Bidder signing the contract, pursuant to ITB Clause 34, and furnishing the performance security, pursuant to ITB Clause 35.</p> <p>15.7 The bid security may be forfeited:</p> <p>(a) if a Bidder</p> <p>i) Withdraws its bid during the period of bid validity specified by the Bidder on the Bid Form or any extension thereto provided by the Bidder,  or</p> <p>ii) does not accept the correction of errors pursuant to ITB Clause 24.2;  or</p> <p>(b) in the case of a successful Bidder, if the Bidder fails:</p> <p>(i) to sign the contract in accordance with ITB Clause 34;  or</p> <p>(ii) to furnish performance security in accordance with ITB Clause 35.</p>
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<b>16. Period of Validity of Bids</b>	<p>16.1 Bids shall remain valid for the period specified in the <b>Bid Data Sheet</b> after the date of bid opening prescribed by the Purchaser, pursuant to ITB Clause 19. A bid valid for a shorter period shall be rejected by the Purchaser as nonresponsive.</p> <p>16.2 In exceptional circumstances, the Purchaser may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing (or by electronic mail). The bid security provided under ITB Clause 15 shall also be suitably extended for a corresponding period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required nor permitted to modify its bid.</p>
<b>17. Format and Signing of Bid</b>	<p>17.1 The Bidder shall prepare an original and the number of copies of the bid indicated in the <b>Bid Data Sheet</b>, clearly marking each "ORIGINAL BID" and "COPY OF BID," as appropriate. In the event of any discrepancy between them, the original shall govern.</p> <p>17.2 The original and the copy or copies of the bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the contract. This authorization shall consist of a written confirmation as specified in the BDS (Bid Data Sheet) and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for un-amended printed literature, shall be initialed by the person or persons signing the bid.</p> <p>17.3 Any interlineation, erasures, or overwriting shall be valid only if they are initialed by the person or persons signing the bid.</p>

## D. Submission of Bids

<b>18. Mode of Submission of Bids</b>	<p>Bids can be submitted either by offline (Hard copy) or online (through e-mail) as mentioned in clause No 5 of Bid data sheet.</p>
<b>19. Dead line for Submission of Bids</b>	<p>19.1 Bids must be received by the Purchaser at the address specified at Clause 5 of BDS in and no later than the time and date specified in the <b>Bid Data Sheet</b>.</p> <p>19.2 The Purchaser may, at its discretion, extend this deadline for the submission of bids by amending the bidding documents in accordance with ITB Clause 7, in which case all rights and obligations of the Purchaser and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.</p>
<b>20. Late Bids</b>	<p>20.1 Any bid received by the Purchaser after the deadline for submission of bids prescribed by the Purchaser pursuant to ITB Clause 19 shall be declared late, rejected and returned unopened to the Bidder.</p>

<b>21. Modification and Withdrawal of Bids</b>	<p>21.1 The Bidder may modify or withdraw its bid after the bid's submission, provided that written notice of the modification, including substitution or withdrawal of the bids, is received by the Purchaser prior to the deadline prescribed for submission of bids.</p> <p>21.2 The Bidder's modification or withdrawal notice shall be prepared, sealed, marked, and dispatched in accordance with the provisions of ITB Clause 18. A withdrawal notice may also be sent by electronic mail, but followed by a signed confirmation copy, postmarked not later than the deadline for submission of bids.</p> <p>21.3 No bid may be modified after the deadline for submission of bids.</p> <p>21.4 No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Form. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security, pursuant to the ITB Clause 15.7.</p>
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## E. Opening and Evaluation of Bids

<b>22. Opening of Bids by the Purchaser</b>	<p>22.1 The Purchaser will open all bids in the presence of bidders' representatives who choose to attend, at the time, on the date, and at the place specified in the Bid Data Sheet. The bidders' representatives who are present shall sign a register evidencing their attendance.</p> <p>22.2 The bidders' names, bid modifications or withdrawals, bid prices, discounts, and the presence or absence of requisite bid security and such other details as the Purchaser, at its discretion, may consider appropriate, will be announced at the opening. No bid shall be rejected at bid opening, except for late bids, which shall be returned unopened to the Bidder pursuant to ITB Clause 20.</p> <p>22.3 Bids (and modifications sent pursuant to ITB Clause 21.2) that are not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances. Withdrawn bids will be returned unopened to the bidders.</p> <p>22.4 The Purchaser will prepare minutes of the bid opening.</p>
<b>23. Clarification of Bids</b>	<p>23.1 During evaluation of the bids, the Purchaser may, at its discretion, ask the Bidder for a clarification of its bid within given reasonable time for a response. Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by the Purchaser shall not be considered. The request for clarification and the response shall be in writing, through e-mail only.</p> <p>23.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Purchaser's request for clarification, its bid may be rejected.</p>



<p><b>24. Preliminary Examination</b></p>	<p>24.1 The Purchaser will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.</p> <p>24.2 The Purchaser may waive any minor informality, nonconformity, or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder.</p> <p>24.3 Prior to the detailed evaluation, pursuant to ITB Clause 26, the Purchaser will determine the substantial responsiveness of each bid to the bidding documents. For purposes of these Clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the bidding documents without material deviations. Deviations from, or objections or reservations to critical provisions, such as those concerning Warranty (GCC 15), Payment (GCC Clause 16), Prices (GCC 17), Liquidated Damages (GCC 23), Applicable Law (GCC Clause 31), Taxes and Duties (GCC Clause 32), Delivery Schedule (as in Section VI. Schedule of Requirements) will be deemed to be a material deviation. The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.</p> <p>24.4 If a bid is not substantially responsive, it will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the nonconformity.</p>
<p><b>25. Evaluation Currency</b></p>	<p>25.1 To facilitate evaluation and comparison, the supplier shall quote prices in USD only.</p>
<p><b>26. Evaluation and Comparison of Bids</b></p>	<p>26.1 The Purchaser will evaluate and compare the bids which have been determined to be substantially responsive, pursuant to ITB Clause 24.</p> <p>26.2 The Purchaser's evaluation of a bid shall be based on CIF-Beira price.</p> <p>26.3 The Purchaser's evaluation of a bid will take into account, in addition to the bid price quoted on CIF-Beira basis in accordance with ITB Clause 11.2, one or more of the following factors as specified in the <b>Bid Data Sheet</b>, and quantified in ITB Clause 26.4:</p> <ul style="list-style-type: none"> <li>(a) delivery schedule offered in the bid;</li> <li>(b) the cost of components, mandatory spare parts, and service;</li> <li>(c) the availability in the Purchaser's country of spare parts and after-sales services for the equipment offered in the bid;</li> <li>(d) the projected operating and maintenance costs during the life of the equipment;</li> <li>(e) other specific criteria indicated in the Bid Data Sheet and/or in the Technical Specifications.</li> </ul>

26.4 a) Delivery schedule offered in the bid

i) The Purchaser requires that the goods under the Invitation for Bids shall be delivered (shipped) at the time specified in the Schedule of Requirements. The estimated time of arrival of the goods at the Project Site will be calculated for each bid after allowing for reasonable international and inland transportation time. Treating the bid resulting in such time of arrival as the base, a delivery “adjustment” will be calculated for other bids by applying a percentage, specified in the **Bid Data Sheet**, of the CIF price for each week of delay beyond the base, and this will be added to the bid price for evaluation. No credit shall be given to early delivery.

or

(ii) The goods covered under this invitation are required to be delivered (shipped) in partial shipments, as specified in the Schedule of Requirements. Bids offering deliveries earlier or later than the specified deliveries will be adjusted in the evaluation by adding to the bid price a factor equal to a percentage, specified in the **Bid Data Sheet**, of CIF price per week of variation from the specified delivery schedule.

(b) Cost of spare parts.

The list of items and quantities of major assemblies, components, and selected spare parts, likely to be required during the initial period of operation specified in the Bid Data Sheet, is annexed to the Technical Specifications. The total cost of these items, at the unit prices quoted in each bid, will be added to the bid price.

(c) Spare parts and after sales service facilities in the Purchaser’s country.

The cost to the Purchaser of establishing the minimum service facilities and parts inventories, as outlined in the Bid Data Sheet or elsewhere in the bidding documents, if quoted separately, shall be added to the bid price.

(d) *Operating and maintenance costs.*

Since the operating and maintenance costs of the goods under procurement form a major part of the life cycle cost of the equipment, these costs will be evaluated in accordance with the criteria specified in the **Bid Data Sheet** or in the Technical Specifications.

(e) *Performance and productivity of the equipment.*

(i) Bidders shall state the guaranteed performance or efficiency in response to the Technical Specification. For each drop in the performance or efficiency below the norm of 100, an adjustment for an amount specified in the **Bid Data Sheet** will be added to the bid price, representing the capitalized cost of additional operating costs over the life of the plant, using the methodology specified in the **Bid Data Sheet** or in the Technical Specifications.

or

	<p>(ii) Goods offered shall have a minimum productivity specified under the relevant provision in the Technical Specifications to be considered responsive. Evaluation shall be based on the cost per unit of the actual productivity of goods offered in the bid, and adjustment will be added to the bid price using the methodology specified in the Bid Data Sheet or in the Technical Specifications.</p> <p>(f) Specific additional criteria indicated in the Bid Data Sheet and/or in the Technical Specifications.</p>
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<b>27. Domestic Preference</b>	27.1 There is no domestic preference.
<b>28. Contacting the Purchaser</b>	<p>28.1 Subject to ITB Clause 23, no Bidder shall contact the Purchaser on any matter relating to its bid, from the time of the bid opening to the time the contract is awarded.</p> <p>28.2 Any effort by a Bidder to influence the Purchaser in its decisions on bid evaluation, bid comparison, or contract award may result in the rejection of the Bidder's bid.</p>

## F. Award of Contract

<b>29. Post-qualification</b>	29.1 The Purchaser will determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated responsive bid continues to meet the qualifying criteria and is qualified to perform the contract satisfactorily, in accordance with the criteria listed in ITB Clause 13.3.
<b>30. Award Criteria</b>	<p>30.1 Subject to ITB Clause 32, the Purchaser will award the contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined to be the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily.</p> <p>30.2 In case L-1 bidder fails to sign the agreement or fails to submit the performance bank guaranty within specified time after communicating the qualifying bidder for award, MBL at its discretion may award the work to the L-2 bidder provided L-2 bidder agrees to match the L-1 bid price, without prejudice to the rights of the purchaser against the defaulting party.</p>
<b>31. Purchaser's Right to Vary Quantities at Time of Award</b>	31.1 The Purchaser reserves the right at the time of contract award to increase or decrease, by the percentage indicated in the Bid Data Sheet, the quantity of goods and services originally specified in the Schedule of Requirements without any change in unit price or other terms and conditions.
<b>32. Purchaser's Right to Accept any Bid and to Reject any or All Bids</b>	<p>32.1 The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to the affected Bidder or bidders. In addition to any other rights herein stated, the Purchaser reserves the right to unilaterally cancel the tender, on its own convenience and its own discretion, without having to argue any cause and/or basis and without having to present any reason/justification, at any time before or after the opening of the bids.</p> <p>32.2 No compensation/indemnization or any other payment shall be due or paid to any bidder for the tender cancellation.</p>

<b>33. Notification of Award</b>	<p>33.1 Prior to the expiration of the period of bid validity, the Purchaser will notify the successful Bidder in writing by registered letter or by electronic mail, that its bid has been accepted.</p> <p>33.2 The notification of award will constitute the formation of the Contract.</p> <p>33.3 Upon the successful Bidder's furnishing of the performance security pursuant to ITB Clause 35, the Purchaser will promptly notify each unsuccessful Bidder and will discharge its bid security, pursuant to ITB Clause 15.</p> <p>33.4 If, after notification of award, a Bidder wishes to ascertain the grounds on which its bid was not selected, it should address its request to the Purchaser. The Purchaser will promptly respond in writing to the unsuccessful Bidder.</p>
<b>34. Signing of Contract</b>	<p>34.1 At the same time as the Purchaser notifies the successful Bidder that its bid has been accepted, the Purchaser will send the Bidder the Contract Form provided in the bidding documents, incorporating all agreements between the parties.</p> <p>34.2 Within ten(10) days of receipt of the Contract Form, the successful Bidder shall sign and date the contract and return it to the Purchaser.</p>
<b>35. Performance Security</b>	<p>35.1 Performance Bank Guarantee: The Successful Bidder shall furnish Performance Bank Guarantee as per the provisions of Clause 7.1 of GCC at Section IV, within 30 (thirty) days from the date of issue of LOI or signing of the agreement whichever is earlier. The Performance Bank Guarantee submitted should be issued by any of the following local (Mozambican) banks:</p> <ol style="list-style-type: none"> <li>1. BIM</li> <li>2. BCI</li> <li>3. Standard Bank</li> <li>4. First Capital Bank</li> <li>5. ABSA</li> <li>6. NED Bank</li> </ol>

	<p>This guarantee shall come into force from the date of issue of this guarantee and shall remain fully, irrevocably, unconditionally valid and in force up to three months after supply and acceptance of all the locomotives.</p> <p>Performance Bank Guarantee will not carry any interest. The Performance Bank Guarantee shall be released only on completion of all contractual obligations.</p> <p>35.2 Failure of the successful Bidder to comply with the requirement of ITB Clause 34 or ITB Clause 35.1 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security, in which event the Purchaser may make the award to the next lowest evaluated Bidder as per the provisions of ITB Clause 30.2, whose bid is substantially responsive and is determined by the Purchaser to be qualified to perform the Contract satisfactorily.</p>
<b>36. Corrupt and Fraudulent Practices</b>	<p>36.1 Bidders are expected to observe highest standards of ethics in regard to corrupt and fraudulent/prohibited practices as set forth in Public Procurement Act of Mozambique</p>

## SECTION II

### BID DATA SHEET (BDS)

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## 1. Introduction:

Bidders are invited to present proposals for the tender for **PROCUREMENT OF 5 (FIVE) NEW CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES** for haulage of coal with Provision for Preventive Maintenance Services including consumables spares at site for a period of Two (2) years extendable by further period of 3 (Three) Years for Minas de Benga, Lda, Mozambique.

Proposals should be valid for a period of 180 (one hundred and eighty) days, counting from the last date of submission of the Bid, and the Bidders commit themselves not to withdraw or change such proposals unilaterally during that period. Bids with shorter validity period shall be liable for rejection.

Proposals omitting any requested information may be rendered invalid, at the discretion of General Tender Conditions.

## 2. Tender Documents:

- a) Bidders shall ensure that the documents are complete and in accordance with the contents of the tender. Minas de Benga, Lda accepts no liability for any errors or omissions in the proposal due to discrepancies, or similar, that has not been rectified by the due date of submission of tender.
- b) Any conditions in the proposals that are contrary to the tender requirements may be considered invalid.
- c) All information accompanying proposals shall only serve as reference and will be considered jointly with the standard specifications.

## 3. Language

Proposals must be presented in English and the Contract shall be drafted and signed in English language.

## 4. General Tender Conditions

- a) Bid must be in legible writing and all blank spaces in white must be completed in the Formats attached.
- b) Bid shall be submitted in 2 (two) parts, **TECHNO COMMERCIAL BID (Part-A)** and **Acknowledgement/Receipt of Online Price Bid submitted on M-Junction Portal (Part-B)**.

**(Part-A)** shall contain technical offer, legal document, commercial conditions and blank format of Price Bid signed & stamped (without any rate or amount) as a confirmation of Price Bid being unconditional. Any corrections in the bid (Part-A) by use of products such as liquid correctors is strictly forbidden.

**Part-B** shall only contain **Acknowledgement/Receipt of Online Price Bid submitted on M-Junction Portal**.

- c) **Price Bid shall be submitted online on M-Junction Portal only.**



## 5. Submission of the proposals/Bids

### 5.1 How to Submit:

Proposals / bids can be submitted in hard copy or soft copy (i.e., The bidders can also submit the tender documents by e-mail).

### 5.2 Hard copy:

Proposal/Bid shall be submitted accompanied by all duly completed attached documents. Proposals shall be presented in sealed envelopes. On the envelope containing Techno Commercial Bid the tenderer will write **“TECHNO COMMERCIAL BID (Part-A)”** and on the envelope containing Price Bid acknowledgement/Receipt from M-Junction portal, the Tenderer shall write **“PRICE BID ACKNOWLEDGEMENT/RECEIPT (Part-B)”**.

Both the envelope should be placed in one big envelope and tenderer will write **“PROCUREMENT OF 5 (FIVE) NEW CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES WITH PROVISION FOR PREVENTIVE MAINTENANCE SERVICES INCLUDING INCLUDING CONSUMABLE SPARES AT SITE FOR A PERIOD OF TWO (2) YEARS EXTENDABLE BY FURTHER PERIOD OF 3 (THREE) YEARS FOR MINAS DE BENGÁ, LDA, MOZAMBIQUE Reference: N°TE148/MBL/LOCO/BPROJ/2024** and shall be submitted up to the date and time of submission of Bid mentioned in the Tender Document. Two versions (Original + Copy) shall be submitted in the Tender Box located at MBL Training Centre in Tete, Bairro Comunal de Matundo, Estrada Nacional nº 7.

### 5.3 Soft Copy (i.e., electronically):

If the documents are submitted electronically, the tenderer shall submit filled in signed and stamped pdf file of the Tender document with the subject line of the e-mail **“Tender for PROCUREMENT OF 5 (FIVE) NEW CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES WITH PROVISION FOR PREVENTIVE MAINTENANCE SERVICES INCLUDING CONSUMABLE SPARES AT SITE FOR A PERIOD OF TWO (2) YEARS EXTENDABLE BY FURTHER PERIOD OF 3 (THREE) YEARS FOR MINAS DE BENGÁ, LDA, MOZAMBIQUE Reference: N°TE148/MBL/LOCO/BPROJ/2024** containing two separate files with titles **“TECHNO COMMERCIAL BID (Part-A)”** and **“Price Bid Acknowledgement/Receipt (Part-B)”** and shall be submitted in the e-mail address: [Loco.Tender@icvl.co.mz](mailto:Loco.Tender@icvl.co.mz)

If the file size of the Techno Commercial Bid exceeds 10 MB the bid can be submitted in parts. e.g. Techno Commercial Bid Part A 1 of 6; 2 of 6, so on and so forth. The emails containing the techno-commercial and price bids acknowledgment/ receipt should be received by the date and time of submission of Bid mentioned in the Tender Document.

### 5.4 Price Bid submission:

Price Bid shall be submitted online only at M-Junction website/Portal within due date & time of submission. Detailed Process of placement of Online Sealed Bid at M-Junction Services Ltd., Kolkata, India is given in subsequent paragraphs.

## **6. Reverse Auction:**

### **6.1 Methodology**

- i) MBL reserves the right to discover the L-1 bidder/tenderer amongst the techno-commercially qualified bidders/tenderers by opening the sealed price bids, pre-submitted by such bidders along with the techno-commercial bids on or before TOD or by conducting RA.
- ii) MBL reserves the right to use any RA Strategy to be notified to techno-commercially acceptable bidders before RA event. MBL also reserves the right to eliminate one or more of the high price bidders/tenderers before the RA event by ranking the bidders/tenderers based on their sealed price bids, pre-submitted online by such bidders/tenders along with the techno-commercial bids on or before TOD. Such eliminated bidder(s)/tender(s) (H1, H2....Hn) to be eliminated, if any, will be decided by MBL before conducting RA.
- iii) In case, no bid is received during Reverse Auction, then the lowest price (L-1 price) received along with the techno-commercial bids on or before TOD shall be binding on the bidder(s)/tender(s) and the case may be processed on the basis of the L-1 price and the relative ranking of the bidders/tenderers therein.
- iv) Bidder(s)/Tender(s) shall be required to submit detailed price break-up, as per RFQ, within the stipulated time. Non-submission of detailed price break-up within the stipulated time, wherever required, by the L-1 bidder/Matched L-1 bidder, post RA, will be treated as backing out of the bidder and invite penal action as per the extant guidelines of MBL.

### **6.2 REVERSE AUCTION: ROLE OF SERVICE PROVIDER & BIDDER**

- a) MBL has engaged the services of M/s M-Junction Services Limited (MJ) for conducting the Reverse Auctions of Goods & Services. The purpose of such Reverse Auction would be to meet MBL's requirement for item(s)/service(s) from the Sellers / Bidders desiring to sell the item(s)/service(s) to MBL.
- b) The contact details of the M-Junction shall be provided by them in the Auction Notice issued by them. M-Junction is authorized to give clarifications regarding the reverse auction process to Bidders on behalf of MBL.
- c) Definition of Key Terms

#### **i) Reverse Auction**

A reverse auction is an auction in which the traditional roles of buyer and seller are reversed. Thus, there is one buyer and many potential sellers and the sellers compete to sell items/ services to the buyer. The sellers are required bid downwards i.e., underbid each other to win the contract.

#### **ii) On-line Reverse Auctions**

Reverse Auctions which are conducted through the Internet with simultaneous bidding by the bidders (from one or more locations). In other words, the venue for the auction is on an Internet website/ platform. The M-Junction website

<https://auction.buyjunction.in> or any other URL assigned by M-Junction would constitute the venue for the purpose of the on-line auction.

**iii) Award at the Reverse Auction**

The bidder quoting the lowest price is declared the L-1 bidder for the item/service to be procured.

**iv) Client**

MBL who has contracted with M-Junction to conduct the Reverse Auction.

**v) Bidder**

Individual/business entity participating in the Reverse Auction, intending to supply the item(s)/service(s) to the Client which has to secure Client approval for participation and provide written acceptance to the General Rules and Regulations.

**vi) Auction Engine**

The software that encapsulates the entire auction process, processing logic and information flows. M-Junction is the sole owner of the auction engine and retains exclusive right over the utilization of the same.

**vii) Preview Time**

Preview Time refers to the period of time that is provided prior to the commencement of bidding.

**viii) Start Time**

Start time refers to the time of commencement of the conduct of the On-line auction.

**ix) Duration of the Reverse Auction**

It refers to the length of time the price discovery process is allowed to continue by accepting bids from competing bidders. The duration of the auction would normally be for a pre-specified period of time. The same may however be subject to bidding rules.

**x) Auto Extension of the Auction Timings**

In the event of bids received in the last few minutes of the scheduled bid time, the Bid Timings are automatically extended for a specified period from each such bids placed. Such Auto Extension shall continue until no bids are placed for the specified period (i.e., the auction engine remains inactive for the specified period). The Inactivity Time for Auto Extension purpose is normally 5 minutes. M-Junction however retains the right to change the same. The Inactivity time applicable for the particular On-line Bid shall be communicated to the bidder before the bidding process starts, if it is set for less or more than 5 minutes or more.

**xi) End of the Reverse Auction**

Termination of the bidding event signaling an end to the price discovery process.

**xii) Auction Report**

Report provided by M-Junction containing a summary of the bidding event and outcome.

**xiii) Start Bid Price**

Price decided by the client from where the auction starts which would be put up on the site before commencement of Reverse Auction and also communicated in advance to all the bidders by M-Junction. Bidder(s) have to quote a price lesser than the Start Bid Price while participating in the Reverse Auction.

**xiv) Minimum Decrement**

Minimum decrement is the minimum amount a Bidder has to reduce in order to place its bid. It shall be specified in each case prior to start of Reverse Auction. This minimum decrement shall be pre-decided by Client and will be in-built in the auction engine.

**6.3 Process for submission of Price bid and On-line Reverse Auction:**

For tenders issued by MBL, bidders submit their Techno Commercial (TC) bids and the price bids, on or before the due date of tender opening. The price bids shall be submitted by the Bidders online on the buy-junction platform of M-Junction as stated in the RFQ terms. When the price is submitted on buy-junction platform of M-Junction, a system generated acknowledgement of submission of online sealed price bid submitted prior to TOD on the buy-junction platform of M-Junction, which is to be submitted with the TC Bid, will be received by the Bidder.

The process for submitting online price bid on the buy-junction platform of M-Junction is as under:

- i. Web-page to be accessed through the URL: <https://www.buyjunction.in>
- ii. There is a link in the above web-page under the section “Open Tender” through which vendors can access the required Request for Quotation (RFQ)/Tender against which sealed price bids are to be accepted.
- iii. The above mentioned link would be kept active by M-Junction till the due date and time of submission of RFQ/Tender or as per directives/ corrigendum issued by MBL in case of Open Tender Enquiry (OTE)/Global Tender Enquiry(GTE) or as per instructions in RFQ/tender documents in Limited Tender Enquiry(LTE).
- iv. Existing bidder who has earlier registered in M-Junction e-platform shall have direct access to the platform. They would be able to do this by using their existing user IDs and passwords after clicking the above link.
- v. New bidder would have to click the link “New User” which would then throw open a pop-up screen showing details on how to (a) register online (b) receive user ID/password on their registered email with which they have registered online and (c) place their bids. With this, new bidders would also become enabled to log in and participate on M-Junction e-platform.

- vi. After logging in (with respective user IDs/ passwords), bidders shall be directed to a web-page where detailed road map (user manual) on how to place bids would be displayed.
- vii. Each bidder can login and place/register a sealed price bid on M-Junction e-platform within the stipulated period stated in point 'c' above.
- viii. Each bidder shall be provided with a system generated acknowledgement of submission of online sealed price bid submitted prior to TOD on the buyjunction platform of M-Junction which can be printed.
- ix. In case any vendor submits online Price Bid but the Techno-Commercial bid has not been submitted on or before Tender Opening Date (TOD), such online price bid will not be considered by MBL.
- x. In case MBL decides to conduct Reverse Auction, MBL shall inform M-Junction about all bidders whose offers are found techno-commercially acceptable. These techno-commercially acceptable bidders shall become eligible for participating in price bidding through On-line Reverse Auction. MBL shall notified the list of Techno-Commercially acceptable Bidders to M-Junction.
- xi. All eligible bidders having ID & password can after connecting view the bidding on the computer screen and enter their prices any number of times during the duration of RA event.
- xii. The L-1 price matching will not be done in the RA event. If Price matching is required to be done, the same will be done by M-Junction after finalization of L-1 price by MBL.

#### **6.4 Role of Service Provider M-Junction**

Communication w.r.t Reverse Auction shall be done by M-Junction with the authorized representative of Bidders as furnished by Bidders in the Techno commercial bid. The approved bidders will be provided the following information specific to any particular auction:

- i. Preview time & Start Time
- ii. Duration of the Reverse Auction and the Auto extension of the pre specified auction timings
- iii. Total number of Items/Markets/Lots etc. for price-discovery
- iv. Brief on RA strategy to be employed
- v. Start Bid Price (Market wise in case of multiple Markets), if required
- vi. Minimum bid decrement
- vii. Loading Factor, if any (w.r.t delivery terms deviations/any other) will be considered as 25% p.a.
- viii. Special instructions, if any e.g. Exchange rate in case of participation of foreign bidders
- ix. Issue "Auction Notice" to eligible bidders

## 6.5 Vendor Enablement by M-Junction

M-Junction will:

- i. Familiarize the Techno Commercially acceptable bidders with the Reverse Auction Process (including training to the vendors).
- ii. Explain about the process of participating in Reverse Auction event and also provide training to all the eligible bidders regarding the same. Provide the Login ID and Password to all the Techno Commercially acceptable bidders to participate in the Reverse Auction.
- iii. Enable eligible bidders participation in the RA after obtaining bidders acceptance of "Auction Declaration"
- iv. Launch the screen for the Reverse Auction event at the Scheduled time.
- v. Do the price matching, if required

## 6.6 Roles and Responsibilities of the Bidder

The role of the bidder is outlined below:

- i) Get themselves acquainted to their satisfaction with the On-line bidding process by interacting with M-Junction.
- ii) Accept "Auction Declaration" to participate in the auction
- iii) Participate in the Reverse Auction with the aim of posting their lowest best price for the auctioned item(s) in the reverse auction.
- iv) Ensure that the User Id and password is not revealed to unauthorized persons.
- v) Submit their detailed price break-up for the item(s) / service(s) as per RFQ in the event the bidder becomes the Lowest bidder in the Reverse Auction process
- vi) Bidders need not pay any fee towards training or for actual Reverse Auction bidding or any other service with regard to this tender. Bidders need not subscribe to any of the services of M-Junction in lieu of participation in the Reverse Auction.

## 6.7 Cancellation or Reschedule:

M-Junction may cancel or reschedule the Reverse Auction in consultation with MBL, or do so on its own accord in case of any technical issue. The decision of M-Junction either made on its own accord or after consultation with MBL, shall be final.

- a. Signing of the Proposals:  
Proposals submitted shall be signed by the Bidder's Authorized representatives (for which an authorization letter from the bidder shall be submitted).
- b. The right of Minas de Benga, Lda to cancel or reject any bid/proposal whatsoever or to cancel the tender:  
Award of the work will be at the absolute discretion of MBL, which shall be final. MBL reserves to itself the right to cancel the tender process, before or after the opening of the bids, without assigning any reason whatsoever and without reimbursing for any costs, charges, expenses incidental to or incurred by any party to the tender process whomsoever, through or in connection with the preparation and submission of the bids. A Bidder whose bid is not accepted or is rejected shall not be entitled to claim any costs, charges, expenses incidental to or incurred by the Bidder, through or in connection with the preparation and submission of the bid. Conditional bids may be rejected without assigning any reasons whatsoever.

- c. Responsibility of Minas de Benga, Lda for expenses incurred by Bidders:  
Minas de Benga, Lda. shall not be liable for any expenses, charges, costs, incidentals or any other payments incurred by the Bidder(s) in preparing and submitting their proposals/bids or Documents.
- d. Confidentiality of the contents of the documents:  
All communications/discussions in relation to the Tender Document, irrespective of the submission of proposals, shall be treated by the Bidder as private and confidential.
- e. Late Proposals:  
Proposals received after the closing hour of the tender, shall be declared null and void and shall not be taken into consideration.
- f. Tenderer to acquaint with the Local conditions and Rules & Regulations:  
Tenderer should, in their own interest, visit the work site to satisfy themselves as to the source of supply of the materials and sufficiency and adequacy thereof in relation to the purposes for which they are intended. It will be presumed that Bidders have visited and seen the site at which the work is to be executed and that bids are based on a full knowledge of working conditions of soil, availability of materials, water, electric power, labour, transportation facilities, probable sites for labor camps and stores, go downs, and the extent of lead and lift and all other factors involved in the execution of the works. Such visit shall be undertaken by the Bidder at their own cost and MBL shall bear no liability for the same.

Any information or any matter derived from the tender documents or obtained from MBL shall not absolve or relieve the tenderer of any risk or of fulfilling all the terms and conditions of the bid including execution of all details which shall also cover incidental works not particularly mentioned in the tender documents but which, whether temporary or permanent, must evidently be required by reason for the nature of the works included in the tender. It shall be deemed that the tenderer has understood the position as set forth above while framing his bid.

Any neglect or omission or failure on the part of the Bidder in obtaining necessary and reliable information or on any other matter affecting the Bidder, shall not relieve the Bidder from any risk or liability or the entire responsibility for completion of the work in accordance with the Bidding Documents.

In their own interest, the Bidders are requested to familiarize themselves with the Tax laws, the Companies Act, the Customs Act and all other related acts and laws prevalent in Mozambique.

The bidders shall also be provided on request the approved mining plan and other information, if required. The bidders may obtain the same by writing a mail to [Loco.Tender@icvl.co.mz](mailto:Loco.Tender@icvl.co.mz)

## **7. Other important information**

### **7.1 Name of the Purchaser:**

Minas De Benga, Lda

### **7.2 Purchasers Address and contact details:**

Head of Procurement  
ICVL Mozambique  
Rua do Principe, 5<sup>th</sup> floor,  
Edificio dos CFM-Bairro Chaimite  
Beira-Mozambique  
[Shashi.waman@icvl.co.mz](mailto:Shashi.waman@icvl.co.mz)  
+258-843323469

### **7.3 Amount of Bid security**

The amount of Bid security will be 85,000 USD.

### **7.4 Bid validity period:**

The Bid validity period shall be of one hundred and eighty (180) days.

### **7.5 Deadline for bid submission**

The last date and time for submission of Bid is 13:00hrs of 23/12/2024.



## SECTION III

### PRE-QUALIFICATION CRITERIA AND PRICE BID EVALUATION

**The manufacturer/Supplier have to meet the following criterion for submitting the bids:**

**i) Financial Status and Capability:**

The Average annual turnover of the Bidder should be USD 10 Million or more as per audited financial statements of last three (3) financial years of the bidder .

The Bidder shall furnish documentary evidence that it meets the following financial requirement(s):

*The audited financial statements for the last **3 financial** years, namely years 2021, 2022, 2023 shall be submitted demonstrating the current soundness of the Bidder's financial position and availability of adequate financial resources to perform the contract. Refer to **Form FIN-1, Form FIN-2, Form FIN-3** to provide the required information.*

**ii) Experience and Technical Capacity**

The Bidder shall furnish documentary evidence to demonstrate that it meets the following experience requirement(s).

The Bidder should be manufacturer or manufacturers authorized certificate holder and have executed (supplied Locomotives for freight transportation) the following value of Orders during last 10 years:

1. single work/Purchase order for a value of 15 Million USD  
or
2. two work/Purchase orders of 10 Million USD each  
or
3. three work/ Purchase orders of 7.5 Million USD each

Wherever the words "Similar Goods" have been used it includes upgrades, latest and improved versions or models of similar specifications and technology for freight transportation. Refer to **Form Exp** to provide the required information.

**iii) History of non-performing contracts:**

Bidder shall demonstrate that Non-performance of a contract did not occur as a result of the default of the Bidder since last 5 years. The required information shall be furnished as per Form CON.

iv) **Pending Litigation:**

Financial position and prospective long-term profitability of the Single Bidder shall remain sound according to criteria established with respect to Financial Capability under paragraph I (i) above assuming that all pending litigation will be resolved against the Bidder. Bidder shall provide information on pending litigations **Litigation History:**

There shall be no consistent history of court/arbitral award decisions against the Bidder since Last five years. All parties to the contract shall furnish the information as per Form CON.

v) **Evaluation of price bids:**

In accordance with the clause no 26 of ITB , the bids will be evaluated by loading the additional financial implication towards deviation in delivery period and other commercial terms. Illustrations for the calculation of the additional loading of the components are as given below:

Illustration -1

Subject	Quoted terms	Loading to quoted price
Delivery	within 12 months from date of signing of contract/agreement	No additional loading

Illustration -2

Subject	Quoted terms	Loading to quoted price
Delivery	within 15 months from date of signing of contract/agreement. Delay in delivery period by 3 months (I.e. 90 days)	Interest to be considered for advance paid (25% of contract value) for three months above the agreed time  <b>Advance paid(25% of contract value) x 25%(interest rate) x 3 months</b>

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## SECTION IV GENERAL CONDITIONS OF CONTRACT

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## General Conditions of Contract

<b>1. Definitions</b>	<p>1.1 In this Contract, the following terms shall be interpreted as indicated:</p> <ul style="list-style-type: none"> <li>(a) “The Contract” means the agreement entered into between the Purchaser and the Supplier, as recorded in the Contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.</li> <li>(b) “The Contract Price” means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations.</li> <li>(c) “The Goods” means all of the equipment, machinery, and/or other materials which the Supplier is required to supply to the Purchaser under the Contract.</li> <li>(d) “The Services” means those services ancillary to the supply of the Goods, such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract.</li> <li>(e) “GCC” means the General Conditions of Contract contained in this section.</li> <li>(f) “SCC” means the Special Conditions of Contract.</li> <li>(g) “The Purchaser” means the organization purchasing the Goods, as named in SCC.</li> <li>(h) “The Purchaser’s country” is the country named in SCC.</li> <li>(i) “The Supplier” means the individual or firm supplying the Goods and Services under this Contract.</li> <li>(j) “The Project Site,” where applicable, means the place or places named in <b>SCC</b></li> <li>(k) “Day” means calendar day.</li> </ul>
<b>2. Application</b>	<p>2.1 These General Conditions shall apply to the extent that they are not superseded by provisions of other parts of the Contract.</p>
<b>3. Country of Origin</b>	<p>3.1 All goods and related services to be supplied under the contract shall have their origin in eligible countries list</p>

	<p>3.2 For purposes of this Clause, “origin” means the place where the Goods were mined, grown, or produced, or from which the Services are supplied. Goods are produced when, through manufacturing, processing, or substantial and major assembly of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.</p> <p>3.3 The origin of Goods and Services is distinct from the nationality of the Supplier</p>
<b>4. Standards</b>	<p>4.1 The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications, and, when no applicable standard is mentioned, to the authoritative standards appropriate to the Goods’ country of origin. Such standards shall be the latest issued by the concerned institution.</p>
<b>5. Use of Contract Documents and Information</b>	<p>5.1 The Supplier shall not, without the Purchaser’s prior written consent, disclose the Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Supplier in the performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.</p> <p>5.2 The Supplier shall not, without the Purchaser’s prior written consent, make use of any document or information enumerated in GCC Clause 5.1 except for purposes of performing the Contract.</p> <p>5.3 Any document, other than the Contract itself, enumerated in GCC Clause 5.1 shall remain the property of the Purchaser and shall be returned (all copies) to the Purchaser on completion of the Supplier’s performance under the Contract if so required by the Purchaser</p>
<b>6. Patent Rights</b>	<p>6.1 The Supplier shall indemnify the Purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof in the Purchaser’s country.</p>
<b>7. Performance Security</b>	<p>7.1 Within thirty (30) days of receipt of the notification of Contract award, the successful Bidder shall furnish to the Purchaser the performance security in the amount <b>specified in SCC</b>.</p> <p>7.2 The proceeds of the performance security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier’s failure to complete its obligations under the Contract.</p>

	<p>7.3 The performance security shall be denominated in the currency of the Contract i.e. USD and shall be in the format available at Sample forms of the Tender document.</p> <p>7.4 The performance security will be discharged by the Purchaser and returned to the Supplier not later than thirty (30) days following the date of completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless specified otherwise <b>specified in SCC.</b></p>
<b>8. Inspections and Tests</b>	<p>8.1 The Purchaser or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Contract specifications at no extra cost to the Purchaser. SCC and the Technical Specifications shall specify what inspections and tests the Purchaser requires and where they are to be conducted. The Purchaser shall notify the Supplier in writing, in a timely manner, of the identity of any representatives retained for these purposes.</p> <p>8.2 The inspections and tests may be conducted on the premises of the Supplier or its subcontractor(s), at point of delivery, and/or at the Goods' final destination. If conducted on the premises of the Supplier or its subcontractor(s), all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser.</p> <p>8.3 Should any inspected or tested Goods fail to conform to the Specifications, the Purchaser may reject the Goods, and the Supplier shall either replace the rejected Goods or make alterations necessary to meet specification requirements free of cost to the Purchaser.</p> <p>8.4 The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival in the Purchaser's country shall in no way be limited or waived by reason of the Goods having previously been inspected, tested, and passed by the Purchaser or its representative prior to the Goods' shipment from the country of origin.</p> <p>8.5 Nothing in GCC Clause 8 shall in any way release the Supplier from any warranty or other obligations under this Contract.</p>
<b>9. Packing</b>	<p>9.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during</p>

	<p>transit, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.</p> <p>9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in SCC, and in any subsequent instructions ordered by the Purchaser.</p>
<b>10. Delivery and Documents</b>	<p>10.1 Delivery of the Goods shall be made by the Supplier in accordance with the terms specified in the Schedule of Requirements. The details of shipping and/or other documents to be furnished by the Supplier are <b>specified in SCC.</b></p> <p>10.2 For purposes of the Contract, "EXW," "FOB," "FCA," "CIF," "CIP," and other trade terms used to describe the obligations of the parties shall have the meanings assigned to them by the current edition of <i>Incoterms</i><sup>1</sup> published by the International Chamber of Commerce, Paris.</p> <p>10.3 Documents to be submitted by the Supplier are <b>specified in SCC.</b></p>
<b>11. Insurance</b>	<p>11.1 The Goods supplied under the Contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery in the manner specified in the SCC.</p> <p>11.2 Where delivery of the Goods is required by the Purchaser on a CIF or CIP basis, the Supplier shall arrange and pay for cargo insurance, naming the Purchaser as beneficiary. Where delivery is on an FOB or FCA basis, insurance shall be the responsibility of the Purchaser.</p> <p>11.1 The Goods supplied under the Contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery in the manner specified in the SCC.</p>
<b>12. Transportation</b>	<p>12.1 Where the Supplier is required under Contract to deliver the Goods FOB, transport of the Goods, up to and including the point of putting the Goods on board the vessel at the specified port of loading, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price. Where the Supplier is required under the Contract to deliver the Goods FCA, transport of the Goods and delivery into the custody of the carrier at the place named by the Purchaser or other agreed point shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price.</p> <p>12.2 Where the Supplier is required under Contract to deliver the Goods CIF or CIP, transport of the Goods to the port of destination or such other named place of destination in the Purchaser's country, as shall be specified in the Contract, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price.</p> <p>12.3 Where the Supplier is required under the Contract to transport the Goods to a specified place of destination within the Purchaser's country,</p>

	<p>defined as the Project Site, transport to such place of destination in the Purchaser's country, including insurance and storage, as shall be specified in the Contract, shall be arranged by the Supplier, and related costs shall be included in the Contract Price.</p> <p>12.4 Where the Supplier is required under Contract to deliver the Goods CIF or CIP, no restriction shall be placed on the choice of carrier. Where the Supplier is required under Contract (a) to deliver the Goods FOB or FCA, and (b) to arrange on behalf and at the expense of the Purchaser for international transportation on specified carriers or on national flag carriers of the Purchaser's country, the Supplier may arrange for such transportation on alternative carriers if the specified or national flag carriers are not available to transport the Goods within the period(s) specified in the Contract.</p>
<b>13.i) Incidental Services</b>	<p>13.1 The Supplier may be required to provide any or all of the following services, including additional services, if any, <b>specified in SCC</b>:</p> <ul style="list-style-type: none"> <li>(a) performance or supervision of on-site assembly and/or start-up of the supplied Goods;</li> <li>(b) furnishing of tools required for assembly and/or maintenance of the supplied Goods;</li> <li>(c) furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Goods;</li> <li>(d) training of the Purchaser's personnel, at the Supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied Goods.</li> </ul>
<b>ii) Preventive Maintenance Services</b>	<p>13.2 Performance or supervision or maintenance and/or repair of the supplied Goods as mentioned at Section VIII of the Tender document, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract;</p>
<b>14. Spare Parts</b>	<p>14.1 As <b>specified in SCC</b>, the Supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier:</p> <ul style="list-style-type: none"> <li>(a) such spare parts as the Purchaser may elect to purchase from the Supplier, provided that this election shall not relieve the Supplier of any warranty obligations under the Contract; and</li> <li>(b) in the event of termination of production of the spare parts: <ul style="list-style-type: none"> <li>i) advance notification to the Purchaser of the pending termination, in sufficient time to permit the Purchaser to procure needed requirements; and</li> <li>ii) following such termination, furnishing at no cost to the Purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.</li> </ul> </li> </ul>



<b>15. Warranty</b>	<p>15.1 The Supplier warrants that the Goods supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Supplier further warrants that all Goods supplied under this Contract shall have no defect, arising from design, materials, or workmanship (except when the design and/or material is required by the Purchaser's specifications) or from any act or omission of the Supplier, that may develop under normal use of the supplied Goods in the conditions prevailing in the country of final destination.</p> <p>15.2 This warranty shall remain valid for 24 months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the Contract unless <b>specified otherwise in SCC</b>.</p> <p>15.3 The Purchaser shall promptly notify the Supplier in writing of any claims arising under this warranty.</p> <p>15.4 Upon receipt of such notice, the Supplier shall, within the period specified in SCC and with all reasonable speed, repair or replace the defective Goods or parts thereof, without costs to the Purchaser.</p> <p>15.5 If the Supplier, having been notified, fails to remedy the defect(s) within the period specified in SCC, within a reasonable period, the Purchaser may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.</p>
<b>16. Payment</b>	<p>16.1 The method and conditions of payment to be made to the Supplier under this Contract shall be <b>specified in SCC</b>.</p> <p>16.2 The Supplier's request(s) for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the goods delivered and Services performed, and by documents submitted pursuant to GCC Clause 10, and upon fulfillment of other obligations stipulated in the Contract.</p> <p>16.3 Payments shall be made promptly by the Purchaser as <b>specified in SCC</b>.</p> <p>16.4 The currency or currencies in which payment is made to the Supplier under this Contract shall be <b>specified in SCC</b> subject to the following general principle: payment will be made in the currency or currencies in which the payment has been requested in the Supplier's bid.</p>
<b>17. Prices</b>	<p>17.1 Prices charged by the Supplier for Goods delivered and Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, with the exception of any price adjustments <b>authorized in SCC</b> or in the Purchaser's request for bid validity extension, as the case may be.</p>

<b>18. Change Orders</b>	<p>18.1 The Purchaser may at any time, by a written order given to the Supplier pursuant to GCC Clause 31, make changes within the general scope of the Contract in any one or more of the following:</p> <ul style="list-style-type: none"> <li>(a) drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;</li> <li>(b) the method of shipment or packing;</li> <li>(c) the place of delivery; and/or</li> <li>(d) the Services to be provided by the Supplier.</li> </ul> <p>18.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or delivery schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this clause must be asserted within thirty (30) days from the date of the Supplier's receipt of the Purchaser's change order.</p>
<b>19. Contract Amendments</b>	<p>19.1 Subject to GCC Clause 18, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.</p>
<b>20. Assignment</b>	<p>20.1 The Supplier shall not assign, in whole or in part, its obligations to perform under this Contract, except with the Purchaser's prior written consent.</p>
<b>21. Subcontracts</b>	<p>21.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under this Contract if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the Supplier from any liability or obligation under the Contract.</p> <p>21.2 Subcontracts must comply with the provisions of GCC Clause 3.</p>
<b>22. Delays in the Supplier's Performance</b>	<p>22.1 Delivery of the Goods and performance of Services shall be made by the Supplier in accordance with the time schedule prescribed by the Purchaser in the Schedule of Requirements.</p> <p>22.2 If at any time during performance of the Contract, the Supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the Goods and performance of Services, the Supplier shall promptly notify the Purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may at its discretion extend the Supplier's time for performance, with or without liquidated damages, in which case the extension shall be ratified by the parties by amendment of Contract.</p>
	<p>22.3 Except as provided under GCC Clause 25, a delay by the Supplier in the performance of its delivery obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to GCC Clause 23, unless an extension of time is agreed upon pursuant to GCC Clause 22.2 without the application of liquidated damages.</p>

<b>23. Liquidated Damages</b>	<p>23.1 Subject to GCC Clause 25, if the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) specified in the Contract, the Purchaser shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in SCC of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in SCC. Once the maximum is reached, the Purchaser may consider termination of the Contract pursuant to GCC Clause 24.</p>
<b>24. Termination for Default</b>	<p>24.1 The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate this Contract in whole or in part:</p> <ul style="list-style-type: none"> <li>(a) if the Supplier fails to deliver any or all of the Goods within the period(s) specified in the Contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 22; or</li> <li>(b) if the Supplier fails to perform any other obligation(s) under the Contract.</li> <li>(c) If the Supplier, in the judgment of the Purchaser, has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for or in executing the Contract. For the purpose of this clause: <ul style="list-style-type: none"> <li>(i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;</li> <li>(ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>2</sup></li> <li>(iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>3</sup></li> <li>(iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>4</sup></li> </ul> </li> </ul> <p><sup>1</sup> “Another party” refers to a public official acting in relation to the procurement process or contract execution.</p> <p><sup>2</sup> “Party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; intended to influence the procurement process or contract execution.</p> <p><sup>3</sup> “Parties” refer and the “act or omission” is s to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.</p> <p><sup>4</sup> “Party” refers to a participant in the procurement process or contract execution.</p>

	<p>(v) “obstructive practice” is</p> <p>(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or</p> <p>(bb) acts intended to materially impede the exercise of the ICVL inspection and audit rights.</p> <p>24.2 In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 24.1, the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Services similar to those undelivered, and the Supplier shall be liable to the Purchaser for any excess costs for such similar Goods or Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.</p>
<b>25. Force Majeure</b>	<p>25.1 Notwithstanding the provisions of GCC Clauses 22, 23, and 24, the Supplier shall not be liable for forfeiture of its performance security, liquidated damages, or termination for default if and to the extent that it’s delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.</p> <p>25.2 For purposes of this clause, “Force Majeure” means an event beyond the control of the Supplier and not involving the Supplier’s fault or negligence and not foreseeable. Such events may include, but are not restricted to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.</p> <p>25.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.</p>
<b>26. Termination for Insolvency</b>	<p>26.1 The Purchaser may at any time terminate the Contract by giving written notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Purchaser.</p>

<p><b>27. Termination for Convenience</b></p>	<p>27.1 The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.</p> <p>27.2 The Goods that are complete and ready for shipment within thirty (30) days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:</p> <ul style="list-style-type: none"> <li>(a) to have any portion completed and delivered at the Contract terms and prices; and/or</li> <li>(b) to cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and Services and for materials and parts previously procured by the Supplier.</li> </ul>
<p><b>28. Resolution of Disputes</b></p>	<p>28.1 If any dispute or difference of any kind whatsoever shall arise between the Purchaser and the Supplier in connection with or arising out of the contract, the parties shall make every effort to resolve amicably such dispute or difference by mutual consultation. 28.2 If, after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereunder provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.</p> <p>28.2.1 Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after deliver of the Goods under the Contract.</p> <p>28.2.2 Arbitration proceedings shall be conducted in accordance with the rules of procedure <b>specified in the SCC</b>.</p> <p>28.3 Notwithstanding any reference to arbitration herein:</p> <ul style="list-style-type: none"> <li>(a) The parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and</li> <li>(b) The Purchase shall pay the Supplier any monies due to the Supplier.</li> </ul>
<p><b>29. Limitation of Liability</b></p>	<p>29.1 Except in cases of criminal negligence or willful misconduct, and Liability in the case of infringement pursuant to Clause 6,</p> <ul style="list-style-type: none"> <li>a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser and</li> </ul>

	<p>b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.</p>
<b>30. Governing Language</b>	<p>30.1 The Contract shall be written in the language <b>specified in SCC</b>. Subject to GCC Clause 31, the version of the Contract written in the specified language shall govern its interpretation. All correspondence and other documents pertaining to the Contract which are exchanged by the parties shall be written in the same language.</p>
<b>31. Applicable Law</b>	<p>31.1 The Contract shall be interpreted in accordance with the laws of the Purchaser's country, unless otherwise <b>specified in SCC</b>.</p>
<b>32. Notices</b>	<p>32.1 Any notice given by one party to the other pursuant to this Contract shall be sent to the other party in writing or by electronic mail. and confirmed in writing to the other party's address <b>specified in SCC</b>.</p> <p>32.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.</p>
<b>33. Taxes and Duties</b>	<p>33.1 A foreign Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's country.</p> <p>33.2 A foreign Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods to the Purchaser.</p>

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## SECTION V. SPECIAL CONDITIONS OF CONTRACT

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## Special Conditions of Contract

The following Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract.

**(The corresponding clause number of the GCC is indicated in parentheses).**

### 1. Definitions (GCC Clause 1)

“The Contract Price”:

for the avoidance of doubt, includes “incidental services” and “Preventive maintenance service including Preventive Maintenance spares” under Clause 13.1(d)

“The incidental Services”

includes those services ancillary to the supply of the Goods, such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract.

“Preventive Maintenance Services”

Includes Preventive/Scheduled/Breakdown maintenance of the locomotives after commissioning for operation.

“Preventive Maintenance Spares”

Includes spares required for preventive maintenance of Locomotives.

“The Purchaser”: Minas de Benga, Lda. (“ICVL”)

“The Purchaser’s country”: Mozambique

“The Supplier”: [.....]

“The Project Site”: ICVL, Beira, Mozambique

### 2. Country of Origin (GCC Clause 3)

Any manufacturer/Supplier with manufacturers authorized certificate holder can participate in the bidding

### 3. Performance Security (GCC Clause 7)

The Successful Bidder shall furnish Performance Bank Guarantee as per the provisions of Clause 35 of Section-I ITB, within 30 (thirty) days from the date of issue of LOI or signing of the agreement whichever is earlier. The Performance Bank Guarantee submitted should be issued by any of the following local (Mozambican) banks in the format available in the Tender document:

1. BIM
2. BCI
3. Standard Bank
4. First Capital Bank
5. ABSA
6. NED Bank



The Performance Bank Guarantee shall be valid for the time period of three (3) months after supply and acceptance of all the locomotives. Performance Bank Guarantee will not carry any interest. The Performance Bank Guarantee shall be released only on completion of all contractual obligations. The amount of the Performance Bank Guarantee shall be equivalent to Five **(5) percent** of the Contract Price.

**4. Inspections and Tests (GCC Clause 8)**

Inspection and tests prior to shipment of goods and at final acceptance are as indicated in the Technical Specifications.

The Purchaser shall have the right to commission an independent party to act as its representative in performing its rights under this Clause.

**5. Packing (GCC Clause 9)**

No additional requirement

**6. Delivery and Documents (GCC Clause 10)**

Upon shipment, the Supplier shall notify the Purchaser and the Insurance Company by electronic mail the full details of the shipment, including Contract number, description of goods, quantity, the vessel, the bill of lading number and date, port of loading, date of shipment, port of discharge, etc. The Supplier shall mail the following documents to the Purchaser, with a copy to the Insurance Company:

- (i) Copies of the Supplier's invoice showing goods description, quantity, unit price, and total amount;
- (ii) Original and three (3) copies of the negotiable, clean, on-board bill of lading marked "freight prepaid" and three (3) copies of nonnegotiable bill of lading, confirming the loading/shipment of all the locomotives onto the vessel at the port of shipment;
- (iii) Copies of the packing list identifying contents of each package;
- (iv) Insurance certificate;
- (v) Manufacturer's or Supplier's warranty certificate;
- (vi) Inspection certificate, issued by the nominated inspection agency, and the Supplier's factory inspection report; and
- (vii) Certificate of origin.

The above documents shall be received by the Purchaser at least one week before arrival of the goods at the port or place of arrival and, if not received, the Supplier will be responsible for any consequent expenses.

**7. Insurance (GCC Clause 11)**

The Insurance shall be in an amount equal to 110 percent of the CIF value of the goods from "warehouse" to "warehouse" on "All Risks" basis, including War Risks and Strikes. Insurance shall cease to be the responsibility of the Supplier from the time of final acceptance.

**8. Preventive Maintenance Service including Incidental Services (GCC Clause 13)**

The Supplier shall provide the following additional services as per clause 13 of GCC and further described at Section VIII of the Tender document.

Maintenance service for the supplied Goods for a period of Two (2) years from acceptance for each unit and further extendable by three (3) years.

**9. Spare Parts (GCC Clause 14)**

Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spares for the goods in accordance with its obligations under Preventive Maintenance Services GCC Clause 13. Other spare part and components shall be supplied as promptly as possible, but in any case in accordance with the relevant Schedule to the Technical Specifications, subject to a maximum delivery delay of four (4) months. This clause shall apply without prejudice to the Supplier's obligations and Purchaser's rights under the Preventive Maintenance, GCC Clause 13.

A list of critical spares required to be maintained adequate inventory shall be provided by the successful bidder for the purchased Locomotives.

**10. Warranty (GCC Clause 15)**

In partial modification of the provisions, the warranty period shall be **twenty (24) months** from date of acceptance of the goods. The Supplier shall, in addition, comply with the performance and/or consumption guarantees specified under the Contract. If, for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the Supplier shall make such changes, modifications, and/or additions to the goods or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract, at its own cost and expense, and to carry out further performance tests in accordance with SCC Clause 8.

The period for correction of defects in the warranty period is: **Ten (10) days**. Period for correction of defects to exclude time for disassembly and assembly of the locomotives.

**11. Payment (GCC Clause 16)**

**(i) For the Supply of the Goods.**

Payment of foreign currency portion shall be made in currency of bid in the following manner:

- (i) **Advance Payment:** Twenty five (25) percent of the Contract Price (excluding any Preventive Maintenance Services) shall be paid by the Purchaser within thirty (30) days of signing of the Contract against a bank guarantee ("BG") for equivalent amount (i.e., twenty five percent of the Contract Price, excluding any Preventive Maintenance Services) submitted by the Supplier from a reputed bank (which is acceptable to purchaser) situated in the Purchaser's country, valid until the goods are delivered and accepted in the form as prescribed in the bidding documents.
- (ii) **On Shipment:** Fifty (50) percent of the Contract Price (excluding any Preventive Maintenance Services) of **the goods shipped** shall be paid through irrevocable confirmed letter of credit issued to supplier's banker in its country, upon submission of following documents, cumulatively, to the Purchaser:
  - a) the Quantity Certificate (PACKING LIST));
  - b) the Quality Certificate issued by the Supplier;
  - c) the on-board Bill of Lading

d) the Commercial Invoice.

- (iii) **On Acceptance:** Fifteen (15) percent of the Contract Price (excluding any Preventive Maintenance Services) of **the goods shipped** shall be paid within thirty (30) days of receipt of the goods and completion of load tests upon submission of claim supported by the acceptance certificate issued by the Purchaser.
- (iv) 5% of the Contract Price of supplied goods (excluding any Preventive Maintenance Services) shall be paid on successful completion of the first year of the warranty.
- (v) 5% of the balance Contract Price of supplied goods (excluding any Preventive Maintenance Services) shall be paid on successful completion of the second year of the warranty.

**(ii) For the Provision of Preventive Maintenance Services**

Payment shall be made, on quarterly basis, within thirty (30) days after submission of a statement by the Supplier, in the format of the relevant form of the Price Schedule together with relevant support documentation as may reasonably be required by the Purchaser only. Only such portion of the statement that is not satisfactorily supported may be withheld from payment. Should any discrepancy be found to exist between the actual payment and costs authorized to be incurred by the Supplier, the Purchaser may add or subtract the difference from the subsequent payment.

**12. Prices (GCC Clause 17)**

Prices shall not be adjusted for the supply of goods.

Prices shall be adjusted in accordance with provisions in the Attachment to SCC for the Preventive Maintenance services under the contract.

**13. Liquidated Damages (GCC Clause 23)**

Clause 23.1 shall read as follows:

“Subject to GCC Clause 25, if the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) *or to the performance standard* specified in the Contract, the Purchaser shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in SCC of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in SCC. Once the maximum is reached, the Purchaser may consider termination of the Contract pursuant to GCC Clause 24.”

Delay Liquidated Damages on the delivered price of delayed Goods:

Applicable rate shall be **one-half (0.5) percent per week** and the maximum shall not exceed **ten (10) percent** of the Contract Price for the supply of the Goods

Performance Liquidated Damages on failure to perform the *Preventive Maintenance Services* to the standard required:

Applicable rate shall be **one tenth of one percent (i.e. 0.1%)** of the overall bill for the concerned calendar quarter per additional day of non-availability per Locomotive unit failing to achieve the availability rate indicator specified in the Technical Specification, subject to a maximum deduction of **ten (10) percent** of the overall bill for the calendar quarter.

In addition, in case the locomotive is stabled for a period exceeding 30 (thirty) days continuously, billing will be reduced for that locomotive on pro-rata basis.

In the event that the maximum performance liquidated damages are reached for 3 (three) quarters in a row or in four of the preceding six quarters, the Purchaser may consider termination of the Contract pursuant to GCC Clause 24.

**14. Resolution of Disputes (GCC Clause 28)**

The dispute resolution mechanism to be applied pursuant to GCC Clause 28.2 shall be as follows:

In the case of a dispute between the Purchaser and the Supplier, the dispute shall be settled by arbitration in accordance with the provisions of the United Nations Commission on International Trade Law (UNCITRAL) Arbitration Rules.

**15. Governing Language (GCC Clause 30)**

The Governing Language shall be: English (The contract form shall be made in English)

**16. Notices (GCC Clause 32)**

GCC 32.1—Purchaser's address for notice purpose

Head of Procurement  
Minas de Benga, Lda.

Bairro Comunal de Matundo, Parcela No. 1049  
Estrada Nacional No. 103  
Tete, Mozambique  
[Shashi.Waman@icvl.co.mz](mailto:Shashi.Waman@icvl.co.mz)  
[Ravinder.Chauhan@icvl.co.mz](mailto:Ravinder.Chauhan@icvl.co.mz)  
Contact No: +258 84 332 3469

**17. Price Adjustment Formula applicable for Preventive Maintenance Services only**

Prices payable to the Supplier, as stated in the Contract, shall be subject to adjustment, on an annual basis, during performance of the Contract to reflect changes in the cost of labor and material components at US Department of Commerce Consumer Price Index with base date being 31<sup>st</sup> August 2024

The inflation factor to be applied on each anniversary of base date would be:

Inflation Factor =  $1 + (\text{Current Index} - \text{Base Index}) / \text{Base Index}$  where

Base Index – US Department of Consumer Price Index as on preceding month of the last date of bid submission.

Current Index - US Department of Consumer Price Index as on each anniversary of base date

# SECTION VI.

## SCHEDULE OF REQUIREMENTS

1. List of Goods and Delivery Schedule							
[The Purchaser shall fill in this table, with the exception of the column "Bidder's offered Delivery date" to be filled by the Bidder]							
Line Item N	Description of Goods	Quantity	Physical unit	Final Destination (Project Site) as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest payment Date	Latest Delivery Date	Bidder's offered Delivery date [to be provided by the Bidder]
1	Locomotives	5	Nos	Beira	release of advance	450 days from date of award of contract or release of advance or opening of LC whichever is later	[insert the number of days following the date of effectiveness of the Contract]

### Preventive Maintenance Services including Consumable Spares

Number	Description	Unit	Quantity
1	Preventive Maintenance of one Locomotive including consumable spares and labor	Calendar Quarters	40 (4quarters*2years*5Locos)

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## SECTION VII.

### TECHNICAL SPECIFICATION DATA SHEET

ITEM	Technical specifications of Line locomotives	
Environmental Conditions		
1	Maximum Altitude	2000m
2	Maximum Temperature	55 °C
3	Minimum Temperature	-10 °C
4	Average relative Humidity	90%
5	Atmospheric Conditions	Wet
Clearance Requirements		
6	Maximum Height	3,965mm
7	Maximum Width	3,050mm
8	Minimum Under Clearance	100mm
9	Track Gauge	1,067mm
Weight		
10	Maximum Axle Load	20Tons
11	Weight Range	120 Tons
12	Locomotive type	AAR "C-C (Co-Co)" all axles powered
13	Length, between truck traction pin centres	11670 to 13870 mm
14	Truck wheelbase	3,700 to 3,810 mm
15	Length between front and rear coupler pulling faces	Upto 21,250 mm
16	Width over cab sides	Within ICVL MMD
17	Width over handrail	Less than 3050 mm
18	Height, top of rail to operators roof	Upto 3, 965 (Max.) with new wheels and full services
19	Height, top of rail to coupler centreline	895 mm with new wheels and full services
20	Notch 8 horsepower	Min. 3300 GHP @ 904 rpm to 1050 rpm
21	Wheel diameter ( new wheels)	36” -38” or 914 mm-965 mm (New Wheels) 32” to 35” or 812 mm to 890 mm (condemning)
22	Maximum speed (fully worn wheels)	100km/h (62.1 MPH)
23	Continuous Tractive Effort	240 to 280 kN @30 kmph
24	Starting Tractive Effort	300 to 400 kN
25	Peak Braking Effort	176 kN
Supplies/Capacities		
26	Fuel tank	6000 +- 5% litres
27	Engine Lube Oil	1050 to 1150 litres
28	Sand	150 litres (5.3 ft³), in front 150 litres (5.3 ft³), rear

29	<b>Curve Negotiation</b>	85m
30	<b>Friction Enhancer</b>	
31	Type	Sand
32	Arrangement	8 nozzles, one on each lead wheel in direction of
36	Manual application	Up to 8 km/h (5 mph)
39	Horn	Two sets of two-tone air horn that points to both directions of travel shall be provided
40	Grossing Bell	Electrical Gong type
41	Cooling system	297 gal (954 litres)
<b>Diesel Engine</b>		
43	Type	Turbocharged and intercooled
47	Gross Horsepower	Min. 3300 GHP or more
48	Maximum Engine Speed	904 rpm to 1050 rpm
52	Exhaust	Single muffler
53	Cranking	Battery powered, via main alternator & starting
55	Fuel Type	HSD
56	Drive	3- phase AC motor
57	Lubrication	AAR LMOA Generation 4 "long Life" required
58	Coolant	As per engine OEM recommendation
59	Fuel Filler provision	"Fuel Fillers with Wiggins style or similar, provision to fill on both sides of the fuel tank"
<b>Drive Train</b>		
60	Transmission Type	Electric, AC/AC
61	Alternator	3-phase AC
62	Drive	Direct, engine flange coupling
63	Control	Auxiliary alternator winding with static regulator
64	Inverter (AC configuration only)	
65	Type (AC configuration only)	IGBT based AC-AC Traction Control System with following essential features:
66	<b>Independent Traction Motor control:</b>	IGBT based traction system should have dedicated inverter to control each AC Traction motor.
67	Remote monitoring system:	<p>The locomotive should have feature of Remote monitoring system to monitor the performance of locomotive remotely online on a server.</p> <p>It should have a feature of Fuel level monitoring and the status to be displayed on driver display.</p> <p>All the performance status related information to be displayed to driver all the time over a touch screen TFT based driver display. There should be a provision to select language in driver display for English as well as Portuguese</p>



	<b>Braking</b>	
	<b>Pneumatic</b>	
71	Schedule	M/S Knorr compact brake units and computerized controlled brake (CCB-II) system or Wabtec.
72	Automatic Brake valve	Mounted in Engineer Console, pull to apply
73	Independent Brake valve	Mounted in Engineer Console, pull to apply
74	Parking Brake	Suitable hand brake required
	<b>Rigging</b>	
75	Type	Single/double shoe
76	Number of Shoes	12/24 (one/two per wheel)
77	Material	Composite
78	Slack Adjusters	Automatic
	<b>Dynamic</b>	
79	Type	Resistance 2 stakes or equivalent
80	Functionality	Dynamic brake with mechanical brake blending
	<b>Cooling Fans</b>	
81	Type	Axial fan
82	Drive	DC motor
83	Control	Grid powered, direct
	<b>Bogies</b>	
84	Model	Fabricated bogie with Three-axle truck or any other suitable type
85	Journal Bearings	Timken, Class G, or Equivalent
86	Layout	2 Wide flange I beams w/top and bottom sheets, weld on fuel tank
87	Collision Protection, Main Cab	EN 12663
88	Anti- climber	AAR S-580 -2001,
89	Walkways	Non-skid, steel tread
90	Couplers	AAR type E automatic coupler with AAR 10A
91	Draft Gear	
92	Pilot	Flat pilot plate
	<b>Accommodations</b>	
93	Seating	Two cushioned swivel seats with back rest and vertical adjustment to be provided, one at operating position of driver and one for assistant.
94	Foot Rest	Engineer: Folding, under desk. Helper: Not provided
95	Control console	Desk style, with forward displays
96	Engineer	Desk style, with two operator displays

97	Helper	Small sidewall mounted
98	Toilet	Vacuum Toilet with Bio-digester tank
99	Refrigerator	Suitable size at suitable location
100	Lighting	Standard operator cab lighting package, with incandescent dome light.
101	Heating	Central, forced air
102	Air conditioning	Central, forced air
103	Overhead cab fans	Not Provided
	<b>Sun Visors</b>	
104	Wind-shield	Three tinted sun visors on the windshield
105	Side Windows	Two padded visors on the engineer side. One padded visor on the assistant side
106	Rear Windows	Use rear corner visor above engineer side window.
107	Wind deflector/Rear View Mirrors	One per side. When extended the mirror interferes with the clearance diagram
108	MU Receptacle	One per end, above deck, with top and side shields
	<b>Battery System</b>	
109	Type	Lead Acid
110	Charging	74 v nominal, static regulator, 3-phase AC supply
111	Speed indicator	Provided on operator Displays in engineers position.
112	Load indicator	Provided Displays
113	Air Gages	Provided Displays With auxiliary duplex air gage.
	<b>Appurtenance</b>	
114	<b>Data Logging</b>	
115	Event Recorder	Integrated, crash-hardened
116	Download	Via USB port on the operator Display, or serially, RS-232 though a PC
117	Incident Log	Part of diagnostic system
118	Download	Via USB port on the operator Display, or serially, if LDSS option is purchased.
119	Heads Lights	2-350 W, 74 volt sealed beams, each end.
120	Ditch Lights	2-350 W, 74 volt sealed beams, platform mounted on the No. 1 end
121	Marker Lights	LED type classification light
122	Vigilance Control	Integrated as part of control system; over speed warning with penalty brake application after delay; visual indication provided on displays.
123	Slow Speed Control	Integrated, access via displays
124	Locked Axles	Via predictive algorithm with operator warning

125	Traction Motor Cut-out	Soft key on display
126	Motor Thermal Protection (MTP)	Via MTP algorithm
127	Ground Detection	Power, auxiliary circuit, excitation and control
128	Radio Interface	12 V, power supply provided. No mounting provisions included.
129	Fire Extinguishers	2 nos.-6 kg dry powder ABC type fire extinguisher provided in operator cab and 2 nos. in the engine room each side.
	<b>Auxiliary External Lighting</b>	
130	Ground Light	2 ladders in each side
131	Coupler Light	Head light with dim operation to be used.
132	Head of Train Receiver	Optional
133	Fuel monitoring	Provided
134	Fuel monitoring	Using dynamic brake grid; full load capacity
135	Self-Load	Using dynamic brake grid; full load capacity
136	Self - Test	Integrated into control System
137	Instructive Labels and Decals	All text will be in English and Portuguese
138	Operator Displays	2 colour graphic screens with soft key operator interface
139	Language	English and Portuguese
140	Auto Engine Start Stop	Optional

**Technical recommendations:**

Item	Description
1	Fuel tank, fuel fills, Fuel gauges
2	Sand Boxes, Sand Fills
3	Inverter
4	Event Recorder
5	Distributed Power (Locotrol)
6	Cab Signal/Automatic Train Control
7	Digital Video Recorder System
8	Driver B must have a rear view of the locomotive when reversing;
9	Must have gutter guards at both ends of the locomotive
10	Tight fixing of sandboxes

## TECHNICAL SPECIFICATION DETAILS

### 1. INTRODUCTION

This technical specification establishes the criteria for the design, manufacture and delivery of the new Mainline Diesel Locomotives. It includes the relative operational and environmental requirements, design criteria as well as strength, performance, maintainability, safety and environmental impact requirements.

The technical specification consists of three parts:

Chapter I - Technical Requirements

Chapter II - Delivery and Acceptance

Supplementary Data and Information - Attachments A through I

Chapter I is structured in accordance with the product groups. The requirements for verification and proof of design as well as production are defined in Chapter II "Delivery and Acceptance". The Attachments contain references such as norms and standards, specific environmental data etc.

The Bidder shall clearly demonstrate in his offer, how he intends to fulfill the requirements of ICVL. The Bidder is requested to comment this Technical Specification clause by clause. The comments shall contain:

Degree of the fulfillment of the requirements (fully, partly, no)

Explanation how the requirements will be met (reference to the technical offer or additional description).

The design, offered by the Bidder, shall be in compliance with the pertinent norms and standards.

The hierarchy of the norms and standards is as follows:

- 1) Mozambican Legislation
- 2) SARA Norms
- 3) UIC Leaflets
- 4) Technical Specifications for Interoperability TSI
- 5) European Norms and Standards

## CHAPTER I – TECHNICAL REQUIREMENTS

### 1 General Vehicle Concept

The Locomotive to be purchased under this Agreement shall be designed to drive all ICVL existing trains and operate on the entire network of the purchasers Railways (pure freight lines, sidings and workshop tracks).

The locomotive shall be a full body width concept with driver's cab on one end. It shall feature a modular design concept for the ease of maintenance.

### 2 Vehicle Data

#### 2.1 Dimensions

The following dimensions are indicative and can be altered by the Bidder. The compliance of the proposed vehicle with the moving gauge (drawing in Annex A.4) must be guaranteed.

Length over carbody structure	As per design mm
Carbody width	<3050 mm
Overall vehicle height above top of rail	4105 mm
Wheel diameter, new	36" -38" or 914 mm-965 mm
Height of centre coupler above rail	880 - 895 mm
Height of buffer above rail	1,050 mm (Optional)

The Bidder shall provide the values of the above dimensions for the proposed locomotive in its tender.

#### 2.2 Weight

The definition of the calculation of the masses shall be according to applicable norm and the maximum weight of the Locomotive (ready to run, including all provisions and a full fuel tank) shall be 120 tons.

#### 2.3 Performance requirements & Characteristics

##### 2.3.1 General

The performance calculations shall be performed with the following boundary conditions:

- Ready to run, fuel tank 10% full
- Ambient temperature 30°, dry rails (UIC conditions)

The traction/braking vs. speed diagram shall be supplied with the offer. The braking performance shall be calculated at the same conditions as the traction performance.

The performance of the locomotive shall be selected to allow a continuous operation on the operational conditions as defined in Attachment E. The specific environment of the Mozambican Company Railways has to be taken into account:

- High temperature, high humidity and sun load (temperature on top of the track)
- Sand and dust (clogging the air filters)

The performance of the traction system shall be calculated in accordance with the

requirements set out in the attachment E. The Bidder shall supply the respective speed-distance diagrams, running time calculations and fuel consumption calculations as requested in Attachment E.

### 2.3.2 Principal Requirements

The Locomotives shall be designed to achieve the following requirements:

Gross Horse power	Min. 3300 GHP
Traction Horse Power	Min. 3000 THP @ AAR
Continuous Tractive effort	280 kN or above
Starting tractive effort	400 kN or above
Dynamic braking effort	Extended range per curve attached (12 – 35km /h).
Gauge	1067mm
Maximum mass	120 000kg
Maximum axle mass	20 ton/axle
Maximum speed	100 km/h
Number of locomotives in multiple	Multiple with own as well as at least two diesel locomotives

The Bidder shall indicate the available traction power at

Maximum ambient temperature 55°C

Relative humidity 90%

Height: 2000 m above sea level

### 2.3.3 Locomotive operating envelope

2.3.3.1 The dimensions of the locomotive shall be inside the rolling stock outline by ICVL Clearance Diagram [Annex A](#).

2.3.3.2 The locomotive shall be capable of negotiating a minimum curve of 85 meters radius.

2.3.3.3 Due consideration is given for decrease in wheel diameter due to wear. The only exception to the above being sand pipe nozzles which shall be adjustable and capable of being maintained at 50 mm above rail level and which shall be fully enclosed within the width of the wheel. Gear case clearance to top of rail will be a minimum of 75 mm with last turn wheels.

2.3.3.4 Brake stopping distances shall comply with industry standards.

2.3.3.5 The hand brake shall be capable of holding the locomotive on an incline of 1/30. The hand brake (spring applied unitised park brakes) shall be applied and released through a switch in the cab with integrated light.

#### 2.3.4 Climatic conditions:

2.3.4.1 The locomotive shall operate properly under climate conditions in Mozambique, defined in attachment B

2.3.4.2 From coastal to inland centers or vice versa. This equates to a height of 0 to 2000m above sea level.

- 2.3.4.3 Ambient conditions of between -10 to +55 deg Celsius.
- 2.3.4.4 Locomotive shall operate in dry or wet and rainy weather.
- 2.3.5 **Motoring Requirements**
- 2.3.5.1 The maximum traction performance shall be indicated in a Tractive Curve diagram.
- 2.3.5.2 A comprehensive diagnostic/fault system shall be installed, which comprise all of the subsystem on the Locomotive. Purpose of the system:
  - To assist the driver and the conductor in order to accomplish their duty in normal operation and in the case of relevant disturbances/faults which have an impact on the operation and the service of the locomotive or the train.
  - To provide the necessary support to the maintenance personnel in order to enable the workshop staff to have the failure eliminated in shortest time. The diagnostic concept is intended to provide comprehensive information about the condition of the Locomotive. Especially the diagnostic system shall be designed so that the faulty subsystem or component can be identified and the occurred faults in the Locomotive (incl. the vehicle control and all subsystem) can be found easily and fast. The diagnostic system shall be able to locate a fault on the level of the smallest exchangeable unit, as far as this is possible with the available sensors. In the case of faults the diagnostic/fault system shall control the subsystem in a way, that the loco can continue the service with a minimum of impact. The diagnostic system shall also provide the relevant information in the driver's cab in case of multiple unit operation between two or three Locomotives.
- 2.3.5.3 The diagnostic is structured as follows:
  - Vehicle diagnostic (central diagnostic)
  - Train diagnostic
  - Subsystem diagnostic (local diagnostic)
- 2.3.5.4 The diagnostic system shall use the appropriate TCN bus system on each level for data communication. Sensor for fault detection shall be provided in the following cases:
  - If they are already provided for control purposes (e.g. generator output voltage sensor) and are able to generate outputs for the diagnostic system
  - If it is evident that they can improve the safety
  - If it is evident that they can improve the reliability, availability and maintainability.
- 2.3.5.5 A non-volatile data memory for recording data selected by the user has to be provided.
- 2.3.5.6 Conditions which shall generate events to be stored in the memory are (depending on the subsystem or component where the event occurs):
  - Voltage out of range
  - Current out of range
  - Speed out of range
  - Temperature out of range
  - Liquid level out of range
  - Liquid or air pressure out of range
  - Earth fault
  - Wrong function of a (sub-) system or a component.

- 2.3.5.7 In case of any relevant irregularities or faults suitable information must be generated by the diagnostic system in order to give a maximum of information. All malfunction messages have to be displayed and stored in non-volatile memory. Three classes of access levels shall be defined:
- Access for the driver: only the relevant messages from point of view of the driver has to be displayed
- Access for maintenance: In this mode the maintenance personnel can download the very detailed diagnostic information from the fault memory. It should be possible to download the data of the locomotive in via a serial link of the on board diagnostic. The diagnosis events shall display on the HMI in the fault classes 3, 2, 1 (A, B and C acc. to UIC 557)
- Very critical fault, immediate action required
  - Critical fault, action required before next maintenance
  - Fault, action required at next maintenance
  - Information (e.g. switch on/ of the Locomotive, activation/ deactivation of the parking mode) Only the events which are relevant to the driver are shown on the display in the cab.
- 2.3.5.8 All alarm messages should be classified in one of three classes:
- Class 3: very critical alarm, immediate action required
- Class 2: critical alarm, action required
- Class 1: alarm for information purposes
- 2.3.5.9 All faults should be classified in one of three classes:
- Class 3: very critical fault, immediate action required
- Class 2: critical fault, action required before next maintenance
- Class 1: fault, action required at next maintenance
- 2.3.5.10 After the startup of the locomotive the diagnostic system generates appropriate events. Each event shall have the following information at least:
- Date, time
- GPS coordinates
- Event designation
- Current speed
- RPM of the diesel engine
- Value of the battery voltage
- Outside temperature
- The above information is the data at the time of occurrence of an event.
- Each alarm which is shown in the diagnostic display will be assigned to an explanation or instruction for the driver.
- Additionally more detailed information concerning the type of fault must be available at the subsystem level (local).
- 2.3.6 **Braking System Requirements**
- 2.3.6.1 The Locomotive shall be equipped with a dynamic brake which must be able to decelerate the Locomotive with a braking force as high as technically possible down to standstill



without jerks. Reversing of running direction must be definitely excluded. The electric braking energy shall be dissipated through the brake resistors.

The braking forces have to be specified in a corresponding diagram. Braking currents shall be indicated.

The brake management of the train is a function of the brake control units (BCU). The function of the brake management is to use the braking systems optimally dependent on the given circumstances (e.g. availability of the braking systems, rail status).

On demand, the braking forces (like the traction forces) shall be displayed for each driving cab separately on the display.

- 2.3.6.2 The Locomotive shall be equipped with Compact brake units and computerized control brake (CCBII)/Wabtec system with suitable hand brake.

The pneumatic brake corresponds to mandatory points of UIC-540, UIC-541-1, UIC-541-3, UIC-541-05, UIC-543, UIC-544-1, UIC-545, UIC-546.

- 2.3.6.3 Safety systems shall directly evacuate the main brake pipe through a dedicated emergency brake valve.

- 2.3.6.4 Brake performance.

During emergency braking, using all brakes, without the use of the wheel-slide protection device, on a straight and flat track, under full load, the braking distance of the train including the Locomotive shall be not more than 500 m, when braking from 100 km/h to a standstill.

- 2.3.6.5 Normal service braking distance, from 100 km/h to a standstill, under any circumstances, shall never exceed 650 meters.

- 2.3.6.6 The Bidder shall present a graph with the braking distance of the locomotive alone from 60, 80 and 100 km/h.

- 2.3.6.7 The Contractor shall supply brake calculations with an 8 and 9 SDPP train and with a 6 coach Double-Deck train for the following conditions:

Emergency braking distance from 100 km/h to zero.

Normal service braking distance from 100 km/h to zero.

Emergency braking distance from 80 km/h to zero.

Normal service braking distance from 60 km/h to zero.

- 2.3.6.8 Emergency braking shall be activated from the following:

Emergency handles on driver's desk.

Secured emergency handles in passenger compartments with clear indication of activation (light and buzzer) and easy reset: one handle in each end of compartment and one handle in each vestibule.

Penalty brake - "Dead man" (Vigilance) system.

Major failure in the brake system such as bursting of main pipe etc.

- 2.3.6.9 **Direct brake.**

A direct acting brake shall be installed in the driver's cab. This brake shall act onto all axles of the locomotive and it will enable holding a complete train in standstill condition on a slope of 0.5%. The direct brake shall correspond to mandatory points of UIC-541-1.

- 2.3.6.10 **Loco brakes.**

Brake blocks mounted on the wheels shall serve as primary brakes. The Locomotive shall be equipped with a Compact brake units and computerized control brake (CCBII)/Wabtec system with suitable hand brake.

- 2.3.6.11 **Parking brake**  
The locomotive shall be equipped with Compact brake units and computerized control brake (CCBII) system with suitable hand brake.
- 2.3.6.12 **Service brake**  
The service braking system shall be designed and built to perform the requirements of UIC546.
- 2.3.6.13 The pneumatic brakes shall be designed as a load dependent system, in accordance with UIC541- 04, in order to cover the weight differences between empty and loaded trains.
- 2.3.6.14 Emergency brake. See 2.3.6.4
- 2.3.6.15 **Type of mechanical brakes**  
The requirements applicable to high-performance brakes according to UIC546 shall be observed. Brake linings shall be asbestos-free and preferably of a type already in use with.
- 2.3.6.16 **Automatic brake test**  
An automatic brake test facility shall be provided.  
The condition of all brake apparatus, including the parking brake, shall be indicated in the drivers cab. The Bidder shall describe the sequence and procedure for the automatic brake test.
- 2.3.6.17 **Brake components**  
The pneumatic brake control shall be in accordance with UIC 541 latest edition. Only brake components certified for this type of operation shall be used.
- 2.3.6.18. **Mechanical brake force transmission**  
The mechanical brake force transmission is by means of pneumatic actuators and the relative mechanical linkages.
- 2.3.7 **Parking**  
Locomotive is in operation (diesel-generator running), traction inhibited, brake control line lowered (train pneumatically braked, inclination max. 10 %).  
Central door commands in accordance with the last command condition of the drivers cab. Interior and exterior lighting is operational (i.e. it can be switched on or off).  
The parking mode shall feature an energy management system in order to minimize the energy consumption of the locomotive when parked;
- 2.3.8 **MU Ability**
- 2.3.8.1 Multiple ability among the locomotives of the new fleet under procurement.
- 2.3.8.2 The MU ability among the locomotives of the new fleet under procurement shall be offered through the standard 27 pin train line connectors. The configuration will be done according to data supplied by customer.
- 2.3.8.3 One live MU sockets on each end of the locomotive with one MU cable per locomotive.
- 2.3.8.4 The locomotive will be fitted with a "Slim Cable" conversion. This will allow for a trailing locomotive to be cut out or back in from the front locomotive.

### **3. Locomotive Control System**

#### **3.1 General**

The Bidder shall design the traction equipment (diesel engines, generator and propulsion) such that the required performance can be fulfilled and the environmental conditions were considered.

The control concept and its components shall correspond to the state-of-the-art and to the expected operational conditions.

The system shall assure a redundant architecture and a maximum availability. Therefore, clear, possibly simple interfaces between the various control and subsystems within the Locomotive have to be defined. The Contractor is fully responsible for all systems and subsystems which are installed in the Locomotive.

The equipment required for this must be designed to be maintenance-free according to the state- of-the-art (control and power electronics). They have to be dimensioned such that overload shall not have detrimental effects on the equipment.

Cooling of power electronics shall be through a separate cooling circuit and must be designed such that no damage results from the heat accumulation after shutting down the engine. In case of single order failure, 50 % of the traction power must still be available as a minimum. The cooling agent must meet the requirements for environment protection according to sections AH.5 and AH.6.

Monitoring of relevant functions shall be done by suitable devices and relevant signals shall be provided by visual indicators.

The electric control functions have to be implemented with a suitable computer system and a consequent application of a bus structure corresponding to IEC 61375. Different solution shall be approved by ICVL. An integrated control unit shall include all functions of:

- The train control level
- The vehicle control level
- The drive control level.

3.1.1 Train control level includes:

- Multiple unit operation with other Locomotive
- Push pull operation with existing Power Cars (with driver's cab)
- Train control functions by hardwired train lines according the existing system of ICVL.
- Train control functions by WTB on the same level as it is used today in ICVL (to be defined during the design phase)
- Automatic brake test

3.1.2 **Vehicle (locomotive only) control level includes:**

- All vehicle control functions
- Monitoring and protection functions regarding the locomotive
- Auxiliary control
- The integrated diagnostics

3.1.3 **Drive control level includes:**

IGBT based AC-AC Traction Control System with following essential features:

- a) **Independent Traction Motor control:** IGBT based traction system should have dedicated inverter to control each AC Traction motor.

- b) **Remote monitoring system:** The proposed locomotive should have feature of Remote monitoring system to monitor the performance of locomotive remotely online on a server.
- c) Proposed locomotive should have a feature of Fuel level monitoring and the status to be displayed to driver on driver display.
- d) All the performance status related information to be displayed to driver all the time over a touch screen TFT based driver display. There should be a provision to select language in driver display for English as well as Portuguese

In addition, following shall also be include:

Diesel engine control, monitoring and protection

Generator control, monitoring and protection

Propulsion control, monitoring and protection.

The entire control and information system on the Locomotive shall be designed digitally with transmission by bus systems. All vehicle control units (e.g. traction controls, main air compressor, auxiliary inverters, etc.) must be activated automatically and execute a self-test. Beside of the described control functions a comprehensive diagnostic system shall be provided. The requirements are specified in section JC. The internal clocks of the sub-systems must be synchronized by a master clock. The master clock is preferably controlled by GPS; further of the GPS shall be integrated into the diagnosis system in order to allow identification of the locations, where faults occurred. All functions and the operation of one subsystem (e. g. setting a temperature value) must be part of the subsystem and of its control system. Therefore, in case of failure, the source of failure can be detected by testing the interfaces and diagnostics data.

### 3.2 Electronics

All electronic units shall conform to applicable norms. Electronics boards shall be mounted in suitable EMC-proof racks or housings. Different boards must be prevented from being confused. For the electronic devices, the conditions described in attachment B shall apply.

### 3.3 Design of the control equipment

Control electronics shall be located in enclosed housings with heat exchangers (indirect cooling). The Contractor shall provide detailed evidence that the cooling concept enables correct operation of the equipment under the environmental conditions in Mozambique.

Switching devices with contacts have to be reduced to an indispensable extent.

Signals carried by plug connections (e.g. from temperature and path impulse transmitters) must offer a signal level which is sufficient for a permanent function so that after dismantling due to maintenance, a scheduled cleaning or replacement of the plug connections is not envisioned.

Control and auxiliary relays and miniature circuit breakers shall be of the plug-in type, rack mounted or rail-mounted. Relays shall be provided with cable connection sockets and anchored by quick fastening vibration-proof devices. The rated trip current and other characteristics of miniature circuit breakers shall be clearly marked on the rack or rail.

The rated trip current and other characteristics of fuses shall be clearly marked on the rack, rail or panel. Non- resettable fuses should not be used. Exceptions are possible for the protection of the battery and the electromagnetic track brake.

Connectors and test sockets must be prevented from being confused. All control and low voltage connections to pre-mounted devices are done via plug-in contacts.

The components of the different voltages level shall be separated from each other in the control cabinets.

The electric cabinet may be provided with one internal frame with mounted equipment only.

### **3.4 Driving and brake controls**

#### **3.4.1 General**

Drive control design must correspond to the preferred drive concept of the Locomotive.

The demand of the tractive and braking effort of the vehicle control must be converted in the propulsion such that the performance parameters according section AB have been met and no inadmissible status may occur in any operation conditions.

#### **3.4.2 Friction Control**

For operation under unfavorable adhesion conditions between wheel and rail, the Locomotive must be equipped with a self-adapting friction control system. The functionality of the friction control system has to be designed such that the following characteristics are assured:

- Automatic adjustment to different rail conditions

- Automatic adjustment to different train loads

- Effective limitation of slide/slip

The friction control system must operate comparably in drive and brake situation and also includes the pneumatic wheel slide protection (see section RD).

### **3.5 Drive /Brake –Control**

The basic control instructions for the drive control have to be derived from the drive/ brake controller from the driver's cab, from the multiple head control or from the automatic speed control. The set values have to be corrected according to the operating state of the Locomotive and restrictions e.g. by continuous automatic train-running control and the given force/ speed-diagram.

The traction and braking forces shall be displayed for each driving cab separately on the display on the driver's desk.

### **3.6 Automatic Drive-Brake Control**

The Locomotive shall be equipped with an automatic speed control system. This system takes charge of the speed of the Locomotive and controls to the speed target value which is given by the driver in the frame of efficiency of drive and electro-dynamic brake.

The use in multiple head operation must be possible. Priority has always to be given to the dynamic brake of the Locomotive.

### **3.7 Multiple Head Control / Push-pull Control**

The Locomotive must be equipped with a suitable control system which allows the operation with all of the train configurations, mentioned in section AD.5 and AD.6.

The multiple head control and push-pull control must be corresponding to the existing system of ICVL. This system must enable push-pull operation with all appropriately equipped driving trailers of the ICVL fleet.

Multiple head operation with identically equipped Locomotives must be possible with up to three locomotives of the same type

Multiple head operation must also be possible if the propulsion unit of the leading locomotive is switched off.

### **3.8 Power generation controls**

The power generation control design must correspond to the preferred power generation concept of the Locomotive.

The diesel engine shall be controlled such that the combustion of the diesel engine is optimal. General requirements for the design of the power generation control are specified in section GA.

## **4. Power System Drive Unit**

### **4.1 Traction system concept**

4.1.1 The Locomotives shall be equipped with a diesel engine / generator set as a power system. An AC/AC traction system, which has been proven in train revenue operations, shall be installed.

4.1.2 The energy consumption of the Locomotive shall be minimized, and a corresponding analysis shall be provided with the offer. Prior to acceptance of the Locomotive the compliance of the indicated values has to be demonstrated on the ICVL Engineering by the Contractor.

4.1.3 A system, where two traction motors are supplied from one converter is preferred.

4.1.4 In case of defects, the defective part of drive system shall automatically turn off including the corresponding auxiliary circuits or the driver must be able to turn them off on the basis of display help texts. The separation shall be limited on the defective parts so that a maximum of tractive effort with the operation of certain additional functions in the train is remaining. The turn off of defect systems shall be executed from the activated driver's desk.

### **4.2 Power generation**

4.2.1 The power for the Locomotive shall be generated by a state-of-the-art diesel engine. The diesel engine shall drive a synchronous generator.

4.2.2 The high power electric equipment shall be modularized and installed in the respective cabinets, allowing easy access for inspection and maintenance.

### **4.3 Diesel engine**

4.3.1 The diesel engine shall have an output of at least 3000 HP according to UIC 622; the Bidder shall indicate the power reduction under 55° C ambient temperature. The engine shall be designed for a minimum of maintenance and ease of inspection and maintenance.

4.3.2 The maintenance and diagnostic software tools for the diesel engine shall be supplied by Supplier in any event.

4.3.3 The engine shall feature an electric starter. The engine start up shall feature suitable protection system against damage, e.g. by an engine purge system.

4.3.4 The diesel engine shall operate with the fuel as defined in Attachment C.5.

#### 4.3.5 **Engine Protection System**

The engine shall be suitably protected against system and component failure, including the following:

Failure	Reaction
Low lubrication oil pressure	Annunciate, alarm and shutdown
High lubrication oil temperature	Annunciate, alarm and shutdown
High water temperature 1	Annunciate and alarm
High water temperature 2	Annunciate and shutdown
Cooling agent low level	Annunciate and alarm
Cooling agent too low level	Prevent starting engine
Low cooling agent pressure	Annunciate, alarm and shutdown
Overpressure in engine oil crankcase	Shutdown and alarm
Dirty air filter	Annunciate and later limit the engine to throttle
Oil filter clogging	Detector only
Over speed	Alarm and shutdown

Table 2: Engine protection system (at least as defined here but not limited to this list)

The Bidder shall define the engine monitoring and protection concept in the proposal based on the engine manufacturers requirements.

#### 4.3.6 **Exhaust Pipe**

The exhaust pipe shall be run to roof level. Provision shall be made to prevent ingress of water into the exhaust system. The exhaust ports shall be designed with consideration of future operation on lines equipped with overhead line equipment.

#### 4.3.7 **Emission Characteristics**

The diesel engine shall have state-of-the-art low emissions.

4.3.8 The engine shall meet the Tier-0 or equivalent emission characteristics.

#### 4.3.9 **Lubrication Oil**

The specification for the lubrication oil shall be submitted with the proposal. A suitable cock shall be provided in the lubrication oil system for obtaining samples.

4.3.10 Drainage of used oil shall be possible directly outside/underneath of the locomotive (one cock inside, one cock outside). Filling of the new oil shall be by means of an electric pump, installed in the engine room.

#### 4.3.11 **Fuel Tank**

The fuel tank of 6000 Liter capacity shall be provided. The fuel tank shall be provided with a sludge pocket, drain cock and access holes to facilitate cleaning.

4.3.12 The construction of the fuel tanks shall be such that the outlet connections to the pipe lines will be submerged under all operating conditions. Provision shall be made to prevent surging of the fuel under all operating conditions.

#### 4.3.13 **Fuel Fillers**

A filling point shall be provided on each side of the locomotive. The refueling point will be at a height of about 1.1 meters.

- 4.3.14 A mechanical fuel gauge shall be provided near the fueling points on each side of the locomotive. A fuel level indicator shall be provided to transmit fuel level data to the driver's cabs. Alarms shall be triggered at:

Fuel level at 90% (in order to stop automatic filling)

Fuel level at 25%

Stop the engine at 5% A bulkhead light fitting shall be provided near the fueling point on each side of the locomotive at a height that will provide adequate lighting to the refueling point and the level indicator. Provisions have to be made to prevent damage to the fuel tank in case of failure of the automatic filling stop.

#### 4.3.15 Fuel System.

The design of the fuel system shall be such that there shall be no leakages or spillages of fuel during fueling and normal operation (overflow). A suitable efficient fuel filtration system with easily maintainable filter units shall be provided. A pressure drop indicator shall be provided on the filter. The system shall be designed to prevent air ingress into the system. An air purging system shall be provided. A system shall be provided to indicate if there is air in the fuel system or a clog in the system.

#### 4.3.16 Cooling System.

Filling of cooling agent shall easily be possible from the side of the locomotive. The filling status of the cooling agent tank shall be displayed on the diagnose system and additionally by a conventional instrument easily visible in the engine room. Drainage of used cooling agent shall be possible directly outside/underneath of the locomotive (one cock inside, one cock outside). Filling of the new cooling agent shall be by means of an electric pump, installed in the engine room.

#### 4.3.17 Traction Alternator.

An alternator shall be provided. It shall be driven directly by the diesel engine. In order to ensure a proper alignment of the alternator rotor with the flywheel the engine and the alternator shall preferably be mounted on a common sub frame. An earth leakage supervision shall be provided. The insulation class shall be at least F. The protection shall be at least IP 20. The alternator shall be protected from overheating.

### 4.4 Power conversion

- 4.4.1 The traction system shall be designed in accordance with the state of the art of AC/AC traction technology, with a modern traction control system for the envisaged traction program. Including gears and torque transmission, the traction motors have to be dimensioned such that the performance requirements according to the traction program are met. Oscillations resulting from operation at the limit of friction or caused by other reasons must be considered.
- 4.4.2 The diesel engine shall drive a three-phase generator, which feeds converters.
- 4.4.3 Passive elements (switch elements which are only effective during transition processes as filter or inductors) have to be avoided by appropriate design of the active elements.
- 4.4.4 After the diesel engine-generator-package, the power electronics system shall be divided into at least two mutually independent groups.



- 4.4.5 Leakages into the environment or into the interior of the traction motors have to be excluded.
- 4.4.6 Traction motor and drive bearings shall have a durability of at least 3 million km. The design and sizing of the seat of the bearing has to be dimensioned such that it will presumably not require any work during the vehicle's whole life. Independently from that, the necessity of a correction of bearing seats may not lead to an exchange of gear housings.
- 4.4.7 The drive system shall be axle hung (MSU supported) and nose suspended on bogie frame.

## **4.5 Electrical Circuit Design**

- 4.5.1 The inverter shall feature high-performance IGBT (Insulated Gate Bipolar Transistor) modules with the appropriate systems of water cooling shall be utilized. For cooling of these IGBT phase modules, an environment-friendly service water cooling system with supply line and drainage by self-sealing quick couplers shall be chosen. By employing IGBT components in a panel cell form, the advantages of large surface pressure contacting without additional solder and bond wire connections shall be used.
- 4.5.2 The power semiconductors shall be integrated with all the necessary components for their control in compact modules as smallest exchangeable units.
- 4.5.3 From the electric equipment, no restrictions must result concerning the admissible differences between the current diameters of the wheel sets of the two bogies. The adaptation of the traction control system to the referring wheel set diameters has to be effected automatically by the control system. The Bidder shall provide the maximum allowed wheel diameter differences within one bogie with the proposal.
- 4.5.4 Connecting cables including their fixation must be documented as a separate component and must be handled as a spare part. Independent from this, a fixation that excludes damages on the motor and transmitter cable has to be guaranteed.
- 4.5.5 Tolerances of inductor, armature and traction motor bearing shall be selected such that inductors, armatures as well as drive and gearing parts are interchangeable revealingly without restrictions.
- 4.5.6 It must be possible to test and adjust the power circuits including power and control electronics while the locomotive is standing.

## **5. Running Gear**

### **5.1 General**

- 5.1.1 The running gear and suspension system shall be designed such that it provides for a service life equal to that of the vehicle (in normal service and under adequate maintenance).
- 5.1.2 The running gear shall be designed according to the latest findings with regard to ride comfort and minimum wear. Wearing parts shall be avoided by using rubber elements as well as circular ball-bearings connections.
- 5.1.3 The bogies shall be interchangeable.
- 5.1.4 Optimum adhesion conditions shall be achieved by an appropriate load path, reducing the weight transfer. The suspension system shall limit the differences in wheel-load within a running gear to plus or minus 2% measured on a static vehicle. Further on the longitudinal force transmission between bogies and carbody shall limit the "pitching" of the locomotive under high traction forces. The Bidder shall explain his respective concept in the technical proposal.

- 5.1.5 The safety against derailment shall be calculated or measured; the factor Y/Q (lateral load/vertical load) shall not exceed 1.2 on the leading wheel on a running distance of more than 2 m under worst case conditions.
- 5.1.6 The connection of the running gear to the carbody shall allow lifting of the car with the running gears attached (safety hooks). It shall however be easy to separate the bogies from the car by simple tools.
- 5.1.7 The maximum speed of the running gear (no instabilities with new and worn wheels and effective conicities of up to 0.4) shall be at least 110 km/h.

## **5.2 Supporting Structures**

### **5.2.1 Carbody interface and load transmission**

The connection between bogie and carbody shall feature a minimum of connection points in order to facilitate maintenance.

## **5.3 Bogie frame**

- 5.3.1 The frame shall be of fully welded construction in combination with steel castings (if necessary). The structural integrity of the bogie shall be calculated and tested according to applicable norm.
- 5.3.2 All box sections shall be fully sealed by welds to prevent corrosion. The production shall be according to the latest norms in force.

## **5.4 Wheel sets and journal bearings**

The design of the wheel sets shall be in accordance with the norms in force for the axle load of 200 kN or above. They consist of:

A hollow or solid axle of appropriate dimension in accordance of AAR or appropriate international norms

Two mono bloc wheels of appropriate design shall be press fit. Wheel profile as per purchasers requirement, the surface treatment of the axle shall be class 2. It shall be reprofile the wheel sets on the wheel lathe without dismantling the from the axles.

## **5.5 Journal bearings and axle boxes**

Approved standard cartridge journal bearings for speeds up to 100 km/h and manufactured by an accepted supplier shall be used (only SKF, TIMKEN or FAG are acceptable). The bearings shall be pre-lubricated. There shall be no possibility of re-greasing; exchange of grease shall only be necessary during overhaul of the bearing (min. interval: 1.2 Millions km).

A split axle box which allows an easy changing of wheel sets is preferred. This means that the wheel set (incl. gearbox) can be easily exchanged without separating the bogie from the locomotive.

The axle-boxes shall be electrically insulated as good as possible; earthing contacts with resistors connected in parallel as per UIC 522 shall be provided for the return current.

The arrangement of the suspension and the axle boxes shall be chosen in such a way that the efficiency of the hot-box detectors is not impaired.

## **5.6 Suspension and damping**

### **5.6.1 Concept**

Both primary and secondary suspension or single stage suspension of suitable design shall be provided

#### 5.6.2 **Suspension**

The suspension shall be positioned between the bogie and the wheel set, to reduce the level of vibrations transferred to the bogie and to isolate the bogie from inadmissible vibrations and noise. The design shall allow the wheel sets to adjust itself to the curve, reducing the wear on wheels and rails.

Stiffness characteristics shall be chosen on the basis of the respective dynamic calculations and simulations, taking the actual track information of purchasers Railways into account. The stiffness of the axle guiding shall be optimized in regard to stability and wheel wear (passive steering in curves).

It must be possible to change the stiffness characteristics and adjust the suspension in a simple manner, in order to obtain an even distribution of wheel loads when an average load is exerted on the bogie.

Helical suspension springs shall be supplied in accordance with applicable norms. Stops and safety hooks shall be installed to limit the movements in the primary stage.

#### 5.6.4 **Dampers**

Heavy duty hydraulic dampers shall be used. The number of dampers shall be minimized.

### 5.7 **Driving systems (active)**

#### 5.7.1 **General**

Three traction motors and gearboxes shall be installed per bogie.

#### 5.7.2 **Installation of Traction Motors and Gears**

The traction motor shall be hung on axle with suspension tube and supported with bogie frame. Gear box shall be attached with axles and traction motors.

The connection of the traction cables and the cooling air ducts (if present) shall be easily accessible from a pit or from the vehicle side.

Traction motor and gearboxes shall feature safety catches in order to prevent fouling of the clearance envelope or dropping to the rail in case of failure of bolted connections.

### 5.8 **Driven systems (passive)**

#### 5.8.1 **Friction brake system**

The friction brake in the bogie shall consist of wheel mounted disc or tread brakes. Compact brake units shall be installed. brake rigging shall be kept at a minimum.

At least two axles per locomotive shall feature a spring applied hand brake function (could be an add-on to the normal brake actuator).

### 5.9 **Safety add-ons**

The leading axles shall be equipped with a rail clearer (120 mm above rail, adjustable). The rail clearer shall sustain an ultimate longitudinal load on the bottom edge of 35 kN.

### 5.10 **Bogie additions**

#### 5.10.1 Sanding system

A sanding device shall be installed on the outer wheel set of each front bogie. The nozzles of the sanding pipes shall be as close as possible to the contact point wheel/rail and must be adjustable to compensate the wear of the wheels. For the sanding system see section MB.

#### 5.10.2 Miscellaneous installations

The following additional equipment shall be installed on the bogies:

- Sensors for speed indicators and slip/slide control (if not installed in the traction motor)
- Ground brushes (1 per axle).

### 6. Brake Rigging

#### 6.1 Brake Cylinders

6.1.1 The bogies shall be fitted with unitized brake cylinders.

#### 6.2 Bogie Brakes

6.2.1 Single/double shoe type brake rigging provided with the unitized brake units mounted directly on bogie behind every wheel.

6.2.2 High friction FIP composition brake blocks shall be fitted to each brake block.

6.2.3 All pins and bushings shall be hardened and ground.

#### 6.3 Slack Adjusters

6.3.1 Automatic slack adjusting integrated in the unitized brake units.

### 7. Pneumatic Equipment

#### 7.1 General

For supply of the pneumatically operated devices of the locomotive, trains and the passenger coaches, compressed air has to be produced, stored and distributed.

The compressed air supply system of the locomotive shall be sufficiently dimensioned to cover the demands of the locomotive as well as of the various train consists.

To protect the parts of the pneumatic equipment of corrosion, cavitation and freezing, the air has to be dehumidified, and the perspiration water has to be collected in a recipient. All elements of the pneumatic system have to be executed according to the technical state of the art. The technical design of the pneumatic and braking equipment has to be based on the pertinent UIC leaflets and ISO standards.

The tubes of the pneumatic system shall be made of stainless steel. All connections shall be designed and built such that galvanic contact with fittings made of non-stainless steel is prevented. Generally all material of the tubing has to have long life time and is easy to maintain.

#### 7.2 Compressed air generation

The capacity of the main air compressor with the related filters and corresponding thermal, pneumatic and electric protection devices (with preference screw-type compressor) shall be conceived to fulfill the requirements as defined in section R. The main air compressor has to turn off automatically, if the main air reservoir pressure reaches 10 bars, and it has to be activated again if the pressure decreases below 8.5 bars.

A safety valve shall be provided behind the main air compressor and the optionally to be installed auxiliary air compressor in order to prevent excess pressure efficiently (12 bar for the main air compressor; 10.5 bar for the auxiliary air compressor).

Precaution shall be taken with the installation of the compressors in order to avoid transmission of noise and vibration into the drivers cab.

### **7.3 Treatment of compressed air**

A self-regenerating two-chamber air drying device with high-efficiency along with purging feature & drain valve shall be installed. The collecting tank for condensate has to have a capacity of at least 50 liters and its emptying has to be possible from outside the locomotive, without demounting. If the collecting tank is not easily accessible or badly visible, a level indicator has to be provided which visually indicates the reach of the maximal fill level on time.

In order to prevent the flowing back of compressed air, a return valve has to be arranged behind the oil mist separator and the bypass for the air drying device. Behind the 12 bar security valve and the return valve, a sufficiently dimensioned oil mist separator shall be arranged, in conjunction with a dehydration valve that automatically empties the collected condensate into the collecting tank and exhausts the air of the pressure pipe upon deactivation of the main air compressor. Upon switching on of the main air compressor, the dehydration valve has to close.

### **7.4 Compressed air storage**

Compressed air shall be stored in air reservoirs with dewatering taps. As storage volume for the main air compressor, at least 850 liters have to be foreseen (main air reservoir). Starting from the main air reservoir, the distribution of the compressed air to the braking systems and the secondary users of compressed air is effectuated.

Each reservoir shall be fitted with Salem 580H or equivalent design automatic drain valve.

A suitable delivery isolating cock, located in an accessible position, shall be fitted in order to isolate the reservoir(s) from the apparatus it is supplying

In order to reduce the start-up time, a sufficiently large volume of compressed air has to be stored at stabling of the locomotive.

The compressed air quality concerning solid particles, remaining humidity and remaining oil content must correspond to ISO 8573-1, category 2-2-2.

A safety valve(s) capable of discharging at a rate not less than the total rate of generation of the system it protects, and sufficient to prevent the pressure within the system at any time exceeding the maximum working pressure by 10%, shall be provided.

Information to be stamped on:

- a) Reservoir serial number.
- b) Authorised maximum working pressure.
- c) Hydraulic test pressure.
- d) Date hydraulically tested.

### **7.5 Compressed air distribution**

Appropriate tubing and reservoirs shall be used for the distribution of the compressed air within the locomotive. Piping in the brake system shall be by stainless steel pipes and fittings of an approved type. Welding or soldering of pipes is not permitted. Railway type hoses are permitted for the intercar connections and the connections between carbody and bogie and the brake actuators.

Piping for auxiliary air operated subsystems can be by appropriate plastic tubes and the respective fittings. The Contractor shall submit the concept to the ICVL for approval.

A brake system with all the valves and pneumatic apparatus centrally arranged on one mounting frame is preferred above a system with individually located equipment.

The possibility to install additional cocks for insulation of the pneumatic system in case of damages of the cocks at the vehicle front shall be investigated.

Wrought steel pipe with AAR fittings shall be used.

All piping shall of appropriate schedule specified by the AAR air system diagram.

Standard SAE fittings shall be fitted.

## **8. Compressed Air And Ancillary Supply**

### **8.1 Air horns**

- 8.1.1 Two sets of two tone air horns that point to both directions of travel shall be fitted. These horns will be operated from the driver and assistant positions

### **8.2 Drivers Brake Gauges**

- 9.2.1 A digital display unit that indicate the brake gauge pressures shall be fitted.

## **9. Couplers and Drawgear**

### **9.1 Coupling/ Uncoupling**

- 9.1.1 Each end of the locomotive shall be equipped with standard E TYPE coupler shall be compatible with all existing rolling stock with Mozambican Railways.
- 9.1.2 Coupling and uncoupling of locomotives in manual.
- 9.1.3 Uncoupling device shall be arranged to operate from either side of the locomotive.
- 9.1.4 A light shall be fitted to make enable safe and effective usage at night.
- 9.1.5 Emergency coupling capability is provided 100 mm below the draw gear pocket.  
The coupling is stored in the emergency toolbox of the locomotive.
- 9.1.6 Draft Gear. : New rubber draft gears shall be fitted.

### **9.2 Vehicle linkage devices**

- 9.2.1 The locomotive shall be equipped with couplers as 11.1.1.
- 9.2.2 No automatic coupler shall be installed.
- 9.2.3 Buffing gear. Buffers or crash-buffers shall be provided if necessary in the proposed concept.

- 9.2.4 The buffers should be designed taking into consideration the maximum traction force in push mode (antifriction buffer plate, reinforced buffers, larger buffer plates etc.). State-of-the-art crash buffers can be proposed if necessary to meet the crash worthiness requirements.
- 9.2.5 Vehicle-vehicle interface for media, signal and power. A multiple contact cable / receptacle shall be provided at both locomotive ends for the jumper cable between locomotive ends and the first passenger coach. The arrangement as well as the type of these connectors shall be compatible with the units in operation with ICVL.
- 9.2.6 The following train line cables should be provided:
- One train multi conductor (61 wires) control cable including the low voltage supply with plugs and sockets make keeps. The train line will be used for the train wide data transmission. At least three twisted screened pair should be provided as spares for future applications. The electrical properties of this conductors shall be suitable for the data transmitting using WTB system acc. IEC 61375.
- One train reversible control line – multi conductor cable including the 27 pins plugs and sockets.

### **9.3 Flooring**

- 9.3.1 The compartment flooring shall be made from sheet metal.

### **9.4 Jacking Pads**

- 9.4.1 Jacking pads and cable sling hooks shall be provided near each bolster on the side sill for jacking and lifting purposes.
- 9.4.2 Substantial lifting brackets shall be provided on the locomotive body under frame for the purpose of lifting the body or complete locomotive with cranes by means of crossbeams and slings. These lifting points need to be similarly located when compared to other locomotives for compatibility purposes. However, the lifting points need to be as close as possible aligned with the bogie centres. The position of the lifting points shall be indicated on the general arrangement drawing.
- 9.4.3 With uniform loading during the lifting and jacking operations, no permanent deformation shall take place.
- 9.4.4 Jacking pads shall be provided on the under frame for the purpose of lifting the locomotive on to the track by means of jacks in the event of a derailment.

### **9.5 Platform Steps**

- 9.5.1 Platform mounting steps shall be provided at both ends, A and B-sides, and the arrangement shall be such that it will serve as switcher man steps, providing the required safety for the shunting operator to keep his body within protected space while performing its duties.
- 9.5.2 A light is fitted to make safe usage at night possible.
- 9.5.3 The tread plates shall be painted yellow.

### **9.6 Handrails**

- 9.6.1 Hood mounted handrails shall be provided to allow safe movement of staff on the platforms of the locomotive.

- 9.6.2 The “A” & “B” side platforms shall be fitted with a full-length handrail.
- 9.6.3 The handrail shall be removable in sections to ease maintenance activities.

## **9.7 Cow catcher**

- 9.7.1 Full width cow catchers shall be fitted at both ends.

## **9.8 Sandboxes**

Sandbox device shall be installed on the outer wheel set of each bogie. The sand reservoirs shall be installed in the locomotive body and it must be possible to replenish them from outside. Each reservoir shall have a sand capacity of at least 40 litres.

The sand reservoirs shall be designed and arranged so that manual replenishment as well as replenishment with a pistol grip nozzle is possible. The shape of the sand reservoirs shall allow the sand to pour out continuously until the reservoirs are completely empty. An easily readable gauge shall reliably display the sand level. Fixed parts of the sanding device must not exceed the loading gauge of the vehicle. Dosing devices, closures, gauges, sanding pipes and adjustable brackets must be easily accessible and visible.

The sanding control shall be automatic upon signals from the traction and brake control systems. There shall be the possibility for switching off of the automatic sanding by the driver. The manual controls within the driver’s reaching area must allow “short sanding” in the unlatched position and “continuous sanding” in the latched position. The sand shall be ejected three seconds after activation of the control.

The sand flow rate shall be:

300 – 500 g/30 s (tolerance +100 g/30 s) at speeds <60 km/h

500 – 800 g/30 s (tolerance +100 g/30 s) at speeds >60 km/h

## **9.9 Drains**

- 9.9.1 The engine and compressor compartment spillage sump is drained through a cock on the side of the locomotive into a container to be provided on site.

## **10. Vehicle Body**

### **10.1 General Carbody structure**

The carbody shall be of a modular design, allowing the maximum utilization of identical parts, such as windows, interior linings etc.

The framing, sheathing and other related structure of the carbody shall form an integrated unit, which is able to resist all the loads inherent in this type of service without deformation. The specific damages shall be easy to repair, e.g. by changing panels or modules.

Low Alloy High Tensile (LAHT) steel, stainless steel or combinations of these materials shall be utilized for the prime structure. It shall be a welded structure, including the entire underframe, sides, front and rear ends as well as the roof. Alternative structural connection methods such as rivets or bolts may be proposed, if an adequate service experience under similar conditions can be demonstrated. Non-structural members such



as side panels, skirts and car-ends may be constructed from aluminum or fiberglass reinforced plastic materials of approved quality.

The dimensional tolerances of the carbody shells shall be in accordance with the applicable industrial standards; the installation of the interior equipment and linings must be possible without trimming and adaptation.

The design of the structure as well as its corrosion protection shall take the specific conditions of the operation in Mozambique (especially the saline air and the sand as well as the high sun load) into account.

## **10.2 Collision protection**

10.2.1 The concept of the locomotive shall reduce the deceleration on the operational personnel. The value of the deceleration shall be minimal. The priority of structural failures in case of head on collision shall be:

- Areas which are not usually occupied by personnel the absorption of crash energy in collisions with a standing locomotive (on straight track or curves up to 225 m) shall be as follows:

0 < v = 5 km/h: reversible by the front coupler and the buffers

5 < v = 10 km/h: irreversible by the crash elements behind the front coupler and/or the crash elements in the buffers

v > 10 km/h: the latest findings of the project SAFETRAIN shall be taken into consideration; the carbody structures in the cab area shall remain intact as far as possible.

10.2.2 The locomotive front shall be designed in a way to avoid penetration of objects into the driver's survival space. Further on, the anti climbers shall be provided.

10.2.3 The installation of the air conditioning system shall be conceived in a way to avoid spilling of air conditioning agent into the drivers cab in case of a collision.

## **10.3 Underframe**

10.3.1 Framing members and shear panels shall form an under frame and an intermediate floor to carry adequately the combined reactions under the anticipated vertical and longitudinal loads. The under frame ends shall be designed to distribute coupler as well as buffing loads evenly into the car structure. Vertical collision posts shall be installed on both ends for maximum protection of the driver.

## **10.4 Sides**

10.4.1 The car sides shall be designed to be fully integrated in the carbody structure and utilized as load carrying elements. They shall be composed of vertical posts, longitudinal stiffeners and the sheathing.

10.4.2 Skirts shall extend the sidewalls below the under frame. These skirts can be removable metal or fibreglass panels or can be designed as equipment covers. In addition to the improvement of the vehicle aesthetics, these skirts protect the under frame mounted equipment and reduce the exterior noise level of the vehicle.

10.4.3 The finished sides before application of filler and paint shall be smooth with a maximum admissible tolerance of  $\pm 1.0$  mm on a length of 1'000 mm. corrugated sides (in longitudinal direction) are acceptable.

## **10.5 Roof**

- 10.5.1 The roof shall be a separate module, integrating the respective elements (such as braking resistors, etc.) and shall be easily removable to give access to the machine room. The connection between the roof module and the locomotive body shall allow transfer of the respective operational forces.
- 10.5.2 The roof shall be adequately stiffened in order to carry the respective roof mounted equipment. The roof shall carry two men with their equipment without permanent deformation. anti-slip coverage shall be provided for roof. Cab roof shall be insulated.
- 10.5.3 The drainage of the roof shall be carefully designed, e.g. by drainage pipes and/or flood barriers and shall feature a water tight connection to the vertical walls. Special care should be taken to avoid streaming of water over the car ends when the locomotive is accelerating or decelerating.

## **10.6 Cab-end structure**

- 10.6.1 The cab-end structure shall meet the requirements for crash-worthiness with regard to the operator safety (see 13.2.1). Adequately dimensioned collision posts, (connected by a horizontal member on waist rail height) shall avoid the shearing-off of the front portion of the carbody structure.
- 10.6.2 An easily replaceable underride protection ("cow catcher") shall be provided. It shall be conceived in order to protect the Locomotive in case of collisions with automobiles or big animals (horses, cows) by pushing objects on the track sideward. The height of the cow catcher shall be 120 mm from TOR with new wheels.
- 10.6.3 Non-load carrying elements shall be made of suitable thickness of steel. The connection of the composite part to the carbody structure shall be durable and water tight.

## **10.7 Welded-on / Add-on parts, Air- and cable ducts**

- 10.7.1 Air ducts, if integrated in the vehicle structure, shall be adequately sized in order to reduce the air velocity. They must be treated with anti-drumming materials and shall be carefully insulated against the vehicle exterior.
- 10.7.2 Cable ducts, if integrated into the vehicle structure, shall be adequately sized (filling factor maximum 0.6). Large radii shall be utilised in order to facilitate the pulling through of cables, especially in the case of fibre optics as transmitting media for signals. Further on sharp edges must be avoided in the interior of the cable ducts in order to avoid damage to the cable insulation.

## **10.8 Equipment Installation**

- 10.8.1 The equipment shall be installed in the engine room. The design of the carbody structure shall allow an easy replacement of the equipment (such as the motor-generator set) e.g. through a removable part of the roof.
- 10.8.2 For the battery and other special equipment, some underfloor boxes may be envisaged. The battery box shall be accessible from the outside, be fabricated from corrosion resistant materials and shall be adequately ventilated in order to avoid the danger of explosions.
- 10.8.3 All equipment boxes shall feature heavy duty hinges and railway type locks (with 8 mm male square, compatible with RIC-key). The boxes for high tension equipment shall be specially locked. The protection class of the boxes shall be IP 65 and the covers shall feature blocking mechanisms (to hold them in open and closed position) and stops. Covers in the ceiling shall feature safety straps in order to reduce the risk for the maintenance personnel.

## **10.9 Fuel tank**

- 10.9.1 A 6000 liter full capacity fuel tank shall be installed under the floor between the bogies. For details see section FC.2.6.
- 10.9.2 Precautions shall be taken in the design of the fuel tank and its connection to the underframe in order to avoid as far as possible any leaking as a consequence of accidents or derailments.
- 10.9.3 The tank shall be built of heavy gauge steel.
- 10.9.4 Sufficient baffle plates shall be fitted to limit diesel splash.
- 10.9.5 One filling point shall be available on each side of the locomotive. The fueling system used is of the Wigans type. This not only prevents fuel spillage but also ensures that diesel theft is minimized.
- 10.9.6 The fuel tank shall be equipped with:
  - Venting and cleanout plugs
  - Handless plugged drain valve
  - Two approved fuel gauges, one on each side of the tank. The fuel gauges are glass tubes are easily replaced and cleaned.

## **10.10 Engine room floor**

The floor in the engine room shall feature anti-slip coverage and shall be removable, if cabling and piping is installed between the floor and the underframe structure. Special care shall be taken in order to guarantee easy cleaning and to avoid oil and debris to enter the space between floor plates and underframe.

## **10.11 Partitions**

- 10.11.1 Partitions, if an integral part of the carbody structure, shall be designed in a way to contribute to the torsional stiffness of the structure and to be strong enough to support the interior linings and equipment attached to them.
- 10.11.2 Bulkheads shall separate the diesel-generator room from the rest of the machine room.

## **10.12 Drivers Cab arrangement**

### **10.12.1 Drivers Cab arrangement**

The Contractor shall optimize the interior of the driver's cab from the point of view of the acoustics by adding acoustically soft materials to reduce reverberation.

The design of the driver's cab shall be consistent with the requirements concerning crash worthiness. The Bidder shall describe the crash worthiness concept and solution.

For the design of the driver's cab, the requirements of EN12663 "Design of driver's cabs for locomotives, motor coaches, multiple units and driving trailers" have to be complied with. Furthermore the ergonomic requirements

The driver's cab shall be equipped with a HVAC unit (see section L).

All materials and technologies applied in the driver's compartment have to provide reliable function under all International common environmental and operational conditions.

The operational control devices have to be grouped in order to allow a one-man operation preferably in the center of the driver's cab.

A modern type of driver seat has to be installed.

The driver's seat shall be pneumatically adjustable for height as well as along the longitudinal axis including the seat and backrest. The positioning of the chair and the adjustability has to allow for a rapid escape from the seating position and must not hamper the transition to a standing position of the driver at the control panel. Preferably, an easily manageable swaying parallelogram or an easily adjustable slide beneath the seat could be used. Furthermore, the arm-rests on both sides shall be foldable in order to secure easy access. A spring based absorbing system, adapted to the dynamic characteristics of the locomotive and adjustable according to the driver's weight shall isolate vehicle vibrations from the driver. For dimensioning the spring based absorbing system, ISO 2631-1 applies with an exposition time of 10 hours.

The following ergonomic parameters shall be taken into account:

- seat depth: approx. 420 mm

- seat width: > 400 mm

- distance of arm-rests:  $\geq 450$  mm

- adjustability of slope of seat: 2° bent forward to 6° bent backward

- adjustability of slope of back: 0° to  $\geq 20^\circ$  bent backward

- back height:  $\geq 550$  mm

- height of slope of back: 180 to 230 mm above seat (loaded)

- adjustability of seat in vertical direction:  $\geq 120$  mm

- adjustability of seat in horizontal direction:  $\geq 230$  mm

- adjustable head-rest

The seat shall be approved by ICVL.

The seat shall be adjustable or easily removable in order to not constrain operational and maintenance works in the driver's cab.

An additional folding seat with provision to adjust the height shall be provided such that from this seat a view to the tracks and to the most important controlling devices is possible. Drawings showing the arrangement of the seat in the driver's cabin as well as the corresponding field of vision shall be supplied with the tender documents. The arrangement shall be approved on the mockup of the drivers cab (see section CA).

Further requirements are:

An "integrated driver's desk" has to be installed.

For all operational information (except information of the operational state) analogue descriptions on displays are preferred. That especially applies for the indication of running and target speed as well as for total values of tractive and brake forces.

Relevant information of the coaches, similar to those provided in the new single deck PP drivers cab, shall be displayed on an additional display.

A diagnostic display for all relevant information for the driver has to be install on the driver's desk (see also section JC).

The possibility of installing additional displays, usable for "electronic timetable sheet" has to be envisaged.

The displays have to be well readable and adjustable – contrast 1:10 – and glare-free in all lighting conditions, especially at darkness. If these characteristics can not be achieved with the available display technology, the information mentioned above shall be displayed by instruments.

The shape and surface design of the components of the driver's cab (control panel, control elements, floor covering, lagging) have to allow for easy cleaning and have to be sufficiently resistant against usual detergents. If necessary, the manufacturer has to state the detergents to be used.

A 2-liter box, one or several shelves with an area of approx. 400 mm x 150 mm (width x depth) and a total volume of at least 60 dm<sup>3</sup> for timetable documents as well as a niche for clothes must be provided.

The driver's desk shall be divisible for installation and removal through the driver's entrance door. The individual components and subsystems in the driver's desk shall be accessible for maintenance and replacement without the need to dismount parts of the desk.

The border areas of the driver's desk have to be equipped with horizontal storage areas framed by bulges.

Within reaching distance of the seated driver, a cup holder has to be provided.

The driver's cab depth (in the vehicle's longitudinal axis) – measured at eye level of the seating driver – must be at least 2'000 mm between inside surface of the windscreen and the closest fixed item (wall, cabinet, door). This dimension must be respected over a width of at least 2'000 mm.

The available air volume shall not be less than 10 m<sup>3</sup>.

Space for the passenger information (handle, "telephone receiver", etc.) shall be provided. The system shall be compatible with the one on the existing double deck trains.

Installation space for future systems, consisting of displays, control elements within the working radius of the locomotive driver, has to be provided according to the requirements defined in the design phase.

#### 10.12.2 Access to driver's cab

Access to the driver's cab shall be through side doors in accordance with the requirements as defined in section NB. The arrangement shall facilitate access from the platform as well as from ground level (see section CF.2).

door height:  $\geq 1750$  mm

door width:  $\geq 550$  mm

The door to the engine room (see also section NC) has to be fitted as escape door:

Door height.  $\geq 1800$ mm

Door width:  $\geq 550$  mm.

The driver must be able to open this door as an emergency exit after a crash scenario.

#### 10.12.3 Driver's desk and operating elements

See section TD.1.

#### 10.12.4 Visibility

The visibility from the driver's cabin for a sitting locomotive driver has to comply with UIC leaflet 651, section 3; the horizontal angle of vision shall be of at least  $\pm 26^\circ$  to both sides. Therewith, a minimum sitting driver's eye distance to the front windscreen of 1100 mm has to be considered.

An interior mirror has to be fitted on the ceiling allowing the driver to observe the area in front of coupler and buffers.

The top edge of the front windscreen shall have a minimum height of 1800 mm above floor.

The position of lighting sources in the driver's cab and the arrangement, slope and curvature of the front windscreen must be compatible so that the driver is not being disturbed by reflections of doubled pictures while being in normal operation position.

An efficient and easily adjustable sun blind shall be provided. This blind shall serve as a protection against sun impact in case of an unused drivers cab (see also section CD.2).

#### 10.12.5 Windscreen wiper and washer

The windscreen wiper and washing system shall work reliably under all operating conditions up to the top speed including a headwind speed of 80 km/h.

The arrangement of windscreen wiper should be orientated to the driver's main field of vision and has to be dimensioned thus at least two thirds of the front window is visible for him.

The drives of the windscreen wiper must be adjustable step less or with smooth-step intervals. Heavy duty and proven electrical actuators shall be installed.

Adequate capacity water reservoir shall be made out of corrosion-resistant transparent material. The water level shall be easily visible and refilling has to be possible from outside with equipment as in service with the customer. The nozzles shall be installed on the wiper arms.

The pump of the window washing equipment has to be switched off if the water level is low. The driver has to be informed in time about the low water level (possible switching off of the pump) by a signal lamp or a display.

#### 10.12.6 Cab side windows

A cab side window shall be provided on both sides of the drivers cab.

The general requirements for the windows are defined in section CB. The windows shall be fitted with an effective, robust sun protection (shutter).

The side windows shall be located and dimensioned such that they allow communication with the personnel on the platform and unrestricted observation of the train when opened.

Opening and closing of the side windows must be possible with one hand. Operation forces for opening and closing of the side windows must not exceed 80 N in any case even after prolonged operation and shall be at most 50 N in average.

It shall be possible to lock the side windows in closed and open position (continuous or with several steps).

The door windows shall be designed as sash windows and they shall be dimensioned for an operation frequency typical in commuter traffic (maintenance-free operation over at least 400,000 operation cycles).

#### 10.12.7 Drivers rear view mirror

At each side windows fixed mirrors shall be fitted for observation of the train. If the mirrors exceed the loading gauge according to appendix A.2 the configuration shall be approved by ICVL.

The fixed rear-view mirrors shall feature an aerodynamic shape in order to reduce noise and vibration.

#### 10.12.8 Drivers cab lighting

The driver's cab lighting shall provide a brightness of 300 lx at the driver's desk. It shall be adjustable to approx. 60 lx. For lighting of the timetable and writing area, 1 - 2 separately controllable spotlights have to be provided at the driver's desk.

At a normal seat position of the driver, lighting of markings of control elements has to be glare-free without reflections in the windscreen.

**10.12.9 Comfort Features (Thermo-box, Wardrobe)**

Driving cab has to be equipped with:

One combined refrigerator and hotbox (min. 8l)

Two easily accessible 230 V/16A/ 50 Hz power sockets according Mozambican Standard, for cleaning equipment and a coffee machine

Two coffee cup or beverage holders

A closed wardrobe for clothes and personal belongings, sufficiently ventilated

A closed drawer for tools, extra bulbs and fuses

A lightened timetable holder at the writing desk

An ashtray for the driver

Megaphone and searchlight, each with corresponding charger and rechargeable battery Activation of the emergency lighting must be possible when the main battery is switched off. The floor shall be covered with flat burls to prevent slipping.

**10.12.10 Noise insulation of driver's cab**

The drivers cab shall comply with all requirements of TSI Conventional Rail – Noise.

**10.12.11 Emergency Equipment**

Provisions shall be made in each driving cab to carry the following items of emergency equipment:

Two 6 kg dry powder ABC fire-extinguisher in the engine room

One 2kg fire-extinguisher in each driver's cab.

**10.13 Hoods**

10.13.1 The rear (long) hood shall consist of a removable center hood section and a permanent end hood section.

10.13.2 The removable center hood section shall be provided with suitable roof mounted doors and hatches to enable maximum accessibility for removal of equipment and power components.

10.13.3 Side doors shall be provided on both sides of the hood for servicing.

10.13.4 The permanent end hood section shall contain the engine cooling radiators and shall enclose the cooling fans.

10.13.5 All compartments shall be fitted with light bulbs that enable maintenance and operation staff to perform their duties.

**10.14 Lighting**

10.14.1 General.

All operating devices (switches, ballast, sockets, lights) and lamps have to be approved by the customer. The high beam on the headlight shall be indicated on the operator's console.

#### 10.14.2 Exterior lighting equipment

The design of the head and tail lights shall be in accordance with UIC leaflets 534 and 651. Both signal lights have to be installed in one housing. It must be possible to switch on the combined aspects as well as to switch and dim the lights from the driver's cab. LEDs shall be preferred as lamps. The lamp housings shall be protected effectively against the intrusion of water and dust as well as against the generation of condensation water.

Additional ditch lights shall be fitted at a lower level to make the locomotive more visible at rail crossings. These ditch lights will 'flash' when the horn is applied.

#### 10.14.3 Interior lighting equipment

The interior lighting in the engine room shall consist of standard fluorescent tubes and electronic inverter ballasts, fed from the battery circuit. The frequency of the inverter ballasts shall be above 18 kHz, and shall include internal overload, short circuit and over-temperature protection. Energy-saving tubes shall be utilized.

#### 10.14.4 As for the lighting in the drivers cab see section CI.8.

### 10.15 Hood Doors

#### 10.15.1 All side doors shall have outside hinges and latches

### 10.16 Car body Filtration

#### 10.16.1 New inertial filter cells shall be fitted to filter air for compartment pressurization and cooling.

#### 10.16.2 The filters shall be hood mounted in a separate compartment behind the toilet.

#### 10.16.3 The separated contaminants shall be blown out by an AC fan.

### 10.17 Toilet

#### 10.17.1 Vacuum toilet with bio-digestive tank shall be provided at rear side and behind the radiator room.

### 10.18 Auxiliary operating equipment

#### 10.18.1 General

Auxiliaries shall be dimensioned according to the loads in the operation program. The auxiliary power supply for the locomotive shall be as follows:

- a medium voltage of 3 phase 400 V, 50 Hz with neutral to supply the air conditioning equipment in the driver's cabs, cooling ventilation, water heater, etc.  
low voltage of 74V for remote control  
low voltage of 24V DC to supply, command and controls, etc. and to charge the battery of the Locomotive.

All Locomotive auxiliary and control circuits shall be protected by individual circuit breaker. Double-pole circuit breakers are required.

#### 10.18.2 Converter equipment



The auxiliary system shall be designed to supply the respective consumers. Auxiliaries shall be supplied by static converters. A sufficient redundancy level must be ensured.

Replacement of the ventilation fans of the auxiliary converters must be possible without disassembling the auxiliary converters.

Traction motors (if necessary) and cooling circuits have to be ventilated by fans controlled dependent from temperature and load.

#### 10.18.3 Battery device

The nominal voltage of the DC onboard network shall be 74V. Final capacity of the batteries shall be defined with the design phase. Ni-Cd batteries are not allowed. Nearly maintenance-free operation batteries have to be used.

The battery system must be charged by battery chargers.

The definition of the required battery capacity depends on the completing of the used and assigned electrical components and has to be defined by the Contractor. The battery capacity must ensure a minimum operating time of 4 hours of the Locomotive (main switch off) starting from a fully loaded battery and at 20°C ambient.

The output of the charging device shall be dimensioned such that all consumers can be supplied from the charging device and, simultaneously, a sufficient charging current for recharging the discharged battery is available.

Caution has to be taken that, if either the battery charger or the battery fails, no faults or interruption of operation will occur in any devices powered by this network. If both the battery charger and the battery fail, this shall not cause any permanent damage to any device.

The battery charging device shall control the charging current and the battery temperatures and has to regulate the charging procedure with regard to battery state.

The battery charger is short-circuiting protected.

The 74 V DC batteries shall be fitted in a temperature-controlled ventilated battery cases. The lock of the cover on the battery case has to be designed and built in such a way that a self-acting opening is prevented in any case, and that the cover, in case of a wrong manipulation, does not remain closed without being securely locked.

All of the consumers of the battery circuits shall be switched on/ off by a battery main switch on the Locomotive.

Separate batteries/chargers shall be used for starting the diesel engine. At least 5 consecutive starting sequences shall be possible without charging of the batteries.

#### 10.18.4 Cooling unit for power and drive systems

A two stage air inlet and filtering system shall be provided:

- 1 The fresh air required for cooling must be aspirated through centrifugal force – sedimentation – separator grids in the upper area of the side walls through an air collection space. The fan grids shall be designed for separation of dust and water.
- 2 In a second stage dry type filters with replaceable filter elements and a pressure drop indicator shall be provided.

The air flow for cooling facilities and for traction motors shall be separated from the equipment room. Exhaust of the cooling air to the outside has to be in downward direction. The fan grids have to be arranged such that water and sand can not penetrate into the equipment room. Behind the fan grids, corrosion-resistant drains have to be installed for separated water and dirt particles.

The cooling air for auxiliary converters and the corresponding components must also be aspirated from the upper side walls.

Sufficient cooling up to an ambient temperature of + 50 °C must be warranted. According calculation results (thermal balance) shall be submitted to the ICVL approval.

The installed cooling air system must work homogeneously in both running directions.

Equipment cubicles shall to be ventilated such that with running fans the temperature does not rise above + 60 °C at an ambient temperature of + 50 °C. Moreover, a slight overpressure must be generated in the equipment and the engine room. An air balance calculation has to be submitted during the concept phase of the project.

10.18.5 Emergency power generators

An auxiliary generator shall be fitted.

10.18.6 External power supply

The connections for electrical power supply from the external source shall be provided on one side of the locomotive.

**10.19 Air conditioning in the driver's cab General**

10.19.1 The HVAC units integrating the cooling system with condenser, compressor and condenser fan as well as the air conditioning system with evaporator, air-heater, air filter and supply fans shall be installed.

A HVAC unit which is fully functional shall be accordance with applicable norms.

10.19.2 It must be assured by appropriate design that the air ducts for fresh air supply and evacuation of condensed air are separated in order to definitely avoid thermal short-circuit.

10.19.3 The HVAC unit has to be designed such that:

It can be completely replaced in minimum time and be repaired outside the driver's cab or defective components can be identified and replaced

The correct function can be verified within one hour after the unit was installed. Maintenance access from the inside of the locomotive for changing the air filters and to the <sup>[1]</sup>diagnostic interface shall be provided.

The installation of the HVAC units shall be optimized from the point of view of maintainability. Thermal insulation has to be dimensioned such that the average heat transmission coefficient total does not exceed a value of 2.3 W/m<sup>2</sup>K at maximum speed. The avoidance of direct thermal bridges has to be assured in order to avoid an unnecessary heating of cab interior in cases of sunshine (if so, ventilated double roof cladding). For the same purpose, all windows have to be equipped with durable window shades adjustable continuously or in smooth steps adjustable with heat reflecting coating covering the entire window. A separately switchable and adjustable additional feet-heating has to be installed.

10.19.4 The necessary air filters shall be installed in the fresh air inlet and in the recirculation air inlet. They shall be easily accessible and shall be dimensioned in order to meet the maintainability criteria. Commercially available washable or disposable types shall be provided.

10.19.5 An environment-friendly, approved halogen-free refrigerant shall be used. From the current point of view, R 134a or R 410a shall be preferred.

10.19.6 A special focus has to be on the complete evacuation of condensation water. Condensation water may not remain at any part of the system under any circumstances.

- 10.19.7      Distribution. Adequate ducting for the air shall be provided, including thermal insulation of the roof ducts. The air velocity in the ducts shall not exceed 10 m/s in order to avoid drumming and aerodynamic noise. A uniform discharge shall be achieved by means of adjustable tamper-proof baffles or vents. The driver shall not be subject to draughts exceeding 0.5 m/s. Adjustable exhaust nozzles shall be provided for use by the driver.
- 10.19.8      Special attention shall be given to prevention of condensate water from entering the cooling ducts.
- 10.19.9      Regulation. The air conditioning system in the Locomotive shall be provided with an automatic control system, including the necessary thermal sensors (if required). A manual control shall allow the driver to set certain operation modes in case of system malfunctions.
- 10.19.10     Control system. For adjustment of HVAC units, a set-point controller (thermostat) at the driver's desk has to be installed which is easily accessible from the driver's position during the run. If the cooling device fails, the heating must remain continuously functional and controlled and the fresh air flow must remain adjustable.
- 10.19.11     Parking mode (hold interior temperature on pre-selected value, i.e. 24°C in winter and 26°C in summer) with external power supply.
- 10.19.12     During pre-cooling or pre-heating the HVAC system operates with return air only, for all other modes with mixed air. The pre-conditioning period lasts until the climate in the respective driver's cab is suitably conditioned. The respective times are given in Attachment D.

## **10.20   Storage Battery**

- 10.20.1      A ventilated battery storage box shall be provided.
- 10.20.2      The set shall consist of 32 cells, 64 volt lead-acid and have a 500-ampere hour capacity (8 hour rating).

## **10.21   Cooling System**

- 10.21.1      New mechanically bonded radiator shall be fitted at the rear of the long hood.
- 10.21.2      The radiator shall be cooled by two AC motor driven cooling fans located below radiator.
- 10.21.3      A water cooled oil cooler and water tank shall be mounted as a unit directly in rear of the governor end of engine.
- 10.21.4      The system shall include automatic water temperature control, hot engine alarm, and engine shutdown in the event of low water level.
- 10.21.5      A water fill system that does not require opening of the pressure cap shall be provided.
- 10.21.6      The cooling will be sufficient for site conditions.

## **10.22   Dynamic Braking**

- 10.22.1      The dynamic brake resistors shall be mounted in hood behind the high voltage cabinet.
- 10.22.2      The blower motor assembly shall be provided.
- 10.22.3      The locomotive will be able to load test onto the dynamic brake grids.

## **11 Carrier Systems, Enclosures**

## **11.1 General**

One train multi conductor (61 wires) control cable including the low voltage supply with plugs and sockets make Keeps. The train line will be used for the train wide data transmission. At least three twisted screened pairs should be provided as spares for future applications. The electrical properties of this conductor shall be suitable for the data transmitting using WTB system acc. IEC 61375. In case the Bidder proposes a data transmission by WTB, the respective interfaces to the existing vehicles of ICVL must be provided.

One train reversible control line – multi conductor cable including the 27 pins plugs and sockets.

The electrical devices and components shall be installed in electric cabinets. The number of cabinets should be as few as possible.

## **11.2 Cabinets, boxes, containers**

### **11.2.1 General**

The cabinet is designed according to UIC550-1.

Control and auxiliary relays and miniature circuit breakers shall be of the plug-in type, rack mounted or rail-mounted. Relays shall be provided with cable connection sockets and anchored by quick fastening vibration-proof devices.

All control and low voltage connections to pre-mounted devices are done via plug-in contacts.

## **11.3 Battery box**

The DC batteries have to be fitted in ventilated battery cases. The batteries have to be mounted to allow easy maintenance and replacement. The lock of the cover on the battery case has to be designed and built in such a way that a self-acting opening is prevented in any case, and that the cover, in case of a wrong manipulation, does not remain closed without being securely locked.

The battery box shall be manufactured from stainless steel and feature an interior lining or an additional protective box from acid resistant plastic material.

## **11.4 Accessibility**

Access to control elements and indicators on the cabinets shall be possible without opening of a cabinet door. All devices and components shall be mounted in a way that the accessibility for the maintenance staff is guaranteed.

All operations which the driver carries out shall be assigned to the driver's desk or in the control cabinet located in the driver's cab.

During the engineering phase the supplier has to demonstrate the required accessibility to the ICVL representative.

## **11.5 Component labelling**

All components shall be individually identifiable through an alphanumerical code. Racks, rails or supports on which the components are mounted shall show the same

identification, using appropriated labels. The numbering will also appear on the schematics, in the parts lists, and in the manual.

For the quality of the labeling see section **UC**.

The rated trip current and other characteristics of miniature circuit breakers shall be clearly marked on the rack or rail.

The rated trip current and other characteristics of fuses shall be clearly marked on the rack, rail or panel. Connectors and test sockets must be prevented from being confused.

#### **11.6 Frames, boards**

The visibility of brake position indicators (if any) must be granted from platforms of 900 mm and higher.

#### **11.7 Control and display units**

#### **11.8 Display units of diagnose system**

The HMI (display and keyboard) shall be conforming to the protection class IP54 according to IEC 60529. The design shall be in accordance with UIC557, type III display.

It shall be possible to choose the language of the text either Portuguese or English.

A screensaver shall be provided, to avoid burning in the screen content. The display consists of a display unit and a keyboard. The display unit forms the man/machine interface. The HMI is a color display. For operation purposes a touch-sensitive keyboard is integrated to the front plate.

#### **11.9 Electronic rack systems**

Control electronics shall be located in enclosed housings with heat exchangers (indirect cooling). The Contractor shall provide detailed evidence that the cooling concept enables correct operation of the equipment under the environmental conditions in Mozambique.

All electronic units shall conform to EN 50155. The requirements regarding climate and environment for Mozambique (see Attachments) have been adhered.

Electronics boards shall be mounted in suitable EMC-proof racks or housings. Different boards must be prevented from being confused.

### **12 Electric Wiring**

#### **12.1 General**

Electric wiring shall be in accordance with the state-of-the art.

#### **12.2 Cables, conductors and bars**

The conductor and (if applicable) screen material shall be copper. The insulation and sheath material shall be polymer. The cables shall be completely free of halogens and shall comply with the relevant standards EN 60754-1, IEC 60332 and IEC 60811-1-1.

The cable shall be completely water-tight longitudinally and transversally. The cables shall be free of corrosion and unsusceptible to ageing. They shall not require any maintenance or inspection during the lifetime of the vehicle.

All cables shall comply with severe fire safety requirements, already effective with SARA

and according to the international standards.

All cabling shall be neatly run and fitted in conduits or cable trays as may be appropriate to the layout and equipment. All sharp edges in the vicinity of cables shall be well smoothed or properly protected. Connections of cables to cabinets shall be effected by means of terminals/terminal strips and not directly to the components.

Spare control and communication wires will be installed in adequate numbers (Minimum 10%). Cables through partition or floor openings shall have fire barriers. Cable joints and piggyback fast-on connections are not permitted. Terminations and connectors must be stress-relieved.

Power supply wires shall have adequate diameters considering the current as well as the voltage drops.

The installation of cabling must be complying with EN 50343 and the requirements regarding the EMC.

The minimum conductor section to be used is 1.5 mm<sup>2</sup>.

Conductors (i.e. cables and bus bars) belonging to different nominal voltage systems should be separate from each other as far as practicable. In any case, the following will apply:

Low voltage conductors will be separate from high voltage conductors.

Conductors belonging to different nominal voltage systems will not use common connectors or terminal boards.

### **12.3 Marking**

All wire and cable conductors shall be individually identifiable at each end by shrinkable sleeves. Wire and cable terminals shall be numbered and identified using appropriated labels, which shall include a description of the termination function where necessary to facilitate maintenance activities. The numbering will also appear on the schematics, in the wiring lists, and in the manual.

The labels used for wire identification shall be resistant against dust and scratch. The durability and readability of the labels shall be guaranteed at least 20 years after takeover of the Locomotive train. The labels shall be fixed such that the labels will adhere for 20 years.

### **12.4 Connecting material**

Only connecting material shall be used which is proved in the field of rolling stock. Connectors shall feature the original pins and sockets (suitable for the harsh environment of the railway and long lasting).

Cables shall be connected by cable shoes or insulated cable end sleeves as appropriate.

### **12.5 Bushings**

Approved railway type bushings shall be used.

### **12.6 Cable ducts, pipes and flexible tubes**

#### **12.6.1 General**

Cables and pipes shall be installed in separate conduits or trays in order to facilitate accessibility and maintainability.

12.6.2 **Cable ducts**

The cable ducts shall be arranged such that the EMC requirements regarding cabling can be kept.

12.6.3 **Piping**

12.6.4 Flexible tubes

Railway proven flexible tubes shall be used

## CHAPTER 2 - DELIVERY AND ACCEPTANCE

### 1 Tests

#### 1.1 General

The issues described in this section relate to the general terms of acceptance in the Agreement.

##### 1.1.1 Introduction

The test program is part of the Contractor's quality assurance program. However, since it is a very comprehensive engineering task, the type test program has been summarized under a separate section. A summary of all tests, including the routine tests, is given in section 1.3. Reference is made to section 2 in regard to manufacturing supervision and routine tests. A type test requirement set out in this section will be waived if satisfactory evidence can be produced by the Contractor, that:

- a) The component or sub-assembly has been in revenue service for more than 5 years on a fleet of more than 20 vehicles with the reliability figures specified.
- b) A closely similar test has been performed satisfactory on the component or sub assembly, for another customer.

##### 1.1.1.1 Test Standards and Procedures

Tests shall be performed according to normal engineering practice. Wherever possible, standard test procedures and standards shall be utilized

##### 1.1.1.2 Test Plans

Within 6 months from the issuance of a Purchase Order, the Contractor shall submit a test program plan for approval. This plan will then be used as a guide for the entire test program.

At least 60 days prior to each individual test, the Contractor shall submit a test procedure for approval. This procedure shall include information on:

- a) Test to be performed;
- b) Test requirements and procedures;
- c) Person responsible for the test;
- d) Time or time frame when test will be executed;
- e) Location where test will be executed;
- f) Instrumentation and equipment for the test;
- g) Evaluation of the test results;
- h) Miscellaneous information

ICVL will comment on or approve the test procedure within 30 days.

##### 1.1.1.3 Test Execution

Appropriate calibrated instrumentation and equipment shall be used; the recording of the test results shall conform to standard practice.

##### 1.1.1.4 Test Reports

Each test shall be covered by a test report detailing the test results which shall be submitted for approval no later than 60 days after the test. The test report shall include an introduction giving the test requirements and the procedure, and shall describe the test performance, location, date of test as well as giving a list of the people present. The



summary shall include an assessment of the full filament of the test requirements. If the test requirements have not been met, proposals for corrective action and re-test shall be made.

## **1.2 Sub-assembly and Unit Tests**

### **1.2.1 General**

### **1.2.2 This part defines the requirements for the tests on components and sub- assemblies. Component Tests**

All components of the vehicle shall be sufficiently proven or tested to guarantee a satisfactory performance of the vehicle.

### **1.2.3 Running gear Tests**

The running gear shall be subject to the following tests:

#### **a) Structural test**

- static test of running gear frame and axle box

- fatigue test of running gear frame

- static and fatigue test of components under high static and dynamic design stress

#### **b) Static tests**

- Verification of suspension system characteristics

#### **c) Dynamic tests**

- dynamic behaviour of the suspension system

### **1.2.4 Carbody Test**

The carbody shall be tested structurally. The static test shall be performed on one of the first completed carbody shells. Separate tests on elements, such as the carbody bolster, shall be performed in addition to the overall carbody test.

### **1.2.5 Traction Motor Test**

The traction motor shall be tested in accordance with the respective norms. This can be done as part of the propulsion system combination test.

### **1.2.6 Traction Gear Test**

The traction gear shall be tested in accordance with the respective norms. This can be done as part of the propulsion system combination test.

### **1.2.7 Friction Brake Test**

The friction brake system shall be tested in order to optimize it with regard to:

- Reaction times/dead times in conjunction with the propulsion control
- Match of brake block with wheel
- Wear of brake block.

### **1.2.8 Magnetic Track Brake Test**

One magnetic track brake shoe shall be submerged in sea water for one week. After this test it shall not demonstrate any leakage or degradation of performance.

### **1.2.9 Auxiliary Power Supply Test**

Test the stability and regulation of the converter under various and step changes of input/output loading conditions.

### **1.2.10 Propulsion System Combination Test**

A propulsion system combination test shall be performed, combining the pertinent

elements of the system, such as

- Traction control
- Inverter
- Traction motor
- Gear

In order to determine the regulation characteristics as well as the thermal capability.

This test shall also be used to simulate failure modes in the propulsion system.

#### 1.2.11 Air-Comfort System Test

The air-comfort system shall be tested in the first vehicle at a very early construction phase. The test shall determine the following characteristics:

- . Thermal capacity
- . Performance
- . Control sensitivity
- . Match with the static converter (e.g. response to short power interruptions and to non- sinusoidal waveform)
- . Priority switching of the electric heaters in order to consume regenerative power
- . Flow and distribution of the air this test shall be performed, utilizing the actual static converter.

#### 1.2.12 Vehicle System Test

##### 1.2.12.1 General

The first consist built shall be subject to a comprehensive test program in order to check all functions and the performance of the subsystems. As a general guideline IEC 61133 shall be followed.

##### 1.2.12.2 Functional Tests

The unit shall go through a comprehensive test program at the plant of manufacture to check out all the functions and interfaces. This shall include a test to check the performance of the air- comfort system.

##### 1.2.12.3 Performance Tests

The locomotive shall be subject to a performance test on an appropriate test track. These tests shall include, but not be limited to:

- Energy consumption tests
- Max. velocity test
- Noise tests
- Ride comfort tests
- Multiple operation tests.

These tests shall be performed both under AW1 and AW2 loading condition (see also AB.1. In addition to the performance test, an endurance test of a minimum of 10,000 km of trouble free running shall be performed, with a subsequent comprehensive check of the entire vehicle and its subsystems. This test can be performed as part of the initial driver's instruction and trial operation.

##### 1.2.12.4 Acceptance Test

Upon arrival of each locomotive in Mozambique a stationary and low speed running test shall be performed in order to establish, that all systems are operating correctly. Due to the limited availability of track on the Mozambican Railway system, it is essential, that

the maximum amount of testing is carried out at or near the supplier's works. The tests to be carried out in Mozambique will be confined to a series of tests designed to verify that the results of the type tests and the routine line tests are applicable to conditions in Mozambique and that no deterioration in performance has taken place during the shipping.

1.2.12.5 Trouble Free Running

Each locomotive has to undergo continuous trouble free running in revenue service for 5000 km before final acceptance.

## **2 Quality Assurance**

### **2.1 Quality Assurance Program General**

#### **2.1.1 General**

The quality assurance program, including regulating procedures, methods and processes to be used to ensure compliance with the Agreement, shall be documented and subject to the review and approval of ICVL. The program shall be executed such that an acceptable level of quality of the supplied equipment is provided. The program shall conform to acknowledged procedures (ISO 9001). The concept of total quality assurance shall be based on the principle that quality is a basic responsibility of each segment of the Contractor's organization and shall be evidenced by:

- (a) Producing and inspectable designs
- (b) Firm procurement and job performance specifications
- (c) Firm procedures for transmission of quality requirements and standards to Sub-Contractors and suppliers and ensuring their compliance
- (d) Adequate testing to ensure repetitive product conformity to design requirements
- (e) Total program surveillance and verification of physical conformance and configuration accountability.

#### **2.1.2 Quality Assurance Plan**

Within 60 days from the issuance of the Initial Purchase Order, the Contractor shall submit his Quality Assurance Policy. It shall clearly show how the organization and methods guarantee compliance with quality control standards and assure proper:

- Engineering, purchasing
- Inspection of handling, storage and delivery
- Receiving inspection
- In-process inspection
- Final and shipping inspection

#### **2.1.3 Corrective Action/Design Changes**

The Contractor shall establish, maintain and document procedures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, and defects in material and equipment shall be promptly identified and corrected. In the case of conditions adverse to quality, the measures shall ensure that the cause of the condition is determined and corrective action is immediately taken to preclude repetition of such conditions. Corrective action and related information shall be documented and made available to ICVL upon request. Corrective action shall extend to the performance of all

sub-suppliers and include as a minimum:

- (a) Analysis of data and examination of sub-standard products to determine extent and causes.
- (b) Introduction of required improvements and corrections, initial review of the adequacy of such measures, and monitoring of the effectiveness of corrective action.

The Contractor shall ensure that inspection and acceptance tests are based on the latest specified revision or change to drawings and specifications. A procedure shall be maintained that embraces the adequacy, completeness, and correctness of drawings, and the control of changes. The Contractor shall ensure that changes are adequately notified to all concerned and that obsolete drawings and change requirements are promptly removed from all points of issue and use.

#### 2.1.4 Quality Assurance Records

Adequate records shall be maintained by the Contractor to provide evidence of quality and accountability. These records shall include results of inspections, tests, process controls, certification of processes and personnel, sub-standard material (including records of disposal), and other quality requirements defined in the Contract. The records shall be maintained completed and available to ICVL at all times during the performance of the Contract and retained for a three-year period thereafter. Inspecting and testing records shall, as a minimum, indicate the nature of the observations, and the number of observations made, and the number and types of deficiencies found. Also, records for monitoring work performance and for inspecting and testing shall indicate the acceptability of work or products and the action taken in connection with the correction of deficiencies.

## 2.2 Inspection and Testing

### 2.2.1 General

- (i) All equipment, including all materials, components, apparatus, etc while in the process of manufacture and during installation and commissioning will be subject to such tests and inspections as required by pertinent standards, as may be the standard practice of the manufacturer and as deemed necessary by ICVL to prove compliance with the requirements of the Agreement.
- (ii) Approval of assemblies, tests, inspections, related procedures etc. shall in no way relieve the Contractor of his contractual obligations.
- (iii) The Contractor shall be responsible for the execution of all inspections and tests required to demonstrate during manufacture and on completion that the equipment complies with the requirements of the Agreement.
- (iv) The Contractor shall prepare an inspection and test programmer including all tests during and after manufacture which shall form part of the Agreement and which shall describe the inspections and tests for each major component and item. The programmer shall include a sufficiently detailed manufacturing schedule with all expected dates of inspections and tests, a description of each inspection or test (including the test method) to be performed and the applicable standards. Where Contractor's acceptance standards are proposed, copies shall be provided for ICVL's approval.
- (v) The test program shall include the proposal of the Contractor in regard to participation of ICVL or ICVL's representative.

#### Class of test Representation

- I ICVL must be present
  - II ICVL will be invited; the Contractor however is entitled to perform the test as scheduled when ICVL or his Representative is not present
  - III Routine test according test program; no invitation to ICVL is necessary; Test Certificates shall be ready for inspection after test if required by ICVL
- (vi) The inspection and test program and the related schedule shall be up-dated by the Contractor at two-month intervals with clear indication of revised inspection and test dates.
- (vii) Written notice of the exact date, time and place of inspections and tests as well as all other necessary information shall be given to ICVL in writing not later than twenty days prior to the date of any such inspections and tests.
- (viii) Should an agreed inspection not be feasible as proposed due to lack of preparation, negligence or material and/or equipment being presented in a state which is clearly not acceptable, all costs incurred by ICVL for repeated inspections shall be borne by the Contractor.

#### 2.2.2 Test Certificates

Test records, test certificates, performance curves, tables, etc. of all inspections and tests, whether or not attended by ICVL, shall be supplied as soon as practicable after performance of each inspection or test. After completion of all testing two (2) sets of the above-mentioned documents shall be supplied properly bound in books.

All test certificates shall be endorsed with sufficient information for identification of the equipment and material to which the certificates refer.

#### 2.2.3 Type of Tests

Inspection and testing of the equipment shall include all inspections, tests, checks, procedures, etc, whether mechanical, pneumatic, hydraulic or electrical, as required to ensure that the equipment supplied meets the requirements of the Agreement.

Inspection and testing shall comprise, but not be limited to:

Mechanical and Chemical testing of materials

Destructive and non-destructive tests of materials

Checks and examinations of welds

Checks of fits and assemblies

Dimensional checks

Inspection of paints and coatings

Balancing tests

Electrical tests

Running tests

Functional tests Performance tests Load and overload tests

Acceptance tests These tests will be carried out principally as:

- Type tests
- Routine tests
- Special tests the techniques, equipment and instrumentation to be used for

these tests, checks, inspections, examinations, etc shall be in accordance with internationally accepted standards, rules or codes, and in particular those mentioned in the Specification. If in ICVL's opinion instruments, apparatus, devices, etc used by the Contractor need calibration or re-calibration, then such instruments, apparatus, devices, etc shall be calibrated by an independent authority or institute approved by ICVL.

#### 2.2.4 Random Sample Tests

Tests shall be carried out on random samples of a lot of equipment, parts or material. Selection of samples to be tested will be done by ICVL and all the equipment, parts etc shall be presented for this purpose. The number of samples taken will be either at the discretion of ICVL, particularly for smaller lots, or shall conform to the generally accepted rules and standards of statistical testing. Should a single sample fail during random sample testing then the following shall

- (a) Small lots: all pieces shall be fully tested;
- (b) Large lots: a second set of samples, identical in number with the first one, shall be chosen and tested. If this set passes all tests satisfactorily, the lot shall be considered to be acceptable. If again one or more samples fail in one or more tests either the whole lot shall be rejected or all pieces of the lot be fully tested individually, as determined by ICVL.

Pieces of lots which have been declared unacceptable and samples which have failed in test shall be marked immediately and shall not be presented for test again.

#### 2.2.5 Tests at Manufacturer's Works

##### 2.2.5.1 General

- (i) Before any material, equipment, apparatus, component etc. is packed or dispatched from the place of manufacture, it shall have passed, as far as practicable, all tests, inspections, checks, examinations, etc required by pertinent and internationally accepted standards, rules or codes.
- (ii) All materials, apparatus and other parts or components of the equipment to be tested, inspected, checked, examined, etc at the place of manufacture shall be made properly accessible for testing and inspection work. There shall be no interference or disturbance from other shop activities when conducting checks, tests and inspections.
- (iii) All equipment, materials, apparatus and other parts or components shall be adequately sheltered and protected against the weather whilst being tested, inspected, checked and examined.
- (iv) Parts and components shall be assembled to the greatest extent possible and as agreed, and dimensional checks performed on all major assemblies, sub-assemblies, parts and components especially when close tolerances and fits are involved (tolerance of shafts, clearance between stationary and moving parts, connecting dimensions for assembly with other elements and supplies, combined functioning of electrical equipment, etc.).
- (v) If dimensional checks show discrepancies in measurements which may affect the fit, assembly or dismantling of the respective part or component, proper and workmanlike corrections or modifications shall be carried out immediately. Such corrections or modifications shall, however, in no way lead to sacrifices with respect to reliability of operation or interchangeability and shall only be performed with ICVL's approval. If the correction or modification cannot be carried out in accordance with the terms mentioned above the part or component concerned may be rejected.

#### 2.2.5.2 Type Tests

Type tests shall be performed to establish the required main characteristics of the equipment and that they conform to the requirements specified for the Agreement. Type testing shall be carried out on a single item of apparatus or assembly of each type and rating and shall be witnessed by ICVL or ICVLs Representative. If there is evidence of successfully performed type tests on identical apparatus in an independent laboratory, the respective certificates may be accepted in lieu of testing. Such type test certificates shall be submitted to ICVL.

#### 2.2.5.3 Routine Tests

Routine tests are required both to prove that the product is in accordance with equipment which has been successfully type tested and to reveal faults or defects in materials or equipment due to inadequate or insufficient supervision during fabrication, assembly, etc.

### 2.3 Test Reports and Certificates

#### 2.3.1 General

This section defines the requirements in regard to the submittal of test reports and certificates of the routine test as defined in section 1.3.

#### 2.3.2 Test Reports and Certificates to be Submitted

Within 30 days of a routine test of the class I and II, the Contractor shall submit an electronic and two (2) paper copies of the relative test report or certificate to ICVL. These test reports and certificates shall clearly indicate, if the item tested has fulfilled all test criteria. In case of minor deviations to the criteria, which the Contractor still considers to be acceptable, a statement with the relative justification shall be included in the report or certificate. Test certificates of class III tests shall not be submitted. These certificates however shall be kept ready for inspection by ICVL at the Suppliers plant.

#### 2.3.3 Vehicle Record Book MRB

For each vehicle to be manufactured under this Agreement, the Supplier shall prepare a Manufacturing Record Book MRB which shall contain all relative documents and information in regard to the specific vehicle. This logbook shall stay with the vehicle during the manufacturing process and shall be continuously updated by the Supplier. It shall be properly structured and be in durable form, so that it can be used by the ICVL after delivery of the vehicle during its entire service life. The MRB shall be structured as follows:

### 2.4 Documentation

Table of contents

Summary sheet

Manufacturing checks

Routine test reports

Configuration Control

Serial lists

Commissioning test report

Acceptance certificate

Before issue of the Acceptance certificate for the first locomotive, the Supplier shall submit three (3) sets of "as-built" drawings as full size paper copies. These drawings shall be marked "as-built" and shall be based on the "approved" drawings. Before issue of the Acceptance certificate for the last vehicle to be supplied under the Agreement, the supplier shall supplement the transparencies by:

Two sets of "as-built" drawings on electronic media, as defined in section 3.5 and 3.6.

Two sets of light copies of the "as-built" drawings, folded to A4 size

Two sets of all design- and test reports

Two sets of all purchase and material specification

Two sets of circuit diagrams, illustrated diagrams (layout) of PCB's, software listings etc., necessary for the independent operation and maintenance of the system Further on the Supplier shall submit an electronic documentation for the entire vehicle in an approved format Interactive Electronic Technical Manual (IETM), prior to acceptance of first vehicle (in a preliminary version). The final version of the IETM shall be delivered after acceptance of the first train; an update shall be submitted after remedy of the open items no later than one year after acceptance of the first train. The supplier shall be responsible for the periodic update of the IETM until the end of the warranty period of the last train. ICVL shall get a free license for the use and the maintenance (updating) after warranty of the IETM.

## **2.5 Configuration Control**

### **2.5.1 General**

The Contractor shall maintain technical documentation records, which allow:

- a) Identification of any part of any level of the system;
- b) Identification of the next assembly drawing number of any equipment
- c) Tracing the associated documents for each part such as:
  - Specification control drawings
  - Source control drawings
  - Sub-Contractor, vendor or supplier part number

### **2.5.2 Records**

The Contractor's documentation shall be capable of identifying changes and of retaining the record of superseded configuration requirements affecting items which have been formally accepted.

The configuration control system shall allow the clear identification of the "as-built" condition of every individual vehicle, even when design changes have been introduced during series production on part of the vehicles. This information shall be included in the vehicle log-book as set out in section 2.3.3. The Contractor shall employ a system of identifying numbers for specifications, drawings and associated documents which will ensure that parts, assemblies and installations are uniquely identifiable with regard to form, fit and function.

### **2.5.3 Submittal of Changed Documents**

During the warranty period, the Contractor shall resubmit any changed drawing, report



or document in the format which will have to be agreed at that time.

## **2.6 Acceptance Procedure**

### **2.6.1 Shipping Certificate**

Upon finalization of manufacture and of the pertinent routine and abroad preliminary tests, ICVL or ICVL's Representative will issue a Shipping Certificate, which entitles the Supplier to ship the vehicle to the site.

### **2.6.2 Acceptance Certificate**

Acceptance of each locomotive by ICVL will be based on the Acceptance Certificate, issued by ICVL. The proof of compliance of the respective locomotive with the Technical Specification has been provided by the Contractor. This proof shall be produced by:

The approved as-built documentation as per section 3.5

The test reports and certificates as per section 2.3 After finalization of the specified acceptance tests on ICVL track and after submittal of the necessary documentation by the Supplier and after 10000 km of trouble free running, ICVL will issue the acceptance certificate.

## **3 Design, Development and Technical Documentation**

### **3.1 General**

This chapter outlines the logistic support requirement, which will be provided as part of the Agreement:

- Technical documentation
- Training
- Technical support

### **3.2 Development and Design Approval**

The contractor shall submit for review by the ICVL three copies of all design drawings, calculations, electrical diagrams, catalogue information and shop detail drawings used to design, manufacture and assemble the Locomotive.

All drawings and documents shall be presented in the English language.

The ICVL review is to verify general conformity of the design with the specification and does not relieve the contractor of any responsibility.

All information shall be submitted within the time specified to enable the ICVL to verify before manufacturing of the relevant parts will start, so that in case of non-conformity the contractor can take steps to remedy this situation.

All computer calculations shall be presented in such a way that the results can be checked by means of none-programmed calculations, based on generally accepted methods.

Design approval can be in the form of design reviews, organized by the supplier. The process ends with the design approval by ICVL and design freeze.

### **3.3 Progress reports during production phase**

The contractor shall submit to the ICVL and his appointed supervisor at the contractor's plant monthly progress reports during the production phase the assembly phase and during the testing and supply periods.

### **3.4 Documents with the start point of testing**

Documents to be supplied concurrent with the start point of testing of the Locomotive:

#### **3.4.1 Mechanical Drawings**

Three complete sets of mechanism and structure detailed drawings, and one set of electronic media, each one with its bill of materials.

#### **3.4.2 Calculations**

Calculations of the structure, mechanisms and electric components shall be supplied in two sets and as an electronic file.

#### **3.4.3 Electrical system documents**

Electrical system data (three sets and electronic media) consisting of:

Block diagram.

Single line diagrams and functional/logical descriptive text explaining all the functions of the control system and its components.

Detailed circuit diagrams of the electrical system.

Guide for fault-finding

Mechanical diagrams showing all electrical components layout on the Locomotive.

Component layout and internal wiring diagrams of all cubicles, panels, controllers, control consoles and the like.

Terminal diagram - interconnection wiring diagrams, showing the connections of all components and devices complete with number of conductors and wire numbering.

Unit wiring diagrams showing the internal wiring of shop-made mounting units, e.g., a circuit-breaker, a relay set or a regulator (no "Black Boxes" are permitted. No unit may be left without information as to their purpose, content and interior connection).

Conduit, cable layout drawings, drawn to scale.

Cable list.

Alternators and motors test certificate, full (110%) and load testing and measurements, dial settings of the potentiometers and the measurements in all test points.

Full test data on the cubicles and electric modules.

Recorder charts of test runs for all train functions.

List of components giving detailed and complete information on technical data and rating type and make, manufacturer's address and ordering reference and the purpose of the component in the equipment.

Program listing and software diskettes of the control software.

#### **3.4.4 Data Sheets**

Performance charts of the Locomotive and all its major components.

### **3.5 Documents to be submitted before acceptance of the locomotive**

#### **3.5.1 Manuals**

Operating, maintenance and parts catalogs for the Locomotive and all its mechanical and electrical equipment, in 10 copies (see detailed specification for these manuals in paragraph 3.4.). The operating and maintenance manuals shall be presented in the English language.

#### **3.5.2 Documentation and manuals concept**

The documentation mentioned above shall be comprehensive to the extent that in the event of a failure of a working part of any manufactured component, maintenance personnel will be able to refer the parts data books to obtain the model number of the component and order the required part without being compelled to dismantle the component.

These books will be utilized in training inexperienced personnel for operation and maintenance and shall be based on the following operation, maintenance and illustrated spare parts catalog manuals specification as described in paragraph 3.6.

#### **3.5.3 Operation, Maintenance and Illustrated Spare Parts Manuals Specification**

**The maintenance manuals shall consist of the following:**

### **3.6 General Description**

This section defines the general description of the Locomotive, its systems and mode of operation.

#### **3.6.1 Operating Instructions (Driver's Manual)**

This chapter shall include the following paragraphs:

Pre-operation check-out.

Start-Up procedure.

Operation procedure (operation limitations should be stated clearly and in bold letters).

General data on the Locomotive and description of the structure, drives and auxiliary systems.

Detailed description of all the control in the cabs and other control stations - their functions, limitations and interlocking.

Shut-down procedure.

Emergency procedures.

Troubleshooting

#### **3.6.2 Preventive Maintenance Procedures**

This chapter will include procedures for periodic cleaning, oiling, greasing, checkouts, adjustments, etc., for periodic inspection in the following frequencies, or other frequencies as recommended by the contractor:

Daily.

3 days.

weekly

Monthly.

Tri-monthly.

Semi-annually.

Annually.

Etc. and shall provide the following data elements:

- . System application.
- . Location.
- . Description of the work to be performed.
- . Adjustments to be performed.

#### Technical Specification Diesel Locomotive

- . Type of oil/grease/compound to be used when performing the work.
- . Spare parts required to perform the work (filters, "O" rings, gaskets, etc.).
- . Special tools required to perform the work.

#### 3.6.3 Maintenance Instructions

This chapter will include instructions and procedures for parts or components replacements, adjustments, disassembly, repair, overhaul, assembly and testing of systems, modules and components.

#### 3.6.4 Parts Catalogue

The catalogue shall include:

##### 3.6.4.1 Parts Breakdown

Illustrated parts breakdown (sub-contractor items included) with a set of section drawings or axonometric/"blow-up" drawings and a list for each one of the drawings including the following data elements:

Item number on the drawing.

Item's name.

Sub-contractor's part number.

Sub-contractor name.

Quantity per assembly.

##### 3.6.4.2 Part Numbers Index

Index of all part numbers appearing in the catalog in P/N sequence having the following data elements:

Part number.

Drawing number.

Drawing index number.

The parts breakdown will include parts breakdown and drawings, also for sub- contractors' items such as engine, electrical motors, electrical components, computers etc.

#### 3.6.5 Delivery format

Each volume shall be bound in a durable, loose-leaf binder.

### 3.7 Interactive Electronic Technical Manual - IETM

Concurrent with the final acceptance of the first Locomotive by the purchaser

Railways, the contractor shall provide the technical documentation as an interactive electronic technical manual (IETM), namely a premiere, high-quality database product. This IETM will allow for multiple methods of accessing the data including full-text and fielded searching, visual access and table of contents (TOC) access, as well as for interactive cross-reference within each publication, and between different but related publications (e.g. cross-references between Maintenance Manual and Parts Catalogue). The IETM user interface will be in Portuguese and English.

The IETM will support the following features (non-comprehensive list):

- . End-user access control
- . Annotations and bookmarks (annotations will support Portuguese)
- . Easy navigation between documents titles and sub-titles
- . Combined Boolean full-text and fielded searches.
- . Nested querying - up to 4 nesting search levels.
- . Compound documents viewer (text, tables, raster/vector images, audio, video, etc.)
- . Multi-target hyperlinks.
- . External executable links.
- . Exporting images in their native format; exporting text.
- . Temporary Revisions and Updates

### **3.8 Lubrication Charts**

The contractor shall prepare framed plastic-coated lubrication charts for all systems, showing all points to be lubricated, type of lubricant to be used at each location and recommended frequency of lubrication.

In order to enable usage of lubricants available in the Mozambique market, the contractor shall provide, three months after signature of the Agreement, a list of recommended lubricants for approval by the ICVL and only the approved lubricants will be used during the construction and erection of the train and will appear on the lubrication charts.

## **4 Operation and Maintenance Training**

### **4.1 Operators Training**

Operators training shall include the following elements:

#### **4.1.1 Class Room Training**

Class room instruction shall include basic theory of the Locomotive systems and their operation.

#### **4.1.2 On the Job Training**

On the job training which shall include:

- . Equipment familiarization.
- . Operation of the Locomotive for at least 10 operating hours for each operator. This training will be given to four driving instructors, which will then instruct the other operators of the ICVL. All training aids which will be used during the training will

be left for the ICVL's use. The on the job training of the instructors will be done before the final test and the acceptance of the first Locomotive so that the instructors will be able to perform the final acceptance test of this train.

The duration and the location of this training period shall be recommended by the bidder and approved by ICVL prior to the signing of the Agreement.

## **4.2 Maintenance Instruction**

Maintenance personnel training will include the following elements, and will be given to two separate groups:

- Mechanical systems technicians.
- Electrical systems technicians.

### **4.2.1 Class Room Training**

Class room instruction:

- . System theory.
- . Maintenance manuals, drawings and schematics organization and interpretation.
- . Equipment familiarization.
- . Maintenance tasks performance which will include:
  - Periodic inspections
  - Trouble shooting.
  - Replacement and adjustment work.

### **4.2.2 On the Job Training**

On the job training and practical hands on.

### **4.2.3 Duration and location for training**

The bidder will recommend the duration and location of the training period.

## **5 Technical Support**

The Supplier shall provide ICVL with technical support as follows:

An electrical engineer and a mechanical engineer ("Technical **Support Team**") shall be present in Mozambique for a period of 6 months, from acceptance of the first Locomotive ordered under the initial purchase.

The members of the Technical Support Team shall be experts with hands on familiarity with the Units, preferably, members of the Units design or development team.

The Technical Support Team shall perform as follows:

It shall supplement the Warranty Team in resolving faults and malfunctions which are beyond the Warranty Teams knowledge or capabilities or such faults and malfunctions which the Warranty Team is having difficulties resolving.

It shall propose changes and upgrades to the various components and systems of the Units.

It is hereby clarified, that the activities of the Technical Support Team shall not in any way derogate from the Suppliers obligations regarding the Warranty Team.

## **6 Industrial Property**

specified in the Agreement.

## **7 Quality of the Documentation**

## **7.1 General**

The documentation shall be prepared according to the latest revision of the applicable ISO standards. Drawings shall be suitable for electronic media; reports shall be in type- writing. In regard to the quality and format of the documentation to be delivered, reference is made to all relevant sections.

## **7.2 Drawing Numbering System**

The Contractor shall structure the documentation according to a Work Breakdown Structure WBS. This WBS shall allow an easy hierarchical identification of each document. The Contractor's own established WBS will be acceptable for this purpose. Each document shall be identified by a number and an additional revision index. The drawing numbering system shall be concise, i.e. also sub-supplier drawings have to have the main- suppliers number. For the ease of identification, each drawing shall show the next assembly drawing number on its title-block. The title block shall conform to UIC Codex 800-60 and shall leave room for the employer's own drawing number. This number will be indicated by ICVL on the approved documents and shall be entered on the original by the Contractor.

## **7.3 Photographs**

The Contractor shall provide color record progress photographs taken as and when directed by ICVL's Representative at intervals of not more than one month until the completion of the first Locomotive. Sufficient photographs shall be taken and one proof copy of each shall be supplied to ICVL's Representative to allow him to select the photographs which in his opinion provide the best record.

The Contractor shall provide an electronic copy of each selected photograph in a sufficient sharpness (JPG- or TIF-format). Each set of photographs shall be clearly identified and the name of the picture file indicating the subject.

The photographs shall become the property of the ICVL. The photographs shall be taken by skilled photographers acceptable to ICVL. Proof copies shall be supplied to ICVL's Representative within 7 days of the photographs being taken and the electronic copies shall be provided within 14 days of ICVL's Representative notifying the Contractor of those photographs which have been selected.

## **9 Spare Parts**

According to the agreement

## **10 Materials and Workmanship**

### **10.1 General**

General workmanship shall be of the highest quality and manufacture shall follow best modern practice for high grade equipment. Parts shall conform to the dimensions shown on, and shall be built in accordance with approved drawings. The surface finish of parts and components shall be in conformity with the respective strength, fit and service requirements. Adjoining surfaces shall be worked to ensure proper alignment and matching. Holes for bolts shall be drilled and accurately located by templates. Joints, datum surfaces and mating components shall be machined and all castings shall be spot faced for nuts. Machined finishes shall be shown on the approved drawings.

## 10.2 Tolerances

In order to be able to freely exchange parts and components during the vehicle maintenance, the individual fitting of parts during manufacturing shall be avoided. All fits, bolt-hole patterns etc. have to be performed with the use of appropriate jigs and templates. The ISO-System for fits shall be adopted.

## 10.3 Materials

### 10.3.1 General

Materials and finishes selected for equipment shall be suitable for the purpose intended and for the environment conditions under which the equipment is to operate. The use of other materials may be permitted where the equipment is hermetically sealed. Where the Contractor proposes to use stock material not manufactured especially for works under this Agreement, he shall submit to ICVL proof that such material complies with an approved standard, that the quality of such material is adequate for the intended use and that an acceptable quality control system is in operation. Substitution of specified materials is only acceptable if approved by ICVL. Substitutes will have to be suitable for the purpose intended and have similar physical and chemical properties as the specified material. When selecting materials as well as combinations of materials, the Contractor shall follow the guideline as given below:

Consistent utilization of light weight design principles (form and material)

Reduction of flammability

Minimum maintenance

Reduction of human impact during manufacturing (dust, toxic fumes, asbestos etc.)

The application notes and manufacturing prescriptions of the material suppliers have to be followed strictly.

### 10.3.2 Detail Requirements

#### 10.3.2.1 Steel Castings and Forgings

All steel casting and forgings shall conform to the chosen standard. Cracks or other defects disclosed during cleaning or machining operations shall be chipped or grooved out by carbon-arc air process to sound clean metal, and the inspected by appropriate non-destructive methods. Repairs by welding on steel castings and forgings shall be undertaken only by properly qualified welders and in full accordance with an approved procedure. All such repairs shall be subject to stress relief.

#### 10.3.2.2 Cast Iron

Cast iron shall not be used for systems containing air, oil or water or for any components subject to tension or impact stresses. Where cast iron is used, the quality shall be in accordance with the chosen standard. If not otherwise specified it shall be of the spheroid graphite type.

#### 10.3.2.3 Plates and Steel Sections

Plates and steel sections must be perfectly straight with surfaces. If straightening is necessary, hammering must be avoided if possible. After the cutting of sheets and steel sections, the edges shall be left clean and without burrs. Plates and steel sections may be flame-cut provided that the material is not damaged. Grinding or machining of the edges shall be performed in order not to reduce fatigue limits of the material and structures and to safeguard against injury. The Engineer may grant exceptions to this requirement where appropriate. Stainless Steel: Stainless steel shall have good arc-welding properties. Stainless steel adversely affected by welding shall not be used.

#### 10.3.2.4 Aluminum



Decorative aluminum parts such as trimming shall be made from alloys best suited for the purpose. Surface treatment shall be by anodizing or by epoxy powder-coating. Flammability Requirements: Special care has to be taken in the selection of the light metal alloys in regard to flammability.

#### 10.3.2.5 Plastic and Synthetic Materials

Neoprene and similar synthetic compounds shall be age-resistant and not be subject to deterioration due to climatic conditions. Applicable standards are e.g. UIC 844-3 and 844-4. All plastic material has to be tested in regard to flammability and production of toxic fumes. They have to be in accordance with the latest standards in regard to fire prevention in rail vehicles (e.g. UIC 617-1). Rubber parts, especially those utilized for window and door sealing, shall conform to DIN 22 103 or approved equivalent. The material has to be resistant to the cleaning chemicals (for inside and outside cleaning) and shall not produce any staining on the passengers' clothes.

Plastics, used as seals and fillers shall be of a quality which allows the application of the painting system. After removal of seals and gaskets (also after an extended period) no residues shall remain which would inhibit the further use of the assembly.

#### 10.3.2.6 Wood

As far as possible the use of wood shall be avoided. When used, woodwork shall be of approved hardwood resistant to fungicidal decay and entirely free from knots, splits, sap, warp and other defects. All woodwork shall be appropriately treated in approved manner to protect it against the ingress of moisture, termite attack, growth of fungus or other forms of deterioration and it shall be fire resistant. Plywood shall be "weather resistant" according to DIN 68 705, AW 100 or approved equivalent. Special care has to be taken with respect to the selection of the glue, which shall, when cured, be fire resistant and shall not produce toxic fumes. The edges of plywood plates have to be properly sealed. Only corrosion resistant screws are allowed in combination with wood. Nails, clamps and staples are not permitted in conjunction with wood.

### 10.4 Joints and Connections

#### 10.4.1 General

When it is necessary to use dissimilar metals in contact, these shall be so selected that the potential difference between them in the electro-mechanical series is not such as to cause galvanic corrosion. If this is not possible, the contact surface of one or both of the metals shall be electroplated or otherwise finished in such a manner that the potential difference is reduced within the required limits or, alternatively, the two metals shall be insulated from each other by a suitable material or a coating of varnish compound. For joints between aluminum parts or aluminum and steel, the relative prescription of the aluminum supplier shall be followed strictly. The connection of subassemblies and components, especially at the bogies, shall be designed in a way, that dismantling is possible also after many years of revenue service.

Plain pins in the relative connections (e.g. for silent blocs, brake hangers etc.) shall be manufactured with a greasing groove in order to allow greasing and to avoid contact corrosion. Moving connections must be provided with facilities for greasing during vehicle servicing and maintenance.

#### 10.4.2 Bolted Connections

All bolts, studs and nuts shall be to an approved standard and to metric dimensions, and shall generally be of steel with a minimum quality of 8.8 (diameter > M6). Different materials for nuts and bolts might be appropriate for specific applications; such deviations are subject to the approval of ICVL. Bolted connections under high static and/or dynamic load shall be subject to a stress analysis. The tightening moment has to be prescribed for

high loaded and safety-relevant connections. Locking of bolted connections shall be by means of approved elements such as tension-washers. Locking by means of adhesives ("Lock tite") and by self-locking nuts is subject to approval by ICVL. Crown-nuts are not considered to be an approved locking device and shall be avoided. If bolts pass through hollow sections, the section has to be stiffened by means of a welded-in tube. All bolts, studs and nuts shall be properly corrosion protected. Elements which are visible or which are subject to frequent adjustment or removal shall be made of stainless steel.

#### 10.4.3 Welding

All welding shall be performed by approved welders under the supervision of a welding engineer. The design of welded joints and connections, and the fabrication of welded steel parts, shall conform to the requirements of an approved code for structural steelwork. Welding of important highly stressed components shall be subject to radiographic or ultrasonic examination. Members to be joined by welding shall be accurately cut to size and where required shall be rolled or pressed to proper curvature in accordance with dimensioned drawings. Edges of members shall be suitable for the required type of welding and shall permit thorough penetration.

Surfaces prepared for welding shall exhibit sound metal without any injurious defect. Surfaces of plates to be welded or spot-welded shall be reasonably clean and free from rust, grease, mill scale and other foreign matter over a distance of at least 25mm back from weld edges. After deposition, welds shall be cleaned of slag and shall show uniform sections, smoothness of weld metal, feather edges without overlay and freedom from porosity, inclusions and undercut. Welds shall be checked before any machining is done. If this inspection is a class I or II inspection by ICVL's Representative, appropriate advance notice shall be given. Spot-welding shall continuously be supervised by regular sample welds. Hole-welding shall be avoided. High-stress butt-welds shall be welded from both sides in order to avoid problems with sufficient penetration. For all materials (especially aluminum alloys), the manufacturers' application notes and recommendations in regard to welding shall be followed. Special care shall be taken to select the correct welding material.

#### 10.4.4 Bonding

Bonded connections shall withstand all operational loads. The adhesives selected shall be appropriate for the purpose and keep the integrity of the element within the operational temperature cycles and also under the influence of humidity. When selecting the adhesives, the requirements in regard to flammability and the production of toxic fumes have to be considered.

### 10.5 Protective Coats

#### 10.5.1 Metallic Coats

Metallic protection such as anodizing, chrome plating, nickel plating or zinc plating shall be performed with adequate thickness. The thickness shall be determined in consideration of the specific application.

#### 10.5.2 Corrosion Protection and Painting

Every component and connection between elements shall be corrosion protected according to the state-of-the-art. Hollow spaces in conjunction with corrosion-prone material shall be treated and sealed. Approved procedures and protection materials shall be utilized. The corrosion protection of the entire vehicle shall be in accordance with an approved method.

#### 10.5.3 Noise and Thermal Insulation

Noise and thermal insulation materials shall be applied on the painted surfaces in accordance with the approved method. The selection of noise and thermal insulation materials shall be in accordance with the requirements of fire protection.

## 11 RAMS

### 11.1 Reliability

#### 11.1.1 General

The vehicle shall conform to high reliability standards. In this section the standards to be achieved in regard to endemic failure are defined and certain requirements are described regarding remedial measures, design procedures and monitoring of reliability.

#### 11.1.2 Definitions

In this Section the following definitions shall apply:

- (a) Service failure - a condition requiring unscheduled maintenance of a locomotive or a component or sub-assembly of such a vehicle either in service or during the daily, bi-weekly or bi-monthly checks.
- (b) Mean Distance between Sub-System Service Failures (MDBSF) - in regard to any sub-system which is listed in section 11.1.4 below and any continuous six-month period, the total number of kilometers travelled in scheduled revenue operation during that period by the Locomotive supplied under the Agreement divided by the number of Service Failures which occurred during that period and which are attributable to defects in that sub-system, save that any data in respect of a locomotive which had not completed 10'000 km of operation by the commencement of that period shall be disregarded.

#### 11.1.3 Calculation of MDBSF

As soon as possible after the beginning of the seventh month of revenue operation of the first locomotive supplied under the Agreement, the ICVL will calculate the MDBSF for the previous six- month period for each of the sub-systems listed in Section 11.1.4 below. Each month thereafter he will repeat this calculation in respect of the corresponding previous six-calendar-month period. On completion of the calculations each month the ICVL will notify the Supplier of the respective MDBSF values. The calculations of the MDBSF values shall be based on log books and maintenance records, in both cases, kept properly, regularly and up-to-date and separately in respect of each locomotive throughout the period during which the endemic failure provisions apply. Such books and records shall be available for inspection by the Supplier subject to his giving reasonable notice to the ICVL.

#### 11.1.4 Reliability Requirements

The locomotives and their sub-systems shall be designed and manufactured so that, for every successive continuous six-month period the MDBSF values, calculated as described above, equal or exceed the respective values shown for each sub-system in the following table:

MDBSF of one Sub-system	MDBSF in km of		
	Particular component	sub- Sub-assembly	or system
Diesel engine			
Generator system			
Traction system			
Friction Brakes			

Auxiliary electric systems and			
Air-comfort system in drivers			
All other Sub-Systems			

The data as given by the Bidder in the data sheet will be filled in this table in order to make it part of the contractual specification.

#### 11.1.5 Corrective Action

If the MDBSF value for any sub-system, calculated as described above at any month, does not achieve the value given in the table then;

- (a) where this occurs during the 12-month period following the date of the Acceptance Certificate for the individual locomotive, the Supplier shall analyse the cause and shall submit his proposals for suitable remedial measures to ICVL who will decide, whether and to what extent, if at all, the Supplier shall be required to undertake these or other remedial measures. Where the Supplier is so required then he shall undertake the measures in accordance with section 2.
- (b) where this occurs during the 10-year period from acceptance and ICVL is of the opinion that the MDBSF for the sub-assemblies or components not achieved or that more than 50 per cent of the associated instances of Service Failure are attributable to a particular sub-assembly or component having been defective then that sub-assembly or component shall be considered to have suffered endemic failure. In this case the relative provisions in the Agreement shall apply.

#### 11.1.6 Design Procedures

The design of the vehicle, its sub-systems and components shall be carried out with careful regard to attaining reliability in service. From time to time, as the design proceeds, this matter shall be reviewed and the results of the final review shall be incorporated in the recommendations for servicing that are included in the manuals. Such recommendations shall include, where appropriate, measure to reduce the likelihood of sub-assembly or component failure. The Supplier shall carefully consider, during the design stage, the need for reliability testing of components and sub-assemblies of the passenger vehicles. He shall discuss this with ICVL, putting forward his proposals for such testing and his reasons for omitting this where he considers it is not necessary, all as may be appropriate. Following such discussion, the Supplier shall submit his proposals for such tests for the approval of ICVL, setting out their scope and form. The results of such tests shall be furnished to ICVL and, where appropriate, shall be incorporated in the manuals. Should the results of any tests prove unsatisfactory, the design or method of manufacture of the component or sub-assembly shall be revised as ICVL may approve or require and similar tests repeated.

#### 11.1.7 Reliability Monitoring Program

During the warranty period of the vehicles the Supplier shall keep records in regard to remedial actions in respect of each locomotive. In these records he shall record any failure of a type that would, during the operating life of a vehicle, fall within the definitions of a Service Failure, notwithstanding that these may occur during testing of the vehicle. Should any such failure indicate the possibility of non-reliability in operation the Supplier shall promptly notify ICVL and submit his proposals for remedying the cause of the failure. During the period while they are in attendance, the field service engineers shall assist ICVL in monitoring any Service Failures and shall advise him upon necessary or desirable to prevent or reduce the likelihood of their recurrence. As and when required by ICVL, the

Supplier shall provide further advice to augment that of the field service engineers. At the beginning of each month during the 12-month period following the date of the Acceptance Certificate for the individual vehicle, the Supplier shall submit to ICVL, a report on the reliability of each vehicle during the preceding month.

## 11.2 Availability

The design should aim to achieve maximum availability and reliability. The relative objectives are given in section AN.3.

## 11.3 Maintainability

### 11.3.1 General

The primary objective of the Maintainability Program is to maximize vehicle availability. To achieve this objective, concentrated efforts shall be made to minimize maintenance downtime, reduce the possibility of human error when performing maintenance, and optimize overall accessibility of equipment for servicing, removal and repair. Maintainability considerations shall include features for minimizing maintenance costs and the need for highly skilled maintenance personnel.

### 11.3.2 Maintainability Targets

The maintainability requirement for a vehicle is an MTTMC of 1.5 hours. The maintainability figures for subsystems shall be indicated by the Supplier:

Subsystem	MTTMC	MTTMP
Diesel engines		
Generator		
Traction system		
Compressed air system		
Friction brakes		
Battery charger		
Doors		
Bogies & Suspension		
Air comfort		
Communications		
Car body		
Miscellaneous		

The Supplier shall indicate the MTTMP for the vehicle with the respective calculations.

## 11.4 Safety

### 11.4.1 General

The objectives of the system safety design shall be to ensure that no failure or deficiency shall result in a catastrophic or critical accident and that a hazard control program (as part as the system's operational procedures) will be maintained to ensure the optimum level of safety for:

- 1) Passengers boarding, alighting and being transported by the train, of which the locomotive is the traction vehicle.
- 2) The ICVL's personnel who are operating, maintaining or testing the vehicle.

- 3) The vehicle, its equipment and supporting facilities.
- 4) Wayside personnel, equipment and facilities.

The following accident categories shall be used in assessing hazard impacts on the system:

*Category I - Catastrophic*

May cause one or more fatalities and/or loss of major portions of the system.

*Category II - Critical*

May cause serious or multiple injuries and/or may require immediate corrective action to prevent fatalities or major system loss.

*Category III - Marginal*

May cause minor injury or system damage and/or may cause lengthy service interruption.

*Category IV - Minor*

Will not result in injury, system damage or lengthy service interruption, but may require non-routine repair service and/or operational procedure.

#### **11.4.2 Safety Requirements**

The vehicle system shall be designed, so that a second order failure (i.e. two failures superimposed) does not cause a category I or II hazard.

#### **11.4.3 Safety Analysis and Demonstration**

The design of the vehicle, its subsystems and components shall be effected according to approved methods with regard to systems safety. The safety analysis shall be performed by the Supplier on a regular basis, and shall be presented to ICVL at design review meetings. The safety analysis shall specifically include:

- a) identifying by analytical techniques the sources of functional failures in vehicle equipment, arrangements and operating controls which can result in catastrophic or critical accidents. Particular attention shall be given to accidents involving:

Collision or Derailment Fire/Explosion

Electrocution

Entrapment/Crushing

Falls/Contusions

Passenger safety

Safety of the operational and maintenance personnel

- b) Demonstrating that sources of these functional failures are eliminated and/or,
- c) Demonstrating how the consequences of these functional failures are controlled to attain the program objectives

Safety information and procedures shall be developed for inclusion in operations, training and publications. These shall include, but not be limited to, normal and emergency operations and the use of protective devices and emergency equipment by operating and maintenance personnel. The emergency procedures shall be demonstrated as part of the training program set out in section.

## ATTACHMENTS

### **A Infrastructure Details**

#### **A.1 Track Geometrical Parameters**

##### **A.1.1 Track Gauge**

###### **A.1.1.1 Standard track gauge**

The standard track gauge is 1067 mm (nominal).

##### **A.1.2 Horizontal Geometry**

Curves on main lines are with radius greater than 100 m.

###### **A.1.2.2 S-Curves**

In some lines there are S-curves with short tangent section and there are some without tangent.

Curves in depot: minimum radius in depot track is 85 m.

##### **A.1.3 Vertical geometry**

Minimum vertical curve

##### **A.2.2 Rails**

###### **A.2.2.1 Types of rails**

The following rail types are being used on the ICVL Railways network: UIC-54, UIC-45 and UIC-40.

###### **A.2.2.2 Rail inclination**

The rails are installed with an inclination of 1 in 20.

##### **A.2.3 Sleepers**

###### **A.2.3.1 Types of the sleepers**

Concrete mono-block

Franko-bagon

Wooden.

###### **A.2.3.2 Sleeper spacing**

Minimum number of sleepers for one km of track is 1428.

##### **A.2.4 Track**

Most of in main lines are with rails in length of 18 m welded or 12 m fish-plated.

Some sections on secondary line are with rails in length of 9 m or 12 m.

##### **A.2.5 Switches**

###### **A.2.5.1 Types of the switches**

1/20, 1/12, 1/9, 1/8 from rails UIC 54, UIC 45, UIC 40 and ASCE 40.

###### **A.2.5.2 General dimension**

Switches: Types and General Dimensions:

#### **A.3 General Criteria for Track Maintenance**





## **B Climate and Environment**

### **B.1 Climate conditions**

#### **B.1.1 Climate and Environmental Conditions**

Max. Ambient temp.	+55 °C
Min Ambient temp.	-10 °C
Relative humidity	10% to 90%
Altitude	00 m to + 2000 m
Sunny hours per year	4600 h
UV Radiation MJ/m2 per year	360 - 600
Rainfall mm/year	400 – 800

#### **B.1.2 Dust Conditions in the atmosphere**

(Microgram per m<sup>3</sup> atmosphere)

	Maximum Half-hour Value	Maximum Daily Average Value	Average
NOx	1064	560	71
SO2	780	260	21
O3	312	143	84
Suspended Dust		350	100

Suspended Particulate Matter (SPM)  
Particle size to 0.5-1 micron

#### **B.1.3 Sea Salt Concentrations in the Atmosphere**

Salt Element	Na		Cl		SO4	
	Season		Season		Season	
	Dry	Wet	Dry	Wet	Dry	Wet
Sea Air at Coast Line	7,3	16	12	22	5,3	7
600 m from Shore	3,1	4,8	4,2	7,9	1,9	2
6000 m from Shore	1,1	1,4	1,5	1,7	1,3	1,4

### **C.1 Various Detail Specifications**

#### **C.2 Sand**

#### **C.3 Wheel Lathe**

#### **C.4 Cleaning Agents**

#### **C.5 Fuel for diesel engines**

Hydro-carbon fuels: Gasoil for diesel engines

#### **C.6 Water specification**

Shall be considered typical water as:

Nº	Parameter	Unit	Range
1	Hardness	ppm	220-450
2	PH		6.4-7.5
3	Chlorides	ppm	20-400
4	Alkalinity	ppm	100-300
5	Ca	ppm	45-100
6	Cr	Ppb	app 3
7	Cu	Ppb	app 3
8	Fe	Ppb	app 68
9	K	ppm	2-5.7
10	Mg	ppm	20-30
11	Mn	ppm	app 6
12	HCO3	ppm	110-400

#### D Air-conditioning standard

According EN 13129-1:2002(E): Railway applications - Air conditioning for main line rolling stock - Part 1: Comfort parameters

#### E Crane – Train Interface

The reversible control train line cable is configured as follows:

1	Safety loop	Safety loop
2	Alarm signal	Alarm signal
3	DV effort set-point	DV effort set-point
4	Battery negative	Battery negative
5	Ready to run	Ready to run
6	Generator field	Generator field
7	CV effort set-point	CV effort set-point
8	Forward	Forward
9	Reverse	Reverse
10	wheel slip	wheel slip
11	Cab interlocking	Cab interlocking
12	BV effort set-point	BV effort set-point
13	Battery positive	Battery positive
14	Ready to depart	Ready to depart
15	AV effort set-point	AV effort set-point
16	Engine run	Engine run
17	Dynamic brake (B)	Dynamic brake (B)
18	Right doors opening permission	Right doors opening permission
19	Left doors opening permission	Left doors opening permission
20	Dynamic brake warning	Dynamic brake warning
21	Dynamic brake control (BG)	Dynamic brake control (BG)
22	Doors opening cancellation	Doors opening cancellation
23	Signal for amperImeter	Signal for amperImeter
24	Dynamic brake set-point	Dynamic brake set-point

25	Direct brake applied	Direct brake applied
26	Battery positive	Right doors opening permission warning
27	Battery positive	Left doors opening permission warning
28	Battery negative	
29	Right doors opening permission warning	
30	Left doors opening permission warning	
31	Battery negative	
32	Battery negative	
33	Screen of wires 26/34 in the male side	
34	Battery positive	
35	Battery positive	
36	Spare	
37	Screen of wires 27/35 in the male side	

Bidder shall fill in his reliability data in the attached table. This information will then be included in the contractual specification (see chapter 2, section 11.1.4):

MDBSF of one Sub-system	MDBSF in km of	
	Particular sub-system	Sub-assembly or component
Diesel engine		
Generator system		
Traction system		
Friction Brakes		
Auxiliary electric systems and controls		
Air-comfort system in drivers cabs		
All other Sub-Systems aggregated		

## SECTION VIII

### PREVENTIVE MAINTENANCE SERVICES REQUIREMENTS

#### 1.0 OVERVIEW

The supplier shall perform the following Preventive Maintenance including incidental services

- Provide the set of tools as further described below:
- Provide detailed operations and maintenance manuals for each unit supplied.
- Maintain records of the use and maintenance/repairs for each unit supplied.
- Scheduled and perform planned safety and maintenance inspections
- Scheduled and perform planned maintenance services, providing the necessary consumable spares as required
- To diagnose and assess accidental damage and provide technical assistance to the Purchaser in undertaking the necessary repairs
- To diagnose unforeseen technical faults & failures and to take necessary corrective action for repairs even outside the warranty period .
- Deliver on site and off site training as further described below

The Purchaser, at his own cost, shall provide the following inputs in assisting the Supplier to perform the services:

- Dedicated space in Workshop at Beira, with equipment, maintained in serviceable order
- 2-supervisory technical staff, to work 220 days per year, 40 hour week, with individuals to be proposed by the Purchaser and subject to the Supplier's right of refusal on reasonable grounds
- Recovery of stranded locomotives to Beira workshop

The Purchaser and Supplier agree that the Contract Price agreed for meeting these specifications is made on the basis of an assumed workload of 100,000 to 120,000 km per locomotive per year.

#### 2.0 SUPPLY OF TOOLS

The supplier shall, before final acceptance, bring to site all maintenance, diagnostic and repair equipment he deems necessary to perform the Preventive Maintenance services. The Supplier may assume that the Purchaser does not have equipment in good working order and calibrated accurately.

#### 3.0 SPARE PARTS

- i) The Supplier will supply all consumable spare parts for regular preventive maintenance of the Locomotives at its own cost for a period of two (2) years from the date of commissioning of the locomotives. Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spares for the locomotives.
- ii) The supplier shall supply spare parts and components (other than consumables) during the warranty period as promptly as possible, at its own cost, but subject to a maximum delivery delay of four (4) months.
- iii) The warranty period shall be twenty four (24) months from the date of commissioning of the Locomotives.
- iv) The supplier will not be responsible for damages to the locomotives due to technical negligence of the purchaser's operating staff and accident. Spares and components required for putting the damaged locomotive into service will be provided by the supplier on chargeable basis.

#### 4.0 MAINTAIN RECORDS

The supplier shall construct and maintain an electronic database. The database shall be available to the Purchaser at any time. The Supplier shall provide a summary report each month in a format mutually agreed with Purchaser. The database shall include the following information for each locomotive:

1. Kilometers operated each month
2. Out of service time for the following:
  - Mandatory inspections
  - Repair for in-service failures

- Scheduled maintenance
- 3. In-service failures
- 4. Mean time between failures (MTBF)
- 5. Mean distance between failures (MDBF)
- 6. Fuel and lubrication oil tests
- 7. Cost data for each locomotive, including the following:
  - Direct labour
  - Supervision
  - Material
  - Other direct or purchased costs
- 8. Material usage by part number and supplier

## **5.0 PREVENTIVE MAINTENANCE SCHEDULES**

- i) The purchaser shall make the locomotives available for maintenance schedules as per the prescribed preventive maintenance schedules of the locomotives.
- ii) The Supplier shall carry out preventive maintenance schedules as per the maintenance manual for each appropriate unit of the supplied locomotive. Adequate maintenance facilities in the maintenance workshop/Shed shall be made available by the Purchaser.
- iii) The tentative preventive maintenance schedules to be carried out by the supplier are:
  - GC- every 30 days
  - M3 – every 90 days
  - M6 – every 180 days
  - M9 – every 270 days
  - M12 – every year
  - M36 – every 3 years

## **6.0 SCHEDULED INSPECTIONS AND MAINTENANCE SERVICES**

The Supplier shall perform the following tasks:

- Scheduling and performing routine and periodic inspections for each locomotive in accordance with the schedule in the operations and maintenance manual
- Scheduling and performing all routine maintenance for each locomotive, in accordance with the provisions of the operations and maintenance manual
- Supply all the necessary consumable parts for each locomotive in accordance with the provisions of the operation and maintenance manual
- Schedule such as services so as to ensure the minimum availability of each locomotive specified in Data Sheet of these Technical Specifications
- Maintain those areas of the Purchaser's workshop and equipment designated for the use by the Supplier in a clean and safe state and in accordance with domestic environmental, health and safety laws and regulations

## **7.0 UNSCHEDULED REPAIRS**

The supplier shall perform the following tasks:

- Respond to a service call when a locomotive is removed from or in need of removal from service as a result of a failure, accident or force majeure, or when a failure or condition is diagnosed during routine maintenance for which corrective action is necessary.
- Perform diagnostic evaluation to assess the situation and present a plan to repair and return the locomotive to service.
- Advise the Purchaser on the method and parts required to effect the necessary repairs
- The supplier shall include the unit price plus delivery delay of non-consumable replacement spare parts with payment for such parts to be made by the Purchaser on a reimbursable basis within thirty (30) days after delivery to site.
- Oversee the performance of the repairs by the Purchaser's staff and advise if such repairs are not undertaken in the manner described in the operations and maintenance manual.

- Carry out and document the tests necessary to demonstrate proper operation of the repaired locomotive before the locomotive is restored to service.

Nothing in these specifications shall be construed as to relieve the Supplier of his obligations under the warranty (GCC Clause 15)

## **8.0 OTHER INSPECTIONS**

In the event that a locomotive shall be removed from Purchaser's property, the following inspections shall be performed unless explicitly waived by the Purchaser:

- Each locomotive shall be subjected to an outbound inspection. The inspection determine the condition of the locomotive, identify missing material and components, and ensure that the locomotive is in acceptable condition to transport from Purchaser to the Supplier's facility. As its option, the Supplier may participate in this inspection.
- The supplier shall perform an inbound inspection on each locomotive when it arrives at its facility to confirm condition of the locomotive and identify any missing material and components and any shipping damage.
- On completion of the inspection, if the engine appears in condition to do so, the Supplier shall start engine to evaluate its performance and condition.
- All defects and damaged or defective components shall be identified. Purchaser will participate in this inspection and authorize specific repairs, if any.
- On completion of all work on the locomotive, including test and cleaning, the Supplier shall jointly perform an outbound inspection with the Purchaser of the locomotive to confirm the condition of the locomotive, identify missing material and components, and to ensure the unit is ready for transport from the Supplier to Purchaser. The Supplier shall have all test results, inspection records, and other required documentation available for review at the time of inspection.
- On delivery to the specified Purchaser destination, each locomotive shall be subjected to a final inbound inspection to confirm the condition of the locomotive, identify missing materials and components and shipping damage, and determine the remaining work needed to get the unit ready to run.

## **9.0 QUALITY ASSURANCE**

- The Purchaser shall have the right to inspect the Supplier's facility or its sub-contractor facilities, any individual components before they are assembled into a locomotive, any assembly operation, and any tests performed on the components or assembly.
- The Supplier shall notify the Purchaser when material is available for inspection, when the assembly work will be performed, and when tests will be performed with sufficient notice for the inspections and tests.
- Technicians performing testing shall be qualified to perform the specific tests and interpret the results. The Supplier shall provide the Purchaser a copy of the current qualification or pertinent experience of the technicians prior to contract award.
- The Supplier shall make qualification test documents for Purchaser inspection at any time during the life of the Contract and provide copies of the original issue and any revision of each document. The Supplier shall deliver, in a timely manner, copies of all documents created during the life of the Contract.
- The Supplier shall notify Purchaser in writing of any conflicting requirement(s) between this specification and reference documents (AAR specifications, drawings, CFM specification, etc.) The Contractor shall identify the impact(s) of the conflicting requirements on the equipment and any possible delays in the deliveries, ICVL will resolve the issue(s) and respond in writing with directions for the disposition of such issues.
- Structural weld repairs to the under-frame or other load bearing structure of the locomotive must meet the current industrial standards.
- Welders performing structural repairs shall have been tested to demonstrate their ability to make the type of weld required using the welding equipment available. Qualification of welders shall be in accordance with AWS procedures or other Supplier qualification procedure accepted by the Purchaser. The Supplier shall provide records of welder qualification tests.

## **10.0 TRAINING**

The Supplier shall deliver the following formal training, in accordance with a detailed training plan to be prepared by the Supplier and approved by the Purchaser

- Driver training 60-70 person days per year two years, on site
- Mechanic Electric training, and supervisory training – ( about 4) ( person days per year for two years, on site

The Supplier shall provide hand on training to the Purchaser's nominated personnel at Purchaser's Workshop/Shed in maintenance of the locomotives.

#### **11.0 MISCELLANEOUS**

- The supplier shall supply tools for above maintenance schedules of the locomotive and its sub-components.
- The Supplier will provide requisite technical staff for maintenance purpose, for a period of Two (2) years from the date of commissioning for each locomotive can be extendable by three (3) years.
- The Purchaser shall give support to obtain any license/permission required for the working of Supplier's personnel in Mozambique. These license/permissions will be arranged at Supplier's cost.
- The Supplier shall follow all extant regulations of the Purchaser's country for providing Preventive Maintenance services
- The Purchaser will provide free of cost the following to the technical staff of the Supplier
  - Suitable accommodation for office work with telephone, photo-copying and internet facilities.
  - Working place with work benches for doing component overhaul and repair work.
  - Suitable space for storing spare parts and material.
  - Shed facilities like material handling equipment, machines, test stands etc. that are available with the Purchaser.

#### **12.0 MINIMUM PERFORMANCE & PRODUCTIVITY OF EQUIPMENT**

Emission Standard	UCI Stage II standards (UIC) leaflet on exhaust emission tests or equivalent or Tier 0 standard or equivalent
Fuel Efficiency	SFC 158 gm/bhp/hour (maximum)
Availability of Locos – Average per month	Locomotive availability shall be 90% with ( 365 days) working days in a year unless non-availability is due to accident or force majeure.
Reliability of Locos – Average between Loco Failure (MDBF)	10,000 km
Load Carrying Capacity	Minimum 1,500 tons on graded section
Operating Speed (maximum)	100 kmph

## SECTION IX. SAMPLE FORMS

### Notes on the Sample Forms:

The Bidder shall complete and submit with its bid the Bid Form and Price Schedules pursuant to ITB Clause 9 and in accordance with the requirements included in the bidding documents.

When requested in the Bid Data Sheet, the Bidder should provide the Bid Security, either in the form included hereafter or in another form acceptable to the Purchaser, pursuant to ITB Clause 15.3.

The **Contract Form**, when it is finalized at the time of contract award, should incorporate any corrections or modifications to the accepted bid resulting from price corrections pursuant to ITB Clause 16.3 and GCC Clause 17, acceptable deviations (e.g., payment schedule pursuant to ITB Clause 26.5 (c)), spare parts pursuant to ITB Clause 26.3 (d), or quantity variations pursuant to ITB Clause 31. The Price Schedule and Schedule of Requirements deemed to form part of the contract should be modified accordingly.

The **Performance Security** and **Bank Guarantee for Advance Payment** forms should not be completed by the bidders at the time of their bid preparation. Only the successful Bidder will be required to provide performance security and bank guarantee for advance payment in accordance with one of the forms indicated herein or in another form acceptable to the Purchaser and pursuant to GCC Clause 7.3 and SCC 11, respectively.

The **Manufacturer's Authorization** form should be completed by the Manufacturer, as appropriate, pursuant to ITB Clause 13.3 (a).

**Evaluation and Qualification Criteria for Eligibility Forms** should be completed pursuant to ITB Clause 13.3 (b)

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## Sample Forms

1. **Bid Form .....127**
2. **Price Schedules.....128**
3. **Bid Security Form.....129**
4. **Letter of Acceptance Form....130**
5. **Contract Agreement Form.....131**
6. **Performance Bank Gaurantee Form...132**
7. **Bank Guarantee for Advance Payment...134**
8. **Manufacturer's Authorization Form...136**
9. **Evaluation and Qualification Criteria for Eligibility Forms...137**
10. **Historical Contract Non-Performance-Pending Litigation History ...138**
11. **Financial Situation FIN-1.....140**
12. **Average Annual Turnover.....141**
13. **Experience – Form Exp.....142**

## 1. Bid Form

Date: \_\_\_\_\_

To: *[name and address of Purchaser]*

Gentlemen and/or Ladies:

1. Having examined the bidding documents including Addenda Nos. *[insert numbers]*, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply and deliver *[description of goods and services]* in conformity with the said bidding documents for the sum of

For Goods .....  
*[total amount in words and figures]*

For Preventive Maintenance services.....  
*[total amount in words and figures]*

or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

2. We meet the eligibility requirements and have no conflict of interest in accordance with ITB 2.2.

3. Our bid shall be valid for a period of 180 days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

4. We undertake, if our Bid is accepted, to deliver the goods in accordance with the delivery schedule specified in the Schedule of Requirements.

5. We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process;

6. We, along with any of our subcontractors, suppliers, consultants, manufacturers, or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by any authority Mozambique.

7. If our Bid is accepted, we will obtain the guarantee of a bank in a sum equivalent to five percent of the Contract Price for the due performance of the Contract, in the form prescribed by the Purchaser.

8. We agree to abide by this Bid for a period of 180 days from the date fixed for Bid opening under Clause 22 of the Instructions to Bidders, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

9. Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof and your notification of award, shall constitute a binding Contract between us.

10. We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 202 .

*[signature]*

*[in the capacity of]*

Duly authorized to sign Bid for and on behalf of \_\_\_\_\_

## 2. Price Schedule

(to be submitted online at M-Junction Portal only)

PRICE SCHEDULE FOR PROCUREMENT OF 5 (FIVE) no's CAPE GAUGE CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES INCLUDING PREVENTIVE MAINTENANCE SERVICES INCLUDING CONSUMABLE SPARES FOR A PERIOD OF 2 YEARS			
Sl.no	Description	Unit price in USD (IN FIGURES)	TOTAL PRICE FOR 5 NOS IN USD (IN FIGURES)
1	PROCUREMENT OF 5 (FIVE) no's CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES INCLUDING INCIDENTAL SERVICES		
2	PREVENTIVE MAINTENANCE SERVICES INCLUDING CONSUMABLE SPARES FOR A PERIOD OF 2 YEARS		
3		SUB TOTAL IN FIGURES	
4		VAT @ 16% IF APPLICABLE	
5		GRAND TOTAL	

Note: In case of discrepancy between unit price and total, the unit price shall prevail.

Note:

Price Bid should be submitted **online at M-Junction website/Portal** within due date & time of submission. Detailed Process of placement of Online Bid at M-Junction Services Ltd., Kolkata, India is as per the procedure given at Bid Data Sheet.

### 3. Bid Security Form

Whereas *[name of the Bidder]* (hereinafter called "the Bidder") has submitted its bid dated *[date of submission of bid]* for the supply of *[name and/or description of the goods]* (hereinafter called "the Bid").

KNOW ALL PEOPLE by these presents that WE *[name of bank]* of *[name of country]*, having our registered office at *[address of bank]* (hereinafter called "the Bank"), are bound unto *[name of Purchaser]* (hereinafter called "the Purchaser") in the sum of USD \_\_\_\_\_ (US Dollars \_\_\_\_\_) for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this \_\_\_\_\_ day of \_\_\_\_\_ 202\_\_\_\_.

THE CONDITIONS of this obligation are:

1. If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or
2. If the Bidder, having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity:
  - (a) fails or refuses to execute the Contract Agreement; or
  - (b) fails or refuses to (i) furnish the performance security and/or (ii) accept the arithmetical correction of its Bid, in accordance with the Instructions to Bidders;

we undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including thirty (30) days after the period of bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

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*[Signature of the bank]*

**4. Letter of Acceptance**  
*[letter head paper of the Purchaser]*

Date: \_\_\_\_\_ .

To: *[name and address of the Supplier]*

Subject: **Notification of Award Contract No.** . . . . .

This is to notify you that your Bid dated . . . . ***[insert date]*** . . . . for execution of the . . . . .  
. . . ***[insert name of the contract and identification number, as given in the SCC]*** . . . . .  
for the Accepted Contract Amount of . . . . . ***[insert amount in numbers and words and name of currency]***, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 30 days in accordance with the Conditions of Contract, using for that purpose the of the Performance Security Form included in the Bidding Document.

Authorized Signature:

\_\_\_\_\_  
Name and Title of Signatory:

\_\_\_\_\_  
Name of Agency:3

## 5. Contract Agreement Form

### Contract Agreement

THIS AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ 202\_\_\_\_\_ between *[name of Purchaser]* of *[country of Purchaser]* (hereinafter called “the Purchaser”) of the one part and *[name of Supplier]* of *[city and country of Supplier]* (hereinafter called “the Supplier”) of the other part:

WHEREAS the Purchaser invited bids for certain goods and Preventive Maintenance services, viz., *[brief description of goods and services]* and has accepted a bid by the Supplier for the supply of those goods and services in the sum of

For Goods..... *[price in words and figures]*

For Preventive Maintenance Services..... *[price in words and figures]*

In Aggregate *[price in words and figures]* (hereinafter together called “the Contract Price”).

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

- (a) the Bid Form and the Price Schedule submitted by the Bidder;
- (b) the Schedule of Requirements;
- (c) the Technical Specifications;
- (d) the General Conditions of Contract;
- (e) the Special Conditions of Contract; and
- (f) the Purchaser’s Notification of Award.

3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the goods and services and to remedy defects therein in conformity in all respects with the provisions of the Contract

4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the goods and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the contract at the times and in the manner prescribed by the contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, sealed, delivered by \_\_\_\_\_ the \_\_\_\_\_ (for the Purchaser)

Signed, sealed, delivered by \_\_\_\_\_ the \_\_\_\_\_ (for the Supplier)

Note: *The contract Form shall be in both English and Portugues version and shall be signed accordingly.*

## 6. PERFORMANCE BANK GUARANTEE

..... (Name of the Bank)

Address.....

Guarantee No. ....

A/c..... (Name of Bidder)

Date of Expiry.....

Limit to liability (Currency and Amount) .....

Letter of Intent /Agreement No.....

for Procurement of 5 (Five) CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES for haulage of Coal with Provision for Preventive Maintenance Services including consumable spares at site for a period of Two (2) years.

Subject: Performance Bank Guarantee

Date ..... 202...

To

Minas de Benga, Limitada

Estrada Nacional no 7, Tete

Mozambique

Dear Sir,

3. We refer to the Letter of Intent / Agreement (hereinafter called the "Contract") Reference No. .... dated ..... between Minas de Benga, Lda (MBL) and ..... (Name of the Successful Bidder) for Procurement of 5 (Five) CAPE GAUGE DIESEL ELECTRIC LOCOMOTIVES for haulage of Coal with Provision for Preventive Maintenance Services including consumable spares at site for a period of Two (2) years.
4. Whereas the ..... (Name of the Successful Bidder) has undertaken to produce a Bank guarantee under the Contract including any amendment thereto, to secure its obligations to you for the performance of the Contract including the guarantees and warranty of MBL Facilities.
5. We..... (Name of the Bank) do hereby expressly on first demand, irrevocably and unreservedly undertake to unconditionally pay to you merely on your written demand and without referring to ..... (Name of the successful Bidder) and the Contract and without referring to the merits of the request and without protest and demur an amount not exceeding US\$ ..... Any such demand made on us shall be conclusive as regards the amount due and payable by us under this guarantee.
6. Notwithstanding anything to the contrary we agree that your decision as to whether ..... (Name of the Successful Bidder) has committed a breach of any terms and conditions of the Contract shall be final and binding on us and we shall not be entitled to ask you to establish your claim or claims under this Guarantee but shall pay the same forthwith without any objection or excuse.
7. We undertake to pay to you any monies up to the guaranteed amount, so demanded notwithstanding any dispute or disputes raised by the successful Bidder in any suit or proceeding pending before any court or Tribunal or arbitration relating thereto, our liability under these presents being absolute and unequivocal.
8. The payment so made by us under this guarantee shall be a valid discharge of our liability for payment thereunder.
9. This guarantee shall come into force from the date of issue of this guarantee and shall remain fully, irrevocably, unconditionally valid and in force up to three months after supply and acceptance of all the locomotives.
10. This guarantee shall not in any way be affected by you taking any securities from the Contractor or by the winding up, dissolution or insolvency, as the case may be, of the Contractor. The Bank shall not be entitled to proceed against the assets of the Contractor at your site.
11. In order to give full effect to the guarantee herein contained, you shall be entitled to act as if we were your principal debtors in respect of all your claims against the Contractor, hereby guaranteed by us as

aforesaid and we hereby expressly waive all our surety ship and other rights, if any, which are in any way inconsistent with the above or any other provisions of this guarantee.

12. This guarantee is in addition to any other guarantee or guarantees given to you by us.
13. This guarantee shall not be discharged by any change in the constitution of the Contractor or us, nor shall it be affected by any change in your constitution or by any amalgamation or absorption thereof or therewith but will ensure for and be available to and effaceable by the absorbing or amalgamated company or concern.
14. Notwithstanding anything contained herein before our liability under this guarantee is restricted up to a sum..... (Currency and amount) and shall expire three months after supply and acceptance of all the locomotives as notified to us in writing by yourselves. We are liable to pay the guaranteed amount or any part thereof under this bank guarantee only if you serve upon us a written claim or demand up to the expiry date of this guarantee, otherwise all your rights shall be forfeited and we shall stand relieved and discharged from our liabilities hereunder.
15. We have full power to sign this guarantee under the delegations of powers and notification made under general regulation and resolutions in this regard.

**Yours faithfully**

**For..... (Name of the Bank)**

**Dated ..... day of.....**



## 7. Bank Guarantee for Advance Payment

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** *[Insert name and Address of Purchaser]*

**Date:** *[Insert date of issue]*

**ADVANCE PAYMENT GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *[Insert name and address of place of issue, unless indicated in the letterhead]*

*[name of Contract]*

In accordance with the payment provision included in the Special Conditions of Contract, which amends Clause 16 of the General Conditions of Contract to provide for advance payment, *[name and address of Supplier]* (hereinafter called “the Supplier”) shall deposit with the Purchaser a bank guarantee to guarantee its proper and faithful performance under the said Clause of the Contract in an amount of USD \_\_\_\_\_ (US Dollars \_\_\_\_\_) *[amount of guarantee in figures and words]*.

We, the *[bank or financial institution]*, as instructed by the Supplier, agree unconditionally and irrevocably to guarantee as primary obligator and not as surety merely, the payment to the Purchaser on its first demand without whatsoever right of objection on our part and without its first claim to the Supplier, in the amount not exceeding USD \_\_\_\_\_ (US Dollars \_\_\_\_\_) *[amount of guarantee in figures and words]*, upon receipt by us of the Beneficiary’s complying demand supported by the Beneficiary’s statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (a) has used the advance payment for purposes other than toward delivery of Goods; or
- (b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary’s bank stating that the advance payment referred to above has been credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant’s bank]*.

We further agree that no change or addition to or other modification of the terms of the Contract to be performed there under or of any of the Contract documents which may be made between the Purchaser and the Supplier, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition, or modification.

This guarantee shall remain valid and in full effect from the date of the advance payment received by the Supplier under the Contract until *[date]*.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No.758, except that the supporting statement under Article 15(a) is hereby excluded.

Yours truly,

Signature and seal of the Guarantors

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*[Name of bank or financial institution]*

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*[Address]*

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*[Date]*

## 8. Manufacturer's Authorization Form

[See Clause 13.3 (a) of the Instructions to Bidders.]

To: *[name of the Purchaser]*

WHEREAS *[name of the Manufacturer]* who are established and reputable manufacturers of *[name and/or description of the goods]* having factories at *[address of factory]*

do hereby authorize *[name and address of Agent]* to submit a bid, and subsequently negotiate and sign the Contract with you against Tender No. *[reference of the Invitation to Bid]* for the above goods manufactured by us.

We hereby extend our full guarantee and warranty as per Clause 15 of the General Conditions of Contract for the goods offered for supply by the above firm against this Invitation for Bids.

---

*[signature for and on behalf of Manufacturer]*

**Note:** This letter of authority should be on the letterhead of the Manufacturer and should be signed by a person competent and having the power of attorney to bind the Manufacturer. It should be included by the Bidder in its bid.

## 9. Evaluation and Qualification Criteria Forms

### **Bidder Information** **Form**

*[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]*

**Date:** *[insert date (as day, month and year) of Bid*

*submission]* Page \_\_\_\_\_ of \_\_\_\_\_ pages

1. Bidder's Name <i>[insert Bidder's legal name]</i>
2. Bidder's actual or intended country of registration: <i>[insert actual or intended country of registration]</i>
3. Bidder's year of registration: <i>[insert Bidder's year of registration]</i>
4. Bidder's Address in country of registration: <i>[insert Bidder's legal address in country of registration]</i>
5. Bidder's Authorized Representative Information  Name: <i>[insert Authorized Representative's name]</i> Address: <i>[insert Authorized Representative's Address]</i> Telephone/Fax numbers: <i>[insert Authorized Representative's telephone/fax numbers]</i> Email Address: <i>[insert Authorized Representative's email address]</i>
6. Attached are copies of original documents of <i>[check the box(es) of the attached original documents]</i>

**10. Historical Contract Non-Performance--Pending Litigation History****Form CON**

Bidder's Legal Name: \_\_\_\_\_

Date: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

<b>Non-Performing Contracts</b> in accordance with Section III, Evaluation Criteria			
Contract non-performance did not occur during the stipulated period, in accordance with Section III, Evaluation Criteria			
Contract non-performance during the stipulated period, in accordance with Section III, Evaluation Criteria. List all Non-performed contracts since date specified in the Section III.			
Year	Non-performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/number, and any other identification]</i> Name of Purchaser: <i>[insert full name]</i> Address of Purchaser: <i>[insert street/city/ country]</i> Reason(s) for non-performance: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
<b>Pending Litigation</b> , in accordance with Section III, Evaluation Criteria			
No pending litigation in accordance Section III, Evaluation Criteria			
Pending litigation in accordance with Section III, Evaluation Criteria, as indicated below. List all pending litigation contracts.			
Year	Brief reasons for litigation	Contract Identification	Total Contract Amount (current value, US\$ equivalent)
		Contract Identification: Name of Purchaser: Address of Purchaser: Matter in dispute: Amount in dispute	
		Contract Identification: Name of Purchaser: Address of Purchaser: Matter in dispute: Amount in dispute	

Form Continued			
Litigation History in accordance with Section III—List all contracts since the date specified in Section III indicating:			
Year	Brief reasons for litigation	Contract Identification Contract Identification: Name of Purchaser: Address of Purchaser: Matter in dispute: Amount in dispute Court or Arbitral award decision:	Total Contract Amount (current value, US\$ equivalent)

## 11. Financial Situation

### From -FIN-1

(The following table shall be filled in for the Applicant and shall be certified by the Statutory Authority)  
Historical Financial Performance

Bidders Legal Name: \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ of \_\_\_\_\_ Pages

To be completed by the Bidder

Financial	Historic information for previous _____ ( ) years						
information in	(US\$ equivalent in 000s)						
US\$ equivalent							
	Year 1	Year 2	Year 3	Year ...	Year n	Avg.	Avg.
							Ratio
<b>Information from Balance Sheet</b>							
<b>Total Assets</b>							
<b>(TA)</b>							
<b>Total Liabilities</b>							
<b>(TL)</b>							
<b>Net Worth</b>							
<b>(NW)</b>							
<b>Current Assets</b>							
<b>(CA)</b>							
<b>Current</b>							
<b>Liabilities (CL)</b>							
<b>Information from Income Statement</b>							
<b>Total Revenue</b>							
<b>(TR)</b>							
<b>Profits Before</b>							
<b>Taxes (PBT)</b>							

Attached are copies of financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following conditions:

- Must reflect the financial situation of the Bidder and not sister or parent companies;
- Historic financial statements must be audited by a certified accountant;
- Historic financial statements must be complete, including all notes to the financial statements;
- Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).
- The audited balance sheets and profit & loss account/ annual report for the last 3 accounting years shall be submitted.

## 12. Average Annual Turnover

### Form FIN – 2

*[The following table shall be filled in for the Applicant and shall be certified by the Statutory Auditor].*

Bidder's Legal Name: \_\_\_\_\_

Date: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

To be completed by the Bidder

Annual turnover data		
Year	Amount and Currency	US\$ equivalent
	_____ _____	
	_____ _____	
	_____ _____	
	_____ _____	
	_____ _____	
*Average Annual Turnover	_____	_____ _____

\*Average annual turnover calculated as total certified payments received for supply in progress or completed, divided by the number of years

For Bid evaluation, the Bidder shall demonstrate the minimum average annual financial turnover of 3 times the total bid price of all items for which bid has been submitted as certified payments received by the Bidder since last five years for contracts in progress and completed for all Goods manufactured and supplied divided by the number of years and part thereof elapsed since last three years. If the average annual turnover amount is less than the required turnover amount for all items for which the Bidder is successful, limitation will be placed on the number of item(s) that will be awarded to the Bidder and Purchaser will decide which item or items will be awarded based



### 13. Experience—Form Exp

Bidder's Legal Name: \_\_\_\_\_ Manufacturer's Legal name: \_\_\_\_\_  
 Page \_\_\_\_\_ of \_\_\_\_\_ pages  
 Date: \_\_\_\_\_

Complete all information requested below that are required to assess Bidder's qualifications as per post qualification criteria specified under Section III

To be completed by Bidder

<b>Similar Contract Number: ____ of ____ required.</b>	<b>Information</b>	
Contract Identification		
Award date	_____	
Completion date	_____	
Role in Contract	_____	
Total contract amount		US\$_____
Purchaser's Name:	_____	
Address:	_____	
Telephone/fax number: E-mail:	_____	
Description of Goods		
Quantity of Goods supplied under this contract		
Quantity of Goods supplied under all other contracts since the date indicated in Section III-Provide similar separate details as for this contract for all such other contracts		
Form Exp continued		
First date of manufacturing similar goods as offered in the bid		
Period of Successful use/operation – Number of Years		
<b>Similar Contract Number: ____ of ____ required.</b>	<b>Information</b>	
Installed manufacturing capacity—Number of units per month of item (s) specified in section III		
Demonstrated proven capacity to supply since the date and for Item (s) specified in Section III		

The Bidder shall furnish documentary evidence to demonstrate that it meets the following experience requirement(s). Wherever the words "Similar Goods" have been used it includes upgrades, latest and improved versions or models of similar specifications and technology:

*a) The Bidder shall be manufacturing similar Goods since last 5 years.*

*b) The Bidder (Manufacturer/Supplier) shall furnish documentary evidence to demonstrate that it meets the following experience requirement(s).*

The Bidder should have executed (supplied Locomotives for freight transportation) the following value of Orders during last 10 years:

1. single work order for a value of 15 Million USD  
or
2. two work orders of 10 Million USD each  
or
3. three work orders of 7.5 Million USD each