

**BEML LIMITED**

(A Govt. of India Mini Ratna Company under Ministry Of Defence)
BANGALORE COMPLEX, POST BOX: 7501, NEW THIPPASANDRA POST,
BANGALORE-560075

NOTICE INVITING TENDER**SRM BID NO: 6100001251****Dt: 28.07.2026****Subject: VAC Vehicle Level Climatic Chamber Test required for CMRL ARE02A project.**

Quotation/offer are invited for **VAC Vehicle Level Climatic Chamber Test** for Metro Rolling stock having experience in **VAC Vehicle Level Climatic Chamber Test** in accordance with the enclosed terms and conditions within the tender closing date.

Quotations should be submitted online (E-mode) in SRM Portal in Two-Bid system as below:

- 1) Technical Bid**
- 2) Commercial Bid**

Note: 1. Commercial bids of only technically acceptable firms will be opened and considered for further evaluation by BEML.

2. No commercial terms to be indicated in the technical bid else the offers of such bidders will be rejected and not considered for further commercial evaluation

3. Eligibility based on "Reputed test agency with independent accreditation or JV/consortium where the JV/consortium partner (test agency) that holds the accreditation from the relevant body for the test being conducted shall be the primary partner and shall perform the test & generate test report. Scope sharing details shall be part of JV/consortium"

Note: - The tender consists of **38** no. of pages including this page.

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3. General Instructions to Bidders:

1. The Bidders are advised to carefully go through, read and understand this tender documents completely including terms and conditions, Annexures and Appendices etc. before submitting bids
 - a. This NIT is not transferable under any circumstances.
 - b. All entries in the NIT shall be in English either typed or written legibly. Erasing, over-writings and use of correction fluids are not permitted. All cancellations and insertions should be duly signed / attested by bidder concerned.
 - c. All the corresponding documents shall be attached along with the quotation/offer
 - d. The bidder shall **sign each and every page of tender document** before submitting the tender. No corrections/revisions will be entertained after opening the bids.
 - e. Late and/or incomplete tender shall not be considered.
 - f. Canvassing in any manner including unsolicited letters and request for post tender corrections shall render offers of such parties liable for rejection.
 - g. Bidder shall ensure that all the information & documents submitted by them are true & correct.
 - h. In case, it comes to the knowledge of BEML that the bidder has submitted false information before awarding of contract then the offer would be rejected.
 - i. In the event, it comes to the knowledge of BEML that the successful bidder has submitted false information, subsequent to the award of contract, the contract shall be cancelled/short closed by the company and shall invoke Risk purchase clause with liabilities on such bidder for the entire contract quantity. The PBG shall also be encashed as a result of consequence of breach of contract at the discretion of BEML.

2. Abbreviations used in this NIT

GeM-Government E Market Place	BEML -BEML Limited
NIT- Notice Inviting Tender	CMRL -Chennai Metro Rail Limited
TS-Train set	ERTS - Employer's requirements Technical Specification
PTS- Procurement Technical Specification	ERGS- Employer's requirements General Specification
PO-Purchase order	DLMP -Defect Liability and Maintenance Period
GTC- General Terms and Conditions	PBG – Performance Bank Guarantee

3. In case any person/persons, Company, firm, Associations having any litigation, arbitration cases between themselves and BEML Ltd, pending before any court of law/ Arbitrator shall not be eligible to participate in this tender.
4. Non-compliance with any of the tender conditions, incomplete offers, conditional and ambiguous offers are not acceptable and liable for rejection.
5. The bidder shall fill in all the required particulars in the blank space provided for the purpose in the tender document.
6. All the documents shall be uploaded in GeM Portal.
7. Fax/email quotations are not acceptable.
8. BEML reserves the right to accept or reject all tenders or any tender in part or full without assigning any reasons thereto, which is final & binding on the Bidder

4. DETAILS OF THE TENDER

This "Notice Inviting Tender" hereinafter referred to as the 'NIT' is designated as the tender for **VAC Vehicle Level Climatic Chamber Test required for CMRL ARE02A project.**

1) The tender consists of two parts as indicated below:

Sl. No.	Nature of Bid	Mode of Submission	Details
1	Technical Bid	SRM Portal	- Technical Bid (Without Price Details) shall be uploaded and submitted in the SRM Portal, wherein only technical Bid /technical information in SRM Portal shall be uploaded - Clause by clause compliance to General Terms and conditions. - Clause by Clause compliance to PTS Doc No. GR/TD/8120 Latest revision. - Submission of Integrity pact.
2	Commercial Bid	SRM Portal	Price details to be duly filled in specified field on GeM Portal. Commercial evaluation will be based on total value

2) Details of Items & Services:

TABLE-1

Sl. No	Description	UoM	Quantity
1	Vehicle level VAC System type tests, PTS No: GR/TD/8120, latest revision - CMRL ARE02A Project	AU	1

Note: Reputed test agency with independent accreditation or JV/consortium where the JV/consortium partner (test agency) that holds the accreditation from the relevant body for the test being conducted shall be the primary partner and shall perform the test & generate test report. Scope sharing details shall be part of JV/consortium

5. SUBMISSIONS OF TECHNICAL BID

Technical Bid submission Conditions	<u>TECHNICAL BID (Without Price Details)</u> shall be uploaded and submitted in the SRM Portal, wherein only technical Bid /technical information in SRM Portal shall be uploaded as indicated below: a. Bidders should upload duly filled, signed & stamped Integrity Pact with two witnesses [Appendix – A]. b. Clause by Clause compliance for the Procurement Technical Specification (PTS) Doc No. GR/TD/8120 Latest Rev. [Appendix – B] Bidders to refer “PTS” (Annexure-I) enclosed along with this tender document. Bidders should upload the following documents duly filled, signature & stamped under technical bid. c. Bidder to upload enclosures related to technical & other information deemed appropriate in respect of this tender on the letter head of the company, if any. d. Photographs / Drawings if any, may be uploaded. e. Bidders to refer “GENERAL TERMS AND CONDITIONS (GTC)” (Annexure-II) enclosed along with this tender document and upload clause by clause compliance of GTC duly filled, signature & stamped along with the supporting documents as specified therein. [Appendix – C] f. Bidders to upload duly filled, signature & stamped confidentiality agreement in plain paper [Appendix – D] g. Bidders to upload duly filled, signature & stamped Compliance to Land border sharing Clause – [Appendix – E] h. Bidders to upload duly filled, signature & stamped Compliance to purchase preference under public procurement policy – [Appendix – F] i. Bidders to upload duly filled, signature & stamped Compliance to Contact Details of Supplier/ Bidder – [Appendix – G] BEML at its sole discretion reserves the right to seek the Soft/ Hard copies of the documents which are already been uploaded in GeM, through Courier / post pertaining to technical bid of this tender enquiry at a later date, if required. In such cases, only the documents uploaded in GeM Portal in original has to be couriered at the request of BEML. Any irrelevant documents furnished through courier will not be considered. NOTE: Please note Commercial Bid /Price details should not be indicated in TECHNICAL BID, else bid will not be considered for further evaluation.
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6. SUBMISSION OF COMMERCIAL BID

The price bid to be submitted through SRM Portal. The following details are to be entered in the SRM Portal.

TABLE 1				
Sl. No	Description	UoM	Quantity	Unit Rate in INR
1	Vehicle level VAC System type tests, PTS No: GR/TD/8120,latest revision - CMRL ARE02A Project	AU	1	Price to be uploaded in commercial bid only
The prices are firm and fixed prices and PVC is not applicable.				

Note:

1. Bidder has to quote for the items as listed in SRM Portal
2. Commercial evaluation will be total value.
3. The commercial bids of the technically acceptable vendors only will be opened for further commercial evaluation.
4. Reverse Auction will be conducted among technically qualified Bidders and L1 status will be arrived based on total bid value.

ANNEXURE – II**8.GENERAL TERMS & CONDITIONS (GTC) FOR PROCUREMENT OF MATERIALS:****1. GLOSSARY, DEFINITIONS & INTERPRETATIONS**

- a) The Purchaser means “(include company name and address)” (A Government of India Undertaking) incorporated under the Companies Act having its registered office at “BEML Soudha, No. 23/1, 4th main, S.R. Nagar, Bengaluru – 560027” and shall be deemed to include its successors and assignee.
- b) Supplier’ means a person having been included in a contract as a Contractor and also means a firm or company with whom the order for supply/execution of work is placed and shall be deemed to include the supplier’s successors, (approved by BEML Ltd.) representatives, heirs, executors and administrators. The supplier may also be referred to as the supplier, Contractor or vendor.
- c) Parties to the Contract’ shall mean the Supplier and the Purchaser as named in the main body of the Purchase Order.
- d) Tender’ means and includes quotation, invitation to tender and all other documents like drawings, specifications, design & quality plan, etc., that form part of the tender document.
- e) Acceptance of Tender’ Means the letter of memorandum communicating supplier, the acceptance of the Tender and includes advance acceptance of this tender.
- f) Purchase Orders (PO) / Contract’ means and includes the invitation to tender, instruction to Tenderers, acceptance of tender, Letter of intent / letter of award, the general terms and conditions of Purchase Order / contract, special conditions of Purchase Order /contract, particulars, descriptions, specifications, schedule of prices, quantities, quality plan, drawings enclosed and other condition specified in the acceptance of tenders and includes the repeat order which has been accepted or acted upon by / for the supplier for the supply of stores and includes an order for performance of service and includes amendments, if any, that may take place subsequent to the discussions, negotiations, mutual agreement if any.
- g) Stores / Materials / Services’ means the goods or services as described in Procurement Technical Specification (P.T.S.) and in the Purchase Order which the supplier has agreed to supply under the Purchase Order.
- h) Specification means technical specifications of the Equipment / Material as set forth in Procurement technical specification (PTS) / technical drawings, which is part of tender. Employer (BMRCL) Requirement Technical specification (ERTS) & Employer (BMRCL) Requirement General specification (ERGS)
- i) End-Customer / End-user means: Bangalore Metro Rail Corporation Ltd (BMRCL).
- j) Words in singular include the plural & vice-versa.
- k) Words imparting the masculine gender shall be taken to include the feminine gender and words imparting persons shall include any firm, company or associations or body of individuals whether incorporated or not.

- l) The heading of these conditions shall not affect the interpretations or construction thereof of the contract.
- m) F.O.B / F.D.D / DAP. is to be interpreted in accordance with the provisions of INCOTERMS 2010, unless otherwise specified in this Tender Document / Purchase order.

2. SUBMISSION OF THE TENDER:

Tender is in TWO-BID system (Technical & Commercial Bid)

Bids should be submitted online mode only as follows:

a) Submission of Technical bid (without price):

- i. The Bidder should upload all the requisite technical documents along with respective supporting documents and other information deemed appropriate in respect of the Tender.
- ii. **The price details/commercial bid details should not be given in the Technical bid.** If any of the bidder have given any price/commercial details in the Technical bid, their offer is liable for rejection and will not be considered for further evaluation.
- iii. Technical Bid will be opened on date and time of bid opening and the commercial Bids of those bidders whose technical bids are qualified (accepted) only will be opened for commercial evaluation.

b) Submission of Commercial bid:

- i. The Commercial Bids of those bidders whose technical bids are qualified (accepted) only will be opened for commercial evaluation.
- ii. Price details in specified field on SRM Portal to be submitted.
- iii. Bidder to quote for all the items /Services if any.

c) General:

- i. If dealers/authorized representatives submitting the bids in place of OEM, Dealer / authorized representatives should submit Authorization letter from OEM.
- ii. BEML reserves right to reject the tender due to unsatisfactory past performance in the execution of a contract at any of BEML projects / units.
- iii. Bidders participating in the tender should declare in their offer that whether they have been black-listed / kept on hold for a specified period / given Business holiday for a specified period by any Public sector undertaking or Government departments. The reasons for such action with details and the current status of such hold shall be furnished to BEML.
- iv. In case any person/persons, Company, firm, Associations having any litigations, arbitration cases between themselves and BEML Ltd, pending before the Court / Arbitrator or initiated litigations/arbitrations in connection with any contract / tender issued by BEML Ltd and any contractor has defaulted against the BEML's orders, they are not eligible to participate in this tender.
- v. BEML may decide to scrap the tender/refloat the tender without assigning any reasons thereof before LOI/PO is committed. BEML reserves the right to accept, split, divide, negotiate, cancel or reject any tender or reject all tenders at any time prior to the award of the contract without incurring any liability to the affected tenderers or any obligation to inform affected tenderer, the grounds of such action.

- vi. BEML reserves the right to verify, in its sole discretion, any information given by the bidders independently through any third-party agencies. During this process, if it is found that any of the information given by the bidder is false / misleading, offers of such bidders would be out rightly rejected.
- vii. BEML also reserves the right to independently assess the capability and capacity of the bidder for execution of the order/contract. BEML's decision on any matter regarding short listing of bidders shall be final.
- viii. The Tender / Notice Inviting Tender is not an offer or a contract.
- ix. Bidders will not be compensated or reimbursed for the costs incurred in preparing Proposals. Proposals shall become BEML property.
- x. BEML's decision is final for Evaluation of the offers.
- xi. **DELIVERY SCHEDULE** : Tentative delivery schedule is indicated in the document ref: GR/TD/8120 Latest Rev. However, the bidder has to start the work, after release of Purchase order based on confirmation from R&D department

3. SUPPLIERS SHARING LAND BORDER WITH INDIA:

Land border sharing Declaration in line with Department of Expenditure (DOE) Public Procurement Division order vide F. No. 6/18/2019-PPD dated 23.07.2020 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products, shall be applicable for bidders / suppliers sharing land border with India. Bidders to upload signed & sealed compliance as per appendix attached as part of Technical Bid.

4. PREFERENCE TO MAKE IN INDIA:

Purchase Preferences as per MII (Make In India Policy) and MSE Purchase Preference as Per Public Procurement Policy is Applicable in-line with revised public procurement (preference to make in India), order 2017 dated 04th June, 2020 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products, shall be applicable for bidders / suppliers under Purchase preferences. Bidders shall upload necessary supporting documents and to upload signed & sealed as per appendix attached as part of Technical Bid.

Consideration of bids shall be as follows:

(i) If technically qualified bid(s) with valid Notice of No Objection / Notice of No Objection with Conditions (NONO/NOWC) from end customer (i.e. CMRL) is available for local supplier (as per MII), then bids of local supplier/s only will be considered and bid of non-local supplier/s will not be considered for commercial bid opening and evaluation.

(ii) In the case of technically qualified bid(s) with valid Notice of No Objection (NONO/NOWC) from end customer (i.e. CMRL) is not available for local supplier (as per MII) then the technically qualified bid(s) with valid NONO/NOWC from end customer (i.e. CMRL) of non-local supplier/s will be considered for commercial bid opening and evaluation

5. DELIVERY TERMS:

Transportation of one car from BEML limited, Bangalore complex to test facility and back to BEML after completion of tests is to BEML scope. Sub contractor shall co-ordinate with

transporter to shift the car from the port to the test facility, assist in arranging the required facilities for loading and unloading the car at port and assist in any issues during local transportation of car

6. PAYMENT:

Applicable to Indian Bidder:

Terms of payment are 100% in 60 days from the date of completion of all the tests and submission of test reports & submission of bills duly certified by BEML R&D Department & for MSEs 45 days from the date of completion of all the tests and submission of test reports & submission of bills duly certified by BEML R&D Department.

Bidders to indicate the category of their firm under Micro/Small/Medium industries with necessary documentary proof of evidence for purpose of evaluation and BEML data up dation.

Micro and Small enterprises (MSE) registered under UDYAM registration are eligible for the 45 days payment on submission copy of MSE certificate issued by UDYAM.

Applicable to Foreign Bidder:

Payment will be made through Telegraphic Transfer (T/T) on 60th day from the date of completion of all the tests and submission of test reports & submission of bills duly certified by BEML R&D Department.

Any bank charges incurred in India shall be borne by purchaser and all bank charges outside India shall be borne by the supplier..

The payment is further subject to the following:

- a) The Invoice shall be compliant with GST laws.
- b) GST liability is to be discharged and ensure filing of outward supply details on GSTN portal within timeline prescribed.
- c) Any debit note/supplementary invoice if any, is to be raised within September month following the respective financial year of filing of annual return by BEML, whichever is earlier.
- d) Any loss of tax credit due to the reason attributable to supplier shall be recovered from supplier along with applicable interest and penalty.
- e) Bidders to indicate the GST and other levies applicable. GST shall be paid only after confirmation of payment of GST by vendors on GST Website.
- f) Relevant TDS / TCS as applicable shall be deducted as per prevailing Income Tax / GST / GOI notifications
- g) The supplier should submit the following documents for each supply:
 - Tax Invoice; GSTR-1 return filed with authorities with the relevant abstract
 - GSTR-3B return or any other form of return prescribed by the authorities.
 - Copy of Challans regarding deposit of GST
 - Certificate of Chartered Accountant

- 7. PRICE BID VALIDITY:** The Bid should be valid for 180 days from the date of tender opening. BEML's acceptance of the tender at the quoted / negotiated rates will be binding on the tenderer during the tenure of contract.
- 8. FIRM PRICE.** The prices remain firm for the entire supplies of the purchase order and no escalation shall be entertained under any circumstances. The prices are to be firm & no increase in finalized price will be entertained after awarding contract during the period of Contract for any reasons whatsoever.
- 9. INSPECTION:**

Please refer PTS :: GR/TD/8120 Latest rev. BEML team along with VAC supplier reps will participate in the tests. All tests will be witnessed by customer technical team

10. PERFORMANCE BANK GUARANTEE (PBG):

Firm shall submit the following Performance Bank Guarantees:

- a. Supplier should submit Performance Bank Guarantee for amount equivalent to 10% of the Contract value valid till completion of all the tests and submission of test reports with additional 3 months claim period. The bank guarantee has to be submitted within 60 days from the date of release of Purchase order from BEML but not later than 30 days before commencement of service activities.
- b) In case BEML is constrained to extend the Performance Bank Guarantee to its customer (BMRCL), due to the failure of aggregates attributable to the supplies made by the supplier or non-fulfilment of NRC activities if applicable, then the costs involved to BEML for such PBG extensions shall be borne by the supplier.
- c) Performance Bank Guarantee shall be returned on completion of the order, based on the recommendations of the User Department (i.e. R&D Dept.), the Bank guarantee will be released to the firm/bidder within three months (03) after completion of the order subject to fulfillment of contractual obligations by the firm
- d) If the minor outstanding works as incorporated in the taking over certificate are not attended by the Supplier within the specified time frame, full amount of Performance Security due to the Supplier shall not be released

General terms of PBG:

- a) In case of foreign bank guarantees, the BGs from foreign banks, authorized /recognized by RBI to issue a Bank Guarantee, in their own letter head will be accepted.

In the case of PBG/s submitted from Indian Bank, the PBG shall be furnished by Scheduled Commercial Banks authorized by RBI to issue a Bank Guarantee.

Format for PBG is attached for reference.

- b) In the absence of performance bank guarantee to be submitted by the supplier as per contract terms, BEML will not open Letter of Credit (LC) in the cases of LC in favor of supplier pertaining to the shipment / stores to be supplied as per first delivery schedule

- indicated in the purchase order. Any delay in submission of performance bank guarantee by the supplier, the subsequent delay in opening in Letter of Credit by BEML and supplies to be effected by the supplier are to the account of the supplier, which attracts liquidated damage charges as per contract terms.
- c) No claim shall lie against BEML Ltd., in respect of interest on cash deposits or Govt. Securities depreciation thereof.
 - d) BEML shall be entitled to and it shall be lawful on its part to encash the Bank Guarantee in whole or in part in the event of any default, failure or neglect on the part of the supplier in the fulfilment or performance in all respect of the Purchase Order.
 - e) The Bank Guarantee shall be established through NeSL / **Structured Financial Messaging System (SFMS)** mode from a Scheduled Commercial Bank authorized by RBI in India as defined by RBI.
 - f) A separate copy of the BG has to be sent by the issuing bank to the Purchaser's bank through SFMS. The details of Purchaser's bank are as under:

STATE BANK OF INDIA
Overseas Branch, No.65,
St. Marks Road,
Bangalore – 560001
IFSC Code: SBIN0006861

- g) Following codes are to be used by issuing bank for the purpose of Confirmation and amendment in Bank Guarantees:

Code	Purpose
MT760	Confirmation of Bank Guarantee
MT767	Amendment in Bank Guarantee

- h) Bank Guarantee issued on the SFMS platform with any other code other than mentioned above for the purpose shall not be acceptable to the Purchaser.
- i) The Bank Guarantee validity shall be extended as required till the completion of all contractual and warranty obligations in Full.

11. RIGHT TO VARY QUANTITIES:

“BEML reserves the right to increase or decrease the quantity specified in the schedule of requirements without any change in the unit price or terms and conditions. The purchaser (BEML) may exercise the right on any date/s, before completion of one year from the scheduled delivery of last train set by BEML to end customer.

Purchaser (BEML) at its discretion may advice the contractor (supplying vendor) in writing about the increase in the quantity of the Line items ordered.

Supplier shall be required to supply increased order quantities at the contracted terms & conditions and at determined firm unit price originally ordered and no additional amount on account of quantity variation or escalation or any other account whatsoever is payable to the supplier.

In case of increase in quantity beyond the original quantity, the Key dates for the increased quantities shall be mutually decided at the time of quantity variation by Purchaser.”

12. LIQUIDATED DAMAGES CLAUSE:

The time and the date of delivery of the stores stipulated in the PO shall be deemed to be the essence of the Purchase order and delivery must be completed not later than the dates specified therein. The supplier shall strictly adhere to the delivery schedule indicated in the PO. Any supplies made ahead of this schedule are liable for rejection at the discretion of BEML. Should the supplier fail to deliver the stores or any consignment thereon within the period prescribed for such delivery, BEML shall be entitled:

“To accept the delayed supply and to recover from the supplier Liquidated Damage charges at the rate of **0.1%** of total value of the amounts apportioned to the affected delivery schedule for each calendar day of delay for **first 28 days** and **0.2%** of the total value of the amounts apportioned to the affected delivery schedule for each calendar day of delays from **29th day** to the maximum of **10%** of the affected schedule of the purchase order.”.

The penalty / LD will be charged on the value of the affected delivery schedule excluding statutory levies, freight and insurance wherever not included in the price.

13. RISK PURCHASE CLAUSE:

The time and the date of delivery of the stores stipulated in the PO shall be deemed to be the essence of PO and delivery must be completed not later than the date specified therein. Shall the supplier fail to deliver the stores or any consignment thereof within the period prescribed for such delivery, BEML shall be entitled at their option either;

- a. To purchase elsewhere, without notice to the supplier on the account and at the risk and cost of the supplier the stores not delivered or other of a similar description (where stores exactly complying with the description and readily procurable) without cancelling the PO in respect of consignment not due for delivery

or

- b. To cancel the purchase order.

In the event of action being taken under clause (a) or (b) above, the supplier shall be liable for any loss, which BEML may sustain on that account but the supplier shall not be entitled to any gain or purchases made against default. As soon as it is apparent that the scheduled dates cannot be adhered to, an application shall be sent by the supplier to BEML, well before the expiry of the delivery period specified in the purchase order. Without prejudice to the foregoing rights, if such failure to deliver in proper time as aforesaid shall have arisen from any cause which BEML may admit as a reasonable ground for an extension of the time (and their decision shall be final) they may allow such additional time as they may consider justified by circumstances of the case.

Delivery required to be made in lots shall be made in lots only and any extra deliveries involved either on account of repeated rejections or variance in supply of lots shall be liable for service charges of 5% of the purchase order value for each extra delivery.

14. SECRECY AND CONFIDENTIALITY:

- a) All the information, know-how, technical data, specification and drawing models or specimens furnished by BEML for the purpose of or in connection with the manufacture and supply of the stores hereby tendered constitute the property of BEML and the supplier shall keep them in strict confidence and he/ she shall not divulge the same to anyone else except under the authority and for the purpose of BEML. All such documents, data, drawing, models and specimens are the property of BEML and shall be returned when done with or when demanded by BEML.
- b) The supplier shall not supply the material ordered by BEML to anyone else other than BEML and shall not disclose any initiations, development or adaptations thereof to anyone.
- c) BEML shall be entitled to prevent a breach of the above and claim damages in case of breach. In case of non-performance in this PO, BEML will have to take procurement action at your risks and cost apart from levy of liquidated damages.
- d) Confidentiality agreement to be executed as per Appendix E.

15. AUTHORITY OF PERSONS SIGNING DOCUMENT:

A person signing the tender or any other document in respect of the tender shall be deemed to have power to do so on behalf of the Supplier.

16. ACCEPTANCE OF ORDER:

The supplier shall send Order Acceptance within two weeks from the date of LOI/LOA/Purchase Order or such other period as specified / agreed by the Purchaser. Purchaser reserves the right to revoke the order placed if the order confirmation differs from the original Purchase Order placed and the Purchaser shall only be legally bound after it has agreed explicitly in writing to be in agreement with the deviation. The acceptance of deliveries or supplies by Purchaser as well as payments made in this regard shall not imply acceptance of any deviations. The Purchase Order will be deemed to have been accepted if no communication to the contrary is received within two weeks (or the time limit as specified / agreed by the Purchaser) of receipt of the order.

17. OTHER CONDITIONS:

- a) Refer BEML Purchase Manual (can be accessed in BEML website www.bemlindia.in) for Important terms and conditions of tender and General Terms & conditions applicable to contracts & purchase orders refer General Terms & Conditions
- b) The firm shall take necessary permission for their employees to enter the factory premises and the firm shall arrange ESI & PF coverage to their employees / labourers if any from their end. The firm shall indicate ESI NUMBERS for the labourers hired or employed in advance in order to prepare work permit inside the factory.
- c) BEML will not have any kind of binding towards the compensation on case of injury / death to the firms employees while working in BEML premises or other wises.
- d) BEML will not have any kind of binding on damages or loss to the tools/instruments etc. brought by the firm for commissioning purpose.

18. PRICE, INVOICING AND PAYMENT:

- a) The agreed prices are **fixed prices** for the supply, in the currency as specified in the Purchase Order. They shall include packing, forwarding, loading and carriage to the place specified by the Purchaser and are inclusive of all applicable taxes, duties etc. except for those specifically

agreed between the supplier and purchaser. The method of invoicing shall be without prejudice to the parties; agreement as to the place of performance. Invoices shall be submitted bearing the Purchase Order number & date, item number / s and supporting documents as called for in the Purchase Order.

As soon as each shipment is made in line with the delivery schedule specified in the purchase order, the supplier shall send **one set of Original documents and three (3) sets of photocopies** each of the following documents to the address indicated below by courier service.

- i. Commercial Invoice
- ii. Delivery Challan
- iii. Packing List
- iv. BEML's Inspection clearance document(s), material test certificates and other applicable quality documents pertaining to the supplies.

Postal Address

The Deputy General Manager,
Purchase Department
BEML, Bangalore Complex,
PB No.7501, New Thippasandra post,
Bangalore, Karnataka, India,
Postal Code - 560 075

19. PROGRESS REPORT:

The supplier shall regularly inform the progress of work and in such form as may be called for by the Purchaser from time to time. The submission and acceptance of such reports shall not prejudice the rights of the Purchaser in any manner.

20. QUALITY & WORKMANSHIP:

The stores supplied shall be of the best quality and Workmanship shall be in strict conformity with all the drawings and specifications furnished with the Purchase Orders and shall answer to the description in all respects. All supplies shall be accompanied by supplier's works inspections / test certificates duly certifying, the Stores are in strict conformity with the drawings / specifications. However, final acceptance will be subject to inspection and approval at BEML works. Once the materials are rejected and communicated to the supplier, no request shall be entertained for re-inspection or acceptance of the stores. However, BEML reserves the right to re-inspect the stores and consider acceptance at its discretion.

21. QUALITY, CONDITION OF DELIVERY:

The Supplier shall guarantee that the delivery is of good quality and free from all defects and in the case of services rendered that they are performed by skilled personnel and that new materials are used. The Supplier shall guarantee that the delivery corresponds exactly with the provisions of the agreement, the reasonable expectations of Purchaser regarding the characteristics, quality and reliability of delivery. The Supplier guarantees that the delivery is suitable for the purpose for which it is intended by its very nature or which is evident from the specifications listed and from the order.

The Supplier shall guarantee that the delivery complies with legal requirements applicable in India and other (international) Government regulations, as applicable. The supplier shall guarantee that the delivery complies with the customary norms and standards in the relevant branch of trade or industry. The supplier shall be responsible for compliance with applicable technical, safety, quality, environmental requirements and other regulations in relation to his product, packaging, and raw and ancillary materials.

22. INSPECTION, TESTING & CONSEQUENCE OF REJECTION:

The goods and stores shall be of approved design and each part /component may be inspected and tested by the Purchaser prior to shipment and shall fully comply with relevant requirements of purchaser.

Purchaser has the right to inspect the delivery. In the event of rejection, Purchaser shall inform the Supplier accordingly and Purchaser shall be entitled to replacement or repair at its discretion or may proceed to terminate or annul the agreement. All this does not affect Purchaser's right to compensation.

In case the goods / stores are rejected at the time of inspection at BEML or the rejections are noticed at the time of further processing the supplier will be informed of these rejections. On receipt of this information the supplier shall immediately arrange to collect the rejected items at his cost and risk and arrange for the replacement of goods within the shortest possible time. Under no circumstances the supplier shall compel the Purchaser to rework the rejected goods.

Wherever the supplier has not collected the rejected items within 60 days from the date of intimation, BEML shall have the right to dispose the goods and all cost related to the cost of material, statutory levies incurred both in procurement and disposal shall be recovered from the supplier from any of the bills that are due. The supplier shall have no claims whatsoever against the Purchaser for such disposal.

Purchaser or his authorized representative shall be entitled at all reasonable times during execution to inspect, examine and test at the Supplier's premises the material and workmanship of all stores to be supplied under the Contract, and if the part of the stores are being manufactured at other premises the Supplier shall obtain Purchaser's or his authorized representative's permission to inspect, examine and test as if the said stores are being manufactured at the Supplier's premises. Such inspection, examination and testing, if made shall not release the Supplier from any obligation under the Contract.

All costs related to inspections and re-inspections shall be borne by the Supplier. The cost of inspection staff / third party specified by the Purchaser shall be borne by Purchaser, unless otherwise specifically agreed. Whether the Contract provides for tests on the premises of the Supplier or any of his Sub-contractor/s, Supplier shall be responsible to provide assistance such as, labour, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such other special tests shall be borne by the Purchaser only if specifically agreed.

The supplier shall give the authorized representative of the Purchaser reasonable prior notice in writing of the date on and the place at which any stores will be ready for inspection / testing as provided in the Contract.

23. APPLICABLE LAWS AND JURISDICTION OF COURTS:

Indian laws both substantive and procedure, for the time being in force including modifications thereto, shall govern Contract. The competent Indian courts of shall have sole jurisdiction over disputes between purchaser and the Supplier.

24. JURISDICTION:

Courts of Bangalore alone shall have jurisdiction to decide any issue / dispute arising out of the Arbitration or this Purchase Order in exclusion of all other Courts. However, jurisdiction of any other court may be accepted by mutual discussion and agreement by and between BEML and the Supplier.

25. ARBITRATION:

Any disputes and differences that may arise between the parties in connection with this Agreement/Contract shall be settled by the parties amicably by way of mutual discussion / negotiation / conciliations. In case parties fail to settle the dispute amicably, then the dispute or difference shall be referred to India International Arbitration Centre for resolution. The Arbitration Tribunal shall consist of Sole / three Arbitrator /s. The Arbitrator /s shall be appointed and Arbitration proceeding shall be conducted in accordance with the provision of India International Arbitration Centre (Conduct of Arbitration) Regulations, 2023.

During Arbitration, "Supplies under this Purchase Order, if reasonably possible, may continue by mutual agreement during the dispute / Arbitration proceedings"

26. INTELLECTUAL PROPERTY RIGHTS; LICENSES:

If any Patent design, trademark or any other intellectual property rights apply to the delivery or accompanying documentation, Purchaser shall be entitled to the legal use thereof free of charge by means of a non-exclusive, worldwide, perpetual license. All intellectual property rights that arise due to the execution of the delivery by the Supplier and by its employees or third parties involved by the Supplier for performance of the agreement belong to Purchaser. The Supplier shall be obligated to do everything necessary to obtain or establish the above-mentioned rights. The Supplier guarantees that the delivery does not infringe on any of the intellectual property rights of third parties. The Supplier shall also be obligated to do everything necessary to obtain or establish the alternate acceptable arrangement pending resolution of any (alleged) claims by third parties.

The Supplier shall defend and indemnify BEML against any claims, costs or expenses incurred by reason of any infringement of alleged infringement of any letters, patent, registered design, trademarks or trade name by the use of sale of the stores / goods /material and against all costs or damages which BEML may undergo in legal action for such infringement or for which the BEML may become liable in any such action.

The supplier shall at all times indemnify BEML and shall take all risk of accidents or damage which causes a failure of the supply. The supplier shall comply with the provisions of Contract Labour (Regulation and Abolition) Act, 1970 and the Contract Labour (Regulation and Abolition) Central Rules 1971-as modified from time to time wherever applicable and shall also indemnify the Company from and against any claims under the aforesaid Act and the Rules.

27. BRIBES AND GIFTS:

Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the supplier or his partner, agent or servant or anyone on his or their behalf to any officer, servant, representative or agent of BEML or any person on his or their behalf in relation to the obtaining or to the execution of or any other contract with BEML shall in addition to any criminal liability which the supplier may incur, subject the supplier to the cancellation of the PO and all other contracts with BEML and also to payment of any loss or damage resulting from any such cancellation to like extent as is provided in case of cancellation under **Clause-15** hereof. Any question or dispute as to the committing of any offence under the present clause shall be settled by BEML in such manner and on such evidence of information as they may think fit and sufficient and their decision shall be final and conclusive.

28. FORCE MAJEURE CLAUSE:

Notwithstanding anything contained in the Contract, neither the Supplier nor the Purchaser shall be held responsible for total or partial non-execution of any of the contractual obligations, shall the obligation become unreasonably onerous or impossible due to occurrence of a 'Force Majeure' conditions which directly affect the obligations to be performed by the Purchaser or the Supplier. Such events include war, military operations of any nature, blockages, revolutions, insurrections, riots, civil commotions, insurgency, sabotage, acts of public enemy, fires, explosion, epidemics, quarantine restrictions, floods, earthquake, or acts of God, restrictions by Govt. authorities over which the Supplier or the acts on which the Purchaser has no control.

The party claiming to be affected by Force Majeure shall notify the other party in writing without delay, within two weeks on the intervention and on the cessation of such circumstance. Extension of time sought by the Supplier along with supporting evidence and so granted by the Purchaser for the supply / work affected, if any, shall not be construed as waiver in respect of remaining deliveries.

Notwithstanding above provisions, Purchaser shall reserve the right to cancel the order/ Contract, wholly or partly, in order to meet the overall delivery schedule and make alternative arrangements including arrangements with third party for completion of deliveries and other schedules. Purchase may takeover partly processed material at a mutually agreed price.

29. FALL CLAUSE:

- a) The prices charged for the stores supplied under this P.O by the supplier shall in no event exceed the lowest price at which the supplier sells the stores of identical description to any other BEML Office / Division during the pendency of this PO.
- b) If at any time, during the said period, the supplier reduces the sale price of such stores or sells such stores to any other BEML Office / Division at a price lower than the price chargeable under this P.O and the price payable under this PO for the stores supplied after the date of coming into force of such reduction shall stand correspondingly reduced.

30. NON-DISCLOSURE AND INFORMATION OBLIGATIONS:

The supplier shall provide Purchaser with all information pertaining to the delivery in so far as it could be of importance to Purchaser. The Supplier shall not reveal confidential information to its

own employees not involved with the tender / Contract & its execution and delivery or to third parties. The supplier shall not be entitled to use the Purchaser's name in advertisements and other commercial publications without prior written permission from Purchaser.

31. ASSIGNMENT OF RIGHTS AND OBLIGATIONS; SUBCONTRACTING:

The supplier is not permitted to sub-contract the delivery or any part thereof to third parties or to assign the rights and obligations resulting from this agreement in whole or in part to third parties without prior written permission from Purchaser. Any permission or approval given by the Purchaser shall, however, not absolve the supplier of the responsibility of his obligations under the contract.

32. INTEGRITY PACT:

The bidder / contractor should upload duly signed & stamped **Integrity Pact** (if the tender value is more than or equal to Rs.1.00 crore) as per prescribed format (**APPENDIX- A**) on plain paper as part of technical bid.

The bidder should put their authorized signature in the Integrity pact as a Contractor / bidder with their company seal along with witness's signature, name & address. **The agreement shall be in full as per format enclosed on a plain A4 size paper duly signed & stamped on all pages.**

The Integrity Pact envisages an agreement between the prospective tenderer and the buyer committing the persons/officials of both the parties not to exercise any corrupt influence on any aspect of the contract.

For the successful bidder, the integrity pact will remain valid up to 12 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded.

The Central Vigilance Commission (CVC) has appointed Shri Kasividyasagar & Shri Lt. Gen. Abhay Krishna as Independent External Monitor (IEM) to oversee the implementation of the Integrity Pact.

Address of IEM is as below:-

Shri Kasividyasagar, IAS (Retd.)
House no. 55,
Dream valley gated community,
Manikonda, Hyderabad – 500089.
Mobile no. +91 9771407778
Email : kasividyasagar@gmail.com

Shri Lt. Gen. Abhay Krishna , (Retd.)
4A-902, Gurjinder Vihar,
AWHO Township, Sector CHI-1
Greater Noida, UP - 201310
Mobile no: +91 9871234353
Email: abhayabk@gmail.com

33. GST TERMS & CONDITIONS:

1. The Supplier is required to comply with all the applicable provisions of the GST Laws/Rules/Notifications/Circulars and to furnish required documents/details within the prescribed time limit to enable BEML to claim the benefits of GST Input Tax Credit or any other benefit.
2. The Supplier is required to furnish proper Invoice/Supplementary Invoice/Debit Note/Credit Note in the form and manner prescribed under GST Laws/Rules/Notifications/Circulars containing all the particulars mentioned therein and within the prescribed time limit as per prevailing GST Laws/Rules/Notifications/Circulars. In case of non-compliance by the Supplier, BEML shall not make any payment towards GST against such invoice until it is complied with within the timeline prescribed under GST Laws/Rules/Notifications/Circulars, and also subject to BEML being in a position to avail GST Input Tax Credit as per applicable GST Laws/Rules/Notifications/Circulars.
3. In case of discrepancy in the data uploaded by the Supplier in the GSTN portal or in case of any shortages or rejection in the supply, BEML will notify the Supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue Credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the supplies, within the prescribed time limit to enable BEML to avail GST Input Tax Credit.
4. In case, the availment of GST Input Tax Credit by BEML is delayed for any reason other than those attributable to BEML, interest at applicable rate as prescribed under GST Laws/Rules/Notifications/Circulars for such delays shall be recovered from the Supplier.
5. In case Supplier delays declaring such invoice in his GST Return and GST Input Tax Credit availed by BEML is denied or reversed subsequently as per GST Laws/Rules/Notifications/Circulars, GST amount paid by BEML towards such reversal as per GST Laws/Rules/Notifications/Circulars shall be recoverable from Supplier along with applicable interest.

If BEML has not paid/short paid to the Supplier for any invoices within the time limit prescribed under GST Laws/Rules/Notifications/Circulars due to non-compliance of GST Laws/Rules/Notifications/Circulars by Supplier or any other reason attributable to Supplier and leads to any GST Input Tax Credit reversal by BEML, any losses/expenses/cost/penalty, etc., incurred by BEML shall be recoverable from the Supplier.

6. Wherever applicable, BEML will have the right to deduct "Tax Deducted at Source" at the rate prescribed under the GST Laws/Rules/Notifications/Circulars and to remit the same to the Government
7. In case of supplies made under Reverse Charge Mechanism, the Supplier needs to comply with the provisions under the GST Laws/Rules/Notifications/Circulars in terms of supply of Goods/Services and raising of invoice, so as to enable BEML to remit applicable GST to Govt., within the prescribed time limit and avail GST Input Tax Credit on the same. If the Supplier fails to comply with the above and as a result if BEML incurs any losses/expenses/cost/penalty, BEML shall be entitled to recover the same from the Supplier. Further the Supplier has to mention that "the liability of payment of GST amounting to Rs is on the Recipient of Service" in the invoice raised on BEML.
8. The Supplier is required to comply with the E-Way Bill Provisions under GST Laws/Rules/Notifications/Circulars. If the Supplier fails to comply with the said provisions and as a result if BEML incurs any losses/expenses/cost/penalty, BEML shall be entitled to recover the same from the Supplier.

9. In case of materials/goods issued to Supplier for Job Work, the Job Work Supplier is required to return the goods within the time limit prescribed in the Purchase Order. If the Job Work Supplier fails to return the goods as above, BEML will be entitled to raise a GST Supply Invoice on the Job Worker Supplier with applicable interest as per the provisions of GST Laws/Rules/Notifications/Circulars. In such cases, BEML will be entitled to recover all such GST/interest on GST /losses/expenses/cost/penalty, etc. incurred by BEML along with interest from the Job Work Supplier. Further in such cases where the GST invoice has been raised by BEML, on return of such goods after the prescribed time limit, the Job Work Supplier needs to return the same under GST invoice.
10. The Supplier have the option to give one Bank Guarantee of appropriate value after considering his estimated value of GST involved in invoices raised on BEML instead of Bank Guarantee for each Contract/Invoice. In case of payment through LC, suitable provisions/clause will be inserted while opening LC to ensure compliances of above conditions. However, if at any point of time value of such Bank Guarantee falls short of GST plus interest thereof, Supplier will have to either furnish Bank Guarantee for Differential value or such shortfall value of Bank Guarantee vis-à-vis GST plus interest thereof shall be withheld till Suppliers fulfils its obligations specified under above clauses.

BEML will be entitled to recover all losses/expenses/cost/penalty, etc. incurred by BEML along with applicable interest from the Supplier due to reasons other than those attributable to BEML.
11. If the Supplier is a Composition/Unregistered Dealer, the Supplier needs to comply with the provisions under the GST Laws/Rules/Notifications/Circulars in terms of supply of Goods/Service and raising of invoice. In case, the Supplier fails to comply with the above and as a result if BEML incurs any losses/expenses/cost/penalty, BEML shall be entitled to recover the same from the Supplier along with applicable interest.

34. TAX CLAUSE:

~~Any tax and/or duty, which may hereafter be imposed outside India, shall be on Supplier's account. On the other hand, any tax and/or duty, which may hereafter be imposed in India, shall be on BEML's account. Notwithstanding the foregoing, tax on supervising fee and/or other training fees shall be on Supplier's account, however, it shall be withheld and paid by BEML in India on behalf of Supplier according to provisions of the corporation tax law, the local inhabitant tax law and convention between Republic of India and the respective Suppliers country, for the avoidance of double taxation and the prevention of fiscal evasion with respect to taxes on income.~~

~~Where the government of the supplier's country exempts goods in export from any or all of such taxes, levies, duties on imports, the supplier shall charge the purchase price, which are exclusive of and free from such taxes, levies, and duties on imports.~~

Any increase in statutory levies during the period wherein supplier has defaulted to effect supplies as per delivery schedule indicated in contract has to be borne by the supplier.

Any downward revision in taxes or duties imposed in supplier's country should be informed and that benefit should be passed on to the BEML.

HSN CODE/CHAPTER ID and SAC Code details are to be indicated against each item.

TDS (Tax deducted at source) will be applicable for service purchase orders and will be deducted as per law of land. SAC (Service Account code) shall be indicated for the services /NRC that will be carried out by the supplier.

35. PROJECT IMPORT REGISTRATION:

Customs duty on input content imported by domestic bidders to manufacture tendered items. Bangalore Metro Rail Project is eligible for the concessional rate of custom Duty under chapter 98.01 of Custom Tariff Act for Project Import registration mode. In case if an indigenous supplier imports some items from outside India, the firm has to register with customs for availing concessional rate of duty i.e. 7.5% BCD plus cess, through project import registration mode.

To avail the concessional customs duty benefit, Bill of Material (BOM) of such imported material in the prescribed template (containing part number, description, qty, price, source of supply, mode of shipment – Air/Sea, port of arrival etc.,) should be submitted by bidders to BEML within 02 months from finalization of the contract for obtaining PIR sponsoring letter from BMRC. The PIR sponsoring letter should be registered by the bidders with the concerned Customs Authorities at designated Port of Arrival.

The supplier shall maintain details of concessional Custom Duty deposited with the authority and submit the following for reimbursement of Custom Duty: -

- i) Bills of Entry
- ii) Challan for deposit of Custom Duty
- iii) Declaration that the Sub-contractors/Sub-vendors have neither claimed the deemed export benefit nor they will claim the same.
- iv) Declaration that the Contractor has not claimed the deemed export benefit.

However, the custom duty on items procured for meeting the obligations under DLMP shall be reimbursed as applicable and as per actual supply and use for this contract only based on Custom Duty amount indicated in the Bill of Entry (BoE).

36. ACCEPTABLE MODE OF INVITATION

The acceptable mode of participation against the tender enquiry is as below:

	Individual bidder	Joint venture (JV)	Consortium	MoU	TOT
Individual bidder	√	√	√	√	√
Joint venture (JV)	√	√	√	√	√
Consortium	√	√	√	√	√
MoU	√	√	√	×	×
TOT	√	√	√	×	×

1) **Individual Bidder / OEM.**

2) **Joint Venture (JV) / Consortium:**

- (a) All members shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and
- (b) Authorization of nomination of one of the Members of the JV/Consortium to be in-charge (“Lead member”) shall digitally signed by the legally authorized signatories of all Members of Joint Venture.
- (c) All members of the JV/Consortium shall be jointly and severally responsible for the execution of the Contract in accordance with the terms and conditions of the Contract.

3) Subsidiary:

- (a) The OEM shall nominate a representative of the OEM or its subsidiary who shall have the authority to conduct all business for and on behalf of the OEM during the bidding process and, in the event the OEM/OEM subsidiary is awarded the Contract, during Contract execution.
- (b) In the event of later non-existence of the subsidiary, the OEM will be responsible for the fulfilment of contractual obligations.
- (c) The OEM as well as its subsidiary shall be jointly and severally responsible for the execution of the Contract in accordance with the terms and conditions of the Contract.

NOTE: Mode in which entities participate with only MOU or/and TOT without JV/Consortium are not acceptable. Offers of such bids are liable for rejection

37. INSURANCE COVERED BY BEML.

BEML has insured the Material being procured and the risk Coverage under the MCE policy shall commence from the moment of the first goods/consignments are lifted, mechanically or manually or otherwise, from anywhere in the world for loading onto the transport (all modes included) and remain in force during transit up to BEML’s works.

APPENDIX- A

(To be executed on plain paper and applicable for all tenders of value _ Rs. 1 Crore and above)

INTEGRITY PACT

Between

BEML Limited (BEML) hereinafter referred to as “The Principal”

And

..... hereinafter referred to as “The Bidder/Contractor”

Preamble

The Principal intends to award, under laid down organizational procedures, contract/s for

.....
The Principal values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness / transparency in its relations with its Bidder(s) and / or Contractor(s). In order to achieve these goals, the Principal will appoint an independent External Monitor (IEM), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- (1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:
 - a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - b) The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - c) The Principal will exclude from the process all known prejudiced persons.
- (2) If the principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act, or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions.

Section 2 – Commitment of the Bidder(s)/ contractor(s)

- (1) The Bidder(s)/ Contractor(s) commit themselves to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

- a) The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
 - b) The Bidder(s)/ Contractor(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
 - c) The Bidder(s)/ Contractor(s) will not commit any offence under the relevant IPC/PC Act; further, the Bidder(s) / Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or documents provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 - d) The Bidder(s)/ Contractor(s) of foreign origin shall disclose the name and address of the Agents/ Representatives in India, if any. Similarly, the Bidder(s)/ Contractor(s) of Indian Nationality shall furnish the name and address of the foreign Principals, if any. Further, as mentioned in the "Guidelines on Indian Agents of Foreign Suppliers" shall be disclosed by the Bidder(s)/Contractor(s). Further, as mentioned in the Guidelines all the payments made to the Indian agent/representative have to be in Indian Rupees only. Copy of the "Guidelines on Indian Agents of Foreign Suppliers" is placed at **Appendix (A-1)**.
 - e) The Bidder(s) / Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- (2) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/Contractor(s), before award or during execution has committed a transgression through a violation of Section 2, above or any other form such as to put his reliability or creditability in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or act as per the procedure mentioned in the "Guidelines on Banning of business dealings".

Section 4 – Compensation for Damages

- (1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- (2) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the contract value or the amount equivalent to Performance Bank Guarantee.

Section 5 – Previous Transgression

- (1) The Bidders declares that no previous transgressions occurred in the last three years with any other Company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprises in India that could justify his exclusion from the tender process.
- (2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in “Guidelines on Banning of business dealings”.

Section 6 – Equal treatment of all Bidders /Contractors /Sub-contractors

- (1) The Bidder(s)/ Contractor(s) undertaker(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
- (2) The Principal will enter into agreement with identical conditions as this one with all Bidders, Contractors and subcontractors.
- (3) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 – Criminal charges against violating Bidder(s) / Contractor(s) / Subcontractor(s)

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or of the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer

Section 8 – Independent External Monitor / Monitors

- (1) The Principal appoints competent and credible Independent External Monitor for this Pact.
The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement
- (2) The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. It will be obligatory for him to treat the information and documents of the Bidders/Contractors as confidential. He reports to the CMD, BEML.
- (3) The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Subcontractor(s) with confidentiality.
- (4) The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual

relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

- (5) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- (6) The Monitor will submit a written report to the CMD, BEML, within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise submit proposals for correcting problematic situations.
- (7) If the Monitor has reported to the CMD, BEML, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BEML has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.
- (8) The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

This pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded. If any claim is made/lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by CMD of BEML

Section 10 – Other provisions

- (1) This agreement is subject to Indian Law. Place of performance and jurisdiction is the Corporate Office of the Principal, i.e. Bangalore.
- (2) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- (3) If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- (4) Should one or several provisions of this agreement turn out to be invalid, the reminder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- (5) The bidder shall not approach the Courts while representing the matters to IEMs and he/ she will await their decision in the matter.
- (6) In case of joint venture, all the partners of the joint venture should sign the Integrity Pact. In case of sub-contracting, the Principal contractor shall take the responsibility of the adoption of IP by the sub-contractor. It is to be ensured that all sub- contractors also sign IP.
- (7) In the event of any dispute between the management and the contractor relating to those

contracts where Integrity Pact is applicable, in case, both the parties are agreeable, they may try to settle dispute through mediation before the panel of IEMs in a time bound manner. If required, the organization may adopt any mediation rules for this purpose.

In case, the dispute remains unresolved even after mediation by the panel of IEMs, the organization may take further action as per the terms and conditions of the contract.

The fees / expenses on dispute resolution shall be equally shared by both the parties.

(8) In the event of any contradiction between the Integrity Pact and its Annexure, the Clause in the integrity pact will prevail

(For & On behalf of the Principal)

(Office Seal)

Place-----

Date -----

Witness 1:
(Name & Address)

Witness 2:
(Name & Address)

(For & On behalf of Bidder/Contractor)

(Office Seal)

Place-----

Date -----

Witness 1:
(Name & Address)

Witness 2:
(Name & Address)

Appendix A-1**(Applicable Agents / Suppliers to Sign, Seal & Upload / Submit)****GUIDELINES FOR INDIAN AGENTS OF FOREIGN SUPPLIERS**

- 1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BEML LTD shall apply for registration in the prescribed Application-Form available on www.bemlindia.in.
- 1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/remuneration/ salary/ retainer ship being paid by the principal to the agent before the placement of order by BEML LTD.
- 1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.
- 2.0 DISCLOSURE OF PARTICULARS OF AGENTS/ REPRESENTATIVES IN INDIA, IF ANY:
 - 2.1 Tenderers of Foreign nationality shall furnish the following details in their offer:
 - 2.1.1 The name and address of the agents/representatives in India, if any and the extent of authorization and authority given to commit the Principals. In case the agent/representative be a foreign Company, it shall be confirmed whether it is real substantial Company and details of the same shall be furnished.
 - 2.1.2 The amount of commission/remuneration included in the quoted price(s) for such agents/representatives in India.
 - 2.1.3 Confirmation of the Tenderer that the commission/ remuneration if any, payable to his agents/representatives in India, may be paid by BEML LTD in Indian Rupees only.
 - 2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:
 - 2.2.1 The name and address of the foreign principals indicating their nationality as well as their status, i.e, whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/representatives.
 - 2.2.2 The amount of commission/remuneration included in the price (s) quoted by the Tenderer for himself.
 - 2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/remuneration, if any, reserved for the Tenderer in the quoted price (s), may be paid by BEML LTD in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.
 - 2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission /remuneration, if any payable to the agents/representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.
 - 2.4 Failure to furnish correct and detailed information as called for in paragraph-2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BEML LTD. Besides this there would be a penalty of banning business dealings with BEML LTD or damage or payment of a named sum.

Signature
(For & On behalf of Bidder/Contractor)

APPENDIX B

COMPLIANCE REPORT FOR PROCUREMENT TECHNICAL SPECIFICATION (PTS)

Compliance to PTS GR/TD/8120 Latest Rev				
PTS Clause No	Description	Complied	Not Complied	Remarks
1. Introduction	1.1 General			
	1.2 Train Composition			
	1.3 Climatic & Environmental conditions			
	1.4 Vehicle Performance Requirements			
	1.5 Track Structure Parameters			
	1.6 Current Collection System			
	1.7 Power supply details for VAC System			
	1.8 Platform Interface			
	1.9 Signalling System (ERTS Clause 2.6)			
	1.10 Principal Notional Vehicle Dimensions / Leading particulars			
2. Definitions and Abbreviations	2.1 Definitions			
	2.2 Abbreviations			
3. Precedence of Documents				
4. Qualification criteria				
5. Standards				
6. Technical Specifications	6.1 VAC Technical Specifications			
	6.2 Estimated Heat load			
	6.3 Mounting and Airflow Arrangement			
7. Test Details				
8. Airflow Measurement	8.1. Return air flow measurement			
	8.2 Fresh air flow measurement			
	8.3 Test Procedure - Return air and Fresh airflow measurement			
9. Cooling performance test	9.1 Test conditions			
	9.2. Test details			
	9.3. Equipments			
	9.4. Test procedure			
10. Specific Energy consumption test				
11. Scope of Work	10.1 General			
	10.2 Testing			
12. List of Test and Duration				
13. Submittals with technical offer				

Authorized signatory with company seal / stamp

APPENDIX – C**COMPLIANCE REPORT OF GENERAL TERMS & CONDITIONS**

(To be submitted along with Technical Bid)

Bid Invitation No :**Firm** :**Item details** :

Sl. No.	Terms / Clause	Complied	Not Complied	Remarks
1.	GLOSSARY, DEFINITIONS & INTERPRETATIONS			
2.	SUBMISSION OF THE TENDER			
3.	SUPPLIERS SHARING LAND BORDER WITH INDIA			
4.	PREFERENCE TO MAKE IN INDIA CLAUSE			
5.	DELIVERY TERMS			
6.	PAYMENT			
7.	PRICE BID VALIDITY			
8.	FIRM PRICE			
9.	INSPECTION			
10.	PERFORMANCE BANK GUARANTEE (PBG)			
11.	RIGHT TO VARY QUANTITIES & QUANTITY OPTION CLAUSE			
12.	LIQUIDATED DAMAGES CLAUSE			
13.	RISK PURCHASE CLAUSE			
14.	SECRECY AND CONFIDENTIALITY			
15.	AUTHORITY OF PERSONS SIGNING DOCUMENT			
16.	ACCEPTANCE OF ORDER			
17.	OTHER CONDITIONS			
18.	PRICE, INVOICING AND PAYMENT			
19.	PROGRESS REPORT			
20.	QUALITY & WORKMANSHIP			

Authorized signatory with company seal / stamp

APPENDIX – C**COMPLIANCE REPORT OF GENERAL TERMS & CONDITIONS**

(To be submitted along with Technical Bid)

Bid Invitation No :**Firm** :**Item details** :

21.	QUALITY, CONDITION OF DELIVERY			
22.	INSPECTION, TESTING & CONSEQUENCE OF REJECTION			
23.	APPLICABLE LAWS AND JURISDICTION OF COURTS			
24.	JURISDICTION			
25.	ARBITRATION			
26.	INTELLECTUAL PROPERTY RIGHTS; LICENSES			
27.	BRIBES AND GIFTS			
28.	FORCE MAJEURE CLAUSE			
29.	FALL CLAUSE			
30.	NON-DISCLOSURE AND INFORMATION OBLIGATIONS			
31.	ASSIGNMENT OF RIGHTS AND OBLIGATIONS; SUBCONTRACTING			
32.	INTEGRITY PACT			
33.	GST TERMS & CONDITIONS			
34.	TAX CLAUSE			
35.	CUSTOMS DUTY ON INPUT CONTENT			
36.	ACCEPTABLE MODE OF PARTICIPATION			
37.	INSURANCE COVERED BY BEML UPTO START OF DLMP			

Authorized signatory with company seal / stamp

APPENDIX – D

CONFIDENTIALITY AGREEMENT

(To be typed on plain paper and submitted along with the technical bid)

This Confidentiality Agreement is made and entered into between M/s BEML, (hereinafter referred to as BEML), a Govt. of India Undertaking under Ministry of Defence, having its Registered Office at BEML Soudha, No.23/1, 4th Main, Sampangirama Nagar, Bangalore – 560 027 and M/s ----- (hereinafter referred as XXXX) having its Registered Office at..... M/s. BEML, has been patronizing XXXX for components / spares listed in Annexure hereto. A need has been felt to revitalize the business relationship for mutual advantage.

- 1) It is mutually, therefore, agreed that the following shall form part of the terms and conditions for continued business:
 - a) The supplier shall not divulge to anyone else except under the authority and for the purposed of BEML, all information such as technical data, specifications, drawings, models of specimens furnished / supplied by BEML for the purpose of manufacture or in connection with developmental activities, constitute the property of BEML and the supplier shall keep them in strict confidence. This has been explicitly stated in all the details to the supplier through Purchase Order / Drawings etc., released.
 - b) The supplier shall not supply the components / spares exclusively manufactured for BEML with the Technical Data / Specifications / assistance furnished by BEML and shall not disclose my initiations, development of adaptations thereof to anyone else except with the written consent of BEML.
 - c) BEML shall be entitled to prevent breach of the above and to claim damages in case of any breach. It is hereby mutually agreed that for breach of this agreement the Vendor shall pay, without actual proof of damages, a liquidated amount of Rs. 1.00 Crore (Rupees One Crore only).
 - d) **ARBITRATION:** Any disputes and differences that may arise between the parties in connection with this Agreement/Contract shall be settled by the parties amicably by way of mutual discussion / negotiation / conciliations. In case parties fail to settle the dispute amicably, then the dispute or difference shall be referred to India International Arbitration Centre for resolution. The Arbitration Tribunal shall consist of Sole / three Arbitrator /s. The Arbitrator /s shall be appointed and Arbitration proceeding shall be conducted in accordance with the provision of India International Arbitration Centre (Conduct of Arbitration) Regulations, 2023. The courts in Bangalore alone shall have jurisdiction to deal and decide any legal matter or dispute whatsoever arising out of this contract.
- 2) BEML shall be entitled to prevent breach of the above and to claim damages in case of any breach.
- 3) The Signatories hereto declare that they have the sanction and power to execute and deliver this binding agreement.

IN WITNESS WHEREOF, the parties hereto have set their respective hands to this Confidentiality Agreement on written in the presence of Witness.

For BEML

For M/s. XXXX

WITNESS:

1.

1.

2.

2.

APPENDIX – E

Land Border Sharing Declaration

(To be submitted in the bidder's letter head)

In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref.

F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020

Tender no.

Job:

“I/ we have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India. I/We hereby certify that I/ we the bidder < name of the bidder.....> is / are

Bidder to tick (✓) against option (a) or (b) as applicable

☐

a) Not from such a country and eligible to be considered for this tender.

OR

☐

b) From such country, has been registered with the competent authority and eligible to be considered for this tender. (Evidence of valid registration by the competent authority shall be attached)

For and behalf of _____ (Name of the bidder)

(Signature, date & seal of authorized representative of the bidder)”

APPENDIX -F

**DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH
REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017
DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)**

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,
BEML Limited, Bangalore

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

Ref : 1) NIT/Tender Specification No:
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by.....
(specify the name of the organization here) has a local content of _____ % and this meets the local content requirement for '**Class-I local supplier**' / '**Class II local supplier**'** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

- | | |
|----------|----------|
| 1. _____ | 2. _____ |
| 3. _____ | 4. _____ |

...
...
...

Thanking you,
Yours faithfully,

**(Signature, Date & Seal of
Authorized Signatory of the Bidder)**

**** - Strike out whichever is not applicable.**

Note:

1. Bidders to note that above format duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BEML Guidelines shall be initiated against the bidder.

APPENDIX – G

CONTACT DETAILS OF THE SUPPLIER

(To be filled and submitted by supplier along with the technical bid)

1) Contact Person details in Marketing Office

- (a) Name :**
- (b) Designation :**
- (c) Telephone :**
- (d) Fax :**
- (e) Mobile :**
- (f) Email :**

2) Head Office :

**3) Complete address
including the website :**

**4) Details of the proposed plant from
where item is to be supplied :**

**5) Complete address of the Plant
including Website :**

6) Contact person details in plant

- (a) Name :**
- (b) Designation :**
- (c) Telephone :**
- (d) Fax :**
- (e) Mobile :**
- (f) Email :**

7) Bank Details: (Will used during L/C Execution)

- a) Name of the Bank :**
- b) Full Address of the Bank :**
- c) Suppliers Account Number and Type :**
- b) IBAN No :**
- e) Swift Code :**

FORMAT FOR PERFORMANCE BANK GUARANTEE

Bank Guarantee No.....

Dated

Amount

Valid up to

Claim up to

The General Manager (Materials- Management)

BEML

Bangalore Complex

PB No 7501

New Thippasandra

Bangalore 560075

1. This deed of Guarantee made this day of..... (Month& year) between Bank of..... (Hereinafter called the "Bank") of the one part, and BEML LIMITED (Hereinafter called "the Employer") of the other part.
2. Whereas BEML LIMITED has awarded the contract for..... (Name of work as per PO) (Hereinafter called the "Contract") to..... (Name of the Contractor) (Hereinafter called "the Contractor").
3. AND WHEREAS the Contractor is bound by the said Contract to submit to the Employer a Performance Security for a total amount of..... (Amount in figures and words).
4. Now, We the Undersigned..... (Name of the Bank) being fully authorized to sign and to incur obligations for and on behalf of and in the name of.....(Full name of Bank), hereby declare that the said Bank will guarantee the Employer the full amount of Rs. (Amount in figures and words) as stated above.
5. NOW THEREFORE, We hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor and we hereby unconditionally, irrevocably and without demur undertake to immediately pay to the Employer upon first written demand and without cavil or argument, any sum or sums within limits of.....(Amount of Guarantee) as aforesaid without reference to the Contractor and without your needing to prove or show grounds or reasons for your demand for the sum specified therein. The Bank shall pay to the Employer any money so demanded notwithstanding any dispute/disputes raised by the Contractor in any suit or proceedings pending before any Court, Tribunal or Arbitrator/s relating thereto and the liability under this Guarantee shall be absolute and unequivocal.
6. This Guarantee is valid till.....(The initial period for which this Guarantee will be valid must be for 24 months (twenty four months) longer than the anticipated date of completion of Job.
7. At any time during the period in which this Guarantee is still valid, if the Employer agrees to grant a time extension to the Contractor or if the Contractor fails to complete the Works within the time of completion as stated in the Contract, or fails to discharge himself of the liability or damages or debts as stated under Para 5, above, it is understood that the Bank will extend this Guarantee under the same conditions for the required time on demand by the Employer and at the cost of the Contractor.
8. The Bank agrees that no change, addition, modifications to the terms of the Contract Agreement or to any documents, which have been or may be made between the Employer

and the Contractor, will in no way release us from the liability under this Guarantee; and the Bank, hereby, waives any requirement for notice of any such change, addition or modification to the Bank.

9. The Guarantee here in before contained shall not be affected by any change in the Constitution of the Bank or of the Contractor.
10. The neglect or forbearance of the Employer in enforcement of payment of any moneys, the payment whereof is intended to be hereby secured or the giving of time by the Employer for the payment hereof shall in no way relieve the bank of their liability under this deed.
11. The expressions "the Employer", "the Bank" and "the Contractor" hereinbefore used shall include their respective successors and assigns.
12. Notwithstanding anything contained herein:
 - (a) Our liability under this Bank Guarantee shall not exceed Rs.....
(Rs.....)
 - (b) This Bank Guarantee shall be valid up to.....
 - (c) We are liable to pay the Guarantee amount or part thereof under this Bank Guarantee only & only if you serve upon us a written claim or demand on or before

In witness whereof I/We of the bank have signed and sealed this Guarantee on the.....day of..... (Month & year) being herewith duly authorized.

For and on behalf of theBank.

Signature of Authorized Bank officials.

Name :.....

Designation :

Stamp/Seal of the Bank.....

Signed, sealed and delivered for and on behalf of the Bank by the above namedin the presence of:

Witness 1.

Signature.....

Name.....

Address.....

Witness 2.

Signature.....

Name.....

Address.....

	BEML LIMITED BENGALURU R & D CENTER	Doc. No.	GR/TD/8120
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CMRL ARE02 project
Technical Specification
for VAC Vehicle Level Test
in Climatic Chamber

Approved By	29.10.2025	Shivakumar SB	
Reviewed By	29.10.2025	Manjunath S	
Prepared By	29.10.2025	Lohith MV	
	Date	Name	Signature

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1. Introduction

1.1. General

This Technical specification document specifies the requirements of climatic chamber tests to be conducted on Metro car fitted with Ventilation and Air Conditioning (VAC) units, to validate the cooling performance and to measure Specific Energy Consumption of VAC system, for Chennai Metro Rail Limited (hereafter CMRL) Phase-2 project.

BEML will carry out all required works and activities as Contractor to the Employer for CMRL ARE02A project, while the subcontractor shall be responsible for all works specified in this PTS document with regard to climatic chamber tests and shall be responsible for supporting the BEML activities as contractor for CMRL ARE02A project.

One car will be subjected to the climatic chamber tests. The scope of work includes all activities required to perform the car level type tests of VAC system specified in the document meeting the best international practices even if not specifically mentioned in this PTS.

1.2. Train Composition

The rake formation shall generally be as follows:

3 -Car Train Composition: DMC – TC – DMC

Where,

DMC: Driving Motor Car
TC : Trailer Car

Operation of Trainsets that are formed of 6-cars shall be achievable through two (2) possible configuration options:

- (i) The future provision of a single consist trainset comprised of the rake configuration *DMC + TC + MC + MC + TC + DMC* (67% traction power).
- (ii) Multi-Consist trainset comprising of two (2) coupled 3-car consists having configuration *DMC + TC + DMC* *DMC + TC + DMC* (67% traction power).

All DMC, MC and TC will be totally interchangeable with all other DMC, MC and TC, without modification

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1.3. Climatic & Environmental Conditions

The car shall operate reliably and safely under the climatic and environmental conditions specified at ERTS-RS clause 2.11.1 Accordingly, the VAC system shall be designed to operate with satisfactory performance under the following conditions as per ERTS-RS clause 2.11.1 Environmental conditions for the on-board equipment shall conform to EN 50125-1.

Description	Limiting Values
Climate	Tropical Wet, Dry, and humid
Maximum ambient temperature	45 °C
Minimum temperature	16 °C
Monsoons	October through December
Rainfall	1333 mm average annual. (Very heavy/continuous with heavy lightning discharges).
Atmosphere during hot season	Extremely dusty including bird feathers
Maximum wind speed	130 Km/h
SO ₂ level in atmosphere	5 – 40 micro g/m ³
NO _x level in atmosphere	10– 40 micro g/m ³
Respirator Suspended Particles Matter in atmosphere (RSPM)	45 – 100 micro g/m ³
Total Suspended particulate matter in atmosphere (TSPM)	150 – 320 micro g/m ³
Altitude	Sea Level
Conditions in Stations	All underground stations will be fully air conditioned. Above ground stations will have air-conditioning for certain designated rooms only.

Note:

- 1) The temperature inside of an “inactive” metro train parked in the sun can easily exceed +70 °C. The equipment shall not be adversely affected in any way due to exposure to such high temperatures.
- 2) The equipment mounted on the under-frame shall be designed to permit propulsion of the train at 10 km/h through water up to a depth of 75 mm above rail level (with maximum allowable wheel and rail wear). Equipment shall be made splash proof in accordance with International Standards
- 3) Adequate margin shall specially be built into the design particularly to take care of the higher ambient temperatures, high humidity, dusty and corrosive conditions, etc. prevailing in Chennai area.
- 4) The Subcontractor shall confirm from ASHRAE, outside design data conditions for Chennai for the capacity calculation of VAC.

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- 5) As the Chennai Metro lines will have elevated and underground portions, there may be sudden change in the ambient temperature to rolling stock. The equipment shall be designed to take care of such thermal shocks.
- 6) The Rolling Stock must be able to operate regardless of the external conditions. They must also be so designed as to avoid abnormal wear due to adverse weather. They can be parked outdoors regardless of the atmospheric conditions.
- 7) The rakes shall be continuously exposed to highly corrosive, salty atmosphere along with industrial pollutants.
- 8) With maximum allowable wheel and rail wear, the rake must be able to operate successfully under the above conditions with no entry of moisture or other contaminants into any compartment, component, or device that could cause equipment on the rake to malfunction or be damaged; that could increase maintenance requirements; or that could cause premature wear or failure.
- 9) The Water used in Chennai for washing is likely to have a high level of dissolved matter which may aid corrosion.
- 10) Tunnel walls may be wet and seepage water will normally be present in the invert. VAC system supplied must therefore be capable of withstanding the effects of seepage (if any) and continue to operate in such wet and humid conditions.

1.4. Vehicle Performance Requirements

The proposed system shall meet the vehicle performance requirements as set out in ERTS-RS clause 2.14. Following details are listed for reference only as a minimum.

Item	All Corridors
Minimum Design Average Acceleration rate for fully loaded (seating plus standees @ 8 passengers /sq. m) train on level tangent track shall be as under:	
0 kmph to 40 kmph	1.0 m/s ²
0 kmph to 60 kmph	0.6 m/s ²
0 kmph to 80 kmph	0.3 m/s ²
Minimum Operational Average Acceleration rate for (seating plus standees @ 6 passengers/sq. m) loaded train on level tangent track shall be as under:	
0 kmph to 35 kmph	1.20 m/s ²
0 kmph to 60 kmph	0.65 m/s ²
0 kmph to 80 kmph	0.35 m/s ²

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Minimum Average Service braking rate from 80 kmph to standstill for fully loaded (seating plus standees @ 8 passengers / m ²) train on level tangent track	1.0 m/s ²
Minimum Average Service braking rate from 80 kmph to standstill for - (seating plus standees @ 6 passengers / m ²) train on level tangent track	1.1 m/s ²
Minimum Average Emergency braking rate from 80 kmph to 0 kmph for fully loaded train on level tangent track	1.3 m/s ²
Jerk rate (Maximum)	0.75 m/s ³

1.5. Track structure Parameters

The CMRL-ARE02A cars will operate with the track parameters as specified in the following table

Description	Elevated and At-grade Corridor	Underground Sections
Track Laying Gauge	1435 ± 2 mm	
Rail Type		
Main Line	60E 1 Head hardened as per IRS T 12 – 2009 With All Amendments / Correction Slips. (1080 deleted as per latest draft no more 1080)	
Depot	60E 1 (880 Grade) as per IRS T 12 – 2009 With All latest Amendments / Correction Slips.	
Rail Profile	60 E1 Profile	
Inclination Of Rail	1 / 20	
Rail Seat Spacing, Main line	Nominal 650 mm±5 mm	
Sleeper Spacing, Depot	650 ± 5mm; Inspection Lines 1000 mm	
Ballast Cushion		
Depot	Ballast less Track in Madhavaram Depot Ballasted Track in Poonamalle Depot	
Rail Panel Lengths	Continuous welded rails	
Minimum Radius of Curvature	Depot -100m Main line (At grade and elevated) - - 120m	200m-
Minimum Turn Out Radius. Main Line	140m	

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Minimum Turn Out Depot	Madhavaram Depot: 1 in 7 R140 Poonamalle Depot: 1 in 7 R140,
Minimum Turn Out Main line	1 in 7, R-140
Maximum Cant Permissible in curves	125 mm
Maximum Cant Deficiency Permissible	100mm
Maximum Permissible Cant Gradient	1 in 440
Turn-out Speed : Turnout (Main line)	1 in 9 R 300 = 45 kmph; 1 in 9 R 190 = 35 kmph 1 in 7 R 190 = 35 kmph; 1 in 7 R 140 = 25 kmph
Maximum Gradient (Main Line)	4% (compensated)
Minimum vertical curve radius crest	1500m
Maximum track axle load (AW4)	16 tonnes
Widening of track Gauge on curves	Up to 9 mm
Structural gauge and passing clearance in straight line, in curves, in open air grade, in tunnel	As per SOD of CMRL Refer to Appendix D of the ERTS-RS document for typical Sections
Tunnel Profile	As per SOD of CMRL Drawings showing section of cut and cover and bored tunnel in the Underground sections and details of various equipment's/cables etc located therein are mentioned in are enclosed in ERTS-RS Appendix D
Line profile	The drawings showing the line profiles of all corridors are enclosed in ERTS-RS Appendix D of this document:

1.6. Current Collection System

The details of the Current Collection System are set out in ERTS-RS clause 2.14.1. Following details are listed for reference only.

System Particulars	For all sections and depot
Nominal Voltage	25 KV
Nominal Voltage	19 ~ 27.5 KV
Nominal Voltage	30 KV
Occasional minimum voltage	17.5 KV

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Cut off voltage	16 KV
Voltage for guaranteed performance	22.5 KV
Frequency variation	47 ~ 52 Hz

1.7. Power Supply Details for VAC system

Power supply	Limiting Values
AC Input power supply (APS Output)	3-phase, AC 415 V $\pm$ 5 %, 50 Hz $\pm$ 1 %
DC Control power supply	110V DC, -30%, +25%,

1.8. Platform Interface

The principal details of the Platform Interfaces are set out in the following table.

Particulars		Measurements
Length of Platform		136m (6 coaches)
Width: Island type		8.0 to 12.0m
Width: Side type		4.0 to 6.0m
Height above rail level	Ballasted Track	1090mm $\pm$ 5mm
	Ballast-less Track (DFF)	1080mm $\pm$ 5mm
Distance between track centre and platform edge		In underground: 1510 mm – 1515 mm In Elevated and At grade: 1515 mm – 1520 mm
Minimum horizontal curvature at platform		1000m
Structural gauge and passing clearance in platform		Refer to Appendix D of ERTS-RS

1.9. Signaling System

The proposed system shall meet the principal details of the Signaling and Train Control System are set out as per ERTS-RS clause 1.3, 2.28 and Appendix C of ERTS-RS.

Item	Description
Train Control System	CBTC based On board Continuous Automatic Train Control system (CATC) consisting of i) Automatic Train Protection ii) Automatic Train Operation (ATO) iii) Automatic Train Super-vision (ATS)

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	iv) Automatic Turn Back (ATB) v) Attended/Unattended train operation (GoA2/GoA3/GoA4)
Train Control mode	(i) Automatic mode (ii) Coded Manual modes (iii) Restricted Manual mode (iv) Run on Sight mode (v) Cut-out mode (vi) UTO (vii) Standby

1.10. Principal Notional Vehicle Dimensions/ Leading Particulars

Description	Dimension
Length of DMC / TC / MC over coupler faces	22,600 mm
Height of car, overall	Compatible with the dynamic gauge specified in Appendix D. (4048 mm with pantograph in lockdown position)
Width of car, overall	2900 mm
Wheel dimensions: New wheel diameter Wheel wear limit	860 mm 80 mm (on diameter)
Height of car floor above top of rail at door threshold	1,130 mm (maximum) 1,100 mm (minimum)
Spacing between bogie centrelines	14,850 ± 250 mm
Dynamic outline	Rake shall not exceed the dimensions shown in Appendix D

2. Definitions and Abbreviations

2.1. Definitions

- **“Employer”** means Chennai Metro Rail Corporation (CMRL), its legal successors and assignees.
- **“Subcontractor”** means the Supplier who supplies the required VAC system to BEML for CMRL ARE02A project. Subcontractor shall carry out the works in accordance with ERTS (RS & CMC) with regard to VAC system.
- **“Contractor”** means the persons or person appointed by the Employer to undertake the execution of the works for CMRL ARE02A project. In order to avoid misunderstanding of the roles of the Contractor in ERTS (RS & CMC), the term “Contractor” shall be read as “Subcontractor” in ERTS (RS & CMC) for those ERTS (RS & CMC) Clauses referred to in this PTS.
- **“Contract”** means the contract between Subcontractor and BEML in relation to the

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supply of VAC system for CMRL ARE02A project.

- **“Project Manager or Employer’s Representative”** means any person nominated or appointed from time to time by the Employer to act as the Project Manager or Employer’s Representative for the purposes of the Contract and notified as such in writing to the Contractor.
- **“BEML”** means the Contractor to procure the VAC system for CMRL ARE02A project cars.
- **“NIT”** means Notice Inviting Tender for Supply of VAC System for CMRL ARE02A Project issued by BEML
- **“GTC”** means General Terms and Conditions for Supply of VAC System for CMRL ARE02A Project issued by BEML.
- **“SCC”** means Special Contract Conditions for Supply of VAC System for CMRL ARE02A Project issued by BEML.
- **“ERTS-RS”** means Employer’s Requirements Technical Specification – Rolling Stock for CMRL ARE02A project.
- **“ERTS-CMC”** means Employer’s Requirements Technical Specification - Comprehensive Maintenance Contract for CMRL ARE02A project.
- **“PTS”** means BEML’s Procurement Technical Specification.

2.2. Abbreviations

ATC	:	Automatic Train Control
ATP	:	Automatic Train Protection
ATO	:	Automatic Train Operation
CMC	:	Comprehensive Maintenance Contract
EMC	:	Electro-Magnetic Compatibility
EMI	:	Electro-Magnetic Interference
FMEA	:	Failure Mode Effects Analysis
FMECA	:	Failure Mode Effects and Criticality Analysis
FRACAS	:	Failure Reporting and Corrective Action System
FAI	:	First Article Inspection
FDR	:	Final Design Review
GOA	:	Grade of Automation
ISO	:	International Standards Organization
ITP	:	Inspection Test Plan

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LRU	:	Line Replaceable Unit
MRTS	:	Mass Rapid Transit System
MDBF	:	Mean Distance Between Failures
MDBCF	:	Mean Distance Between Component Failures
MDBSF	:	Mean Distance Between Service Failures
MTTR	:	Mean Time To Repair
NCR	:	Non Confirmation Report
PHA	:	Preliminary Hazard Analysis
PDR	:	Preliminary Design Review
PFDR	:	Prefinal Design Review
SEC	:	Specific Energy Consumption
SOD	:	Schedule of Dimension
TCMS	:	Train Control Management System
UTO	:	Unattended Train Operation
VAC	:	Ventilation and Air Conditioning

3. Precedence of Documents

- 1) The PTS shall be read in conjunction with the Notice Inviting Tender (NIT)/ General Terms and Conditions (GTC)/Special Contract Conditions (SCC) of the tender & ERTS (RS & CMC). To the extent that any provision of the PTS is inconsistent with any provision of the Commercial Specification, the provisions of the NIT shall prevail.
- 2) To the extent that any provision of NIT is inconsistent with any provisions of the ERTS (RS & CMC), the provisions of ERTS (RS & CMC) shall prevail.
- 3) This PTS in no way relieves the Subcontractor from any requirements specified in the technical specification. If a conflict is discovered among any of the above contract documents, the following order of priority shall govern:

Order of Precedence	Document title
1	ERTS (RS & CMC)
2	NIT/GTC/SCC
3	PTS

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- 4) This PTS shall in no way relieve the Subcontractor from any requirements specified in the ERTS-RS.
- 5) The complete requirements are those found in the above documents. It shall be the Subcontractor's responsibility to ensure that equipment, documentation, and services furnished against this PTS are in full compliance with all the above documents.
- 6) Also, in the event of any conflict among the requirements of particular parts of the PTS and ERTS-RS, the Subcontractor shall seek clarification with BEML prior to making a contract. After making a contract, the Subcontractor shall comply with BEML's Interpretation for any discrepancies.

4. Qualification criteria

- 1) Subcontractor shall have in-house climatic chamber to accommodate 25m long metro car with all facilities required for performing climatic chamber test and specific energy consumption (SEC) measurement.
- 2) Subcontractor shall have adequate experience in performing vehicle level type test for VAC system. The testing firm should have carried out the car level VAC validation tests (thermal comfort and SEC tests) of Metro rolling stock on at least three mass rapid transit systems (MRTS).
- 3) The subcontractor shall submit all the documents in support of meeting above requirements along with technical offer.

5. Standards

The testing of the vehicle level VAC test shall conform to the latest editions of EN14750-1 and EN14750-2

6. Technical specifications

6.1. VAC Technical specifications

Item	Unit Specifications	
Cooling capacity	48-50 kW	
Heating capacity	3 kW - For dehumidification	
Supply air	~6000 m ³ /h	
	External conditions	Internal conditions
Design Points	DB 37.3°C, 40 % RH	25°C, ≤60% RH
	DB 34 °C, 65 % RH	25°C, ≤60% RH
	DB 31.3 °C, 80 % RH	25°C, ≤60% RH

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Passenger Capacity (T-Car)	263 (AW3)
Refrigerant	R-407C
Maximum operating temperature	Full load operation up to 48 °C and ventilation mode beyond 48 °C
Fresh air flow	Adjustable with motor operated dampers - Fresh air flow : $\geq 1320 \text{ m}^3/\text{h}$ - Emergency Fresh air flow: $1980 \text{ m}^3/\text{h}$
Return air damper (installed in the return air duct)	Motor-operated The damper has two positions: - Open (normal operation) - Closed (emergency ventilation)
Electrical Power	415V AC / 3Phase / 50Hz (Main power supply-Normal operation) and 110VDC (Control power supply and Emergency Ventilation)
Weight	1050 Kg approx
Max Dimension	4300 L x 1880 W x 460 H Approx.
Modes of operation	Normal operation - Fresh air ventilation (fresh air flow varies as per passenger load) 50 % cooling 100 % cooling - Dehumidification (1 cooling circuit operates together with the heater) Pre-cooling - Full load cooling with AW0 passengers and closed fresh air dampers to bring down the indoor temperature to the specified target Emergency ventilation - Supply fan motor is supplied through the emergency inverter

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Temperature controls	○ Return air temperature sensor - To control the cooling power and saloon temperature ○ 1 fresh air temperature sensor - To control pre-cooling operation and high temperature unloading of the refrigerant circuits ○ 1 supply air temperature sensor - To monitor air flow through the cooling coil
Humidity control	1 solid-stated relative humidity sensor - 1 solid-stated relative humidity sensor

6.2. Estimated heat load

The estimated heat load under various passenger load conditions for summer and monsoon climatic conditions are tabulated below

Ambient condition		DB 34 °C, 65 % RH**
Passenger load condition		AW3
Number of passengers		263
Solar Gain (kW)		7.03
Transmission gain (kW)		3.96
Internal electrical load (kW)		2.5
Passenger load (kW)	Sensible heat	24.03
	Latent heat	13.9
Fresh air gain (kW)	Sensible heat	87.6
	Latent heat	26.7
Total heat load (kW)		91.1

Note: Heat loads specified in the table above are based on estimation and actual values may change marginally during testing

** - Subjected to change to any design points (as in the table 6.1) and same will be confirmed before the tests.

6.3. Mounting and airflow arrangement

Two identical units are suitably mounted on roof to achieve the required saloon interior conditions. General arrangement of VAC units in car is shown below.

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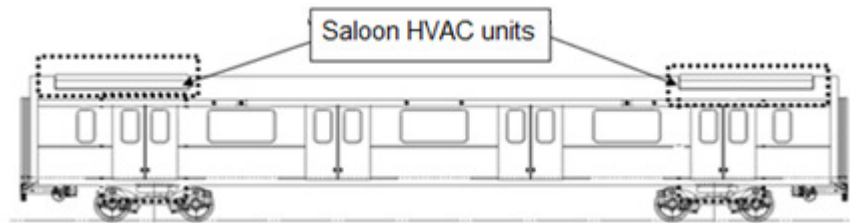


Figure 1: VAC unit Arrangement on car

Conditioned air from each unit is directly introduced into a duct running full length of the car and further uniformly distributed in the saloon through diffusers. The supply air duct is diagonally split for each VAC unit to feeds one side of the car, so that even in case of failure of one VAC, the other working VAC will be able to cool the saloon passenger area. The duct is fully lagged with non-combustible insulation material to prevent the formation of condensation. Two rows of air diffusers are mounted on each side of ceiling panel, for supply of conditioned air to saloon. Exhaust openings are provided at each end wall of the car.

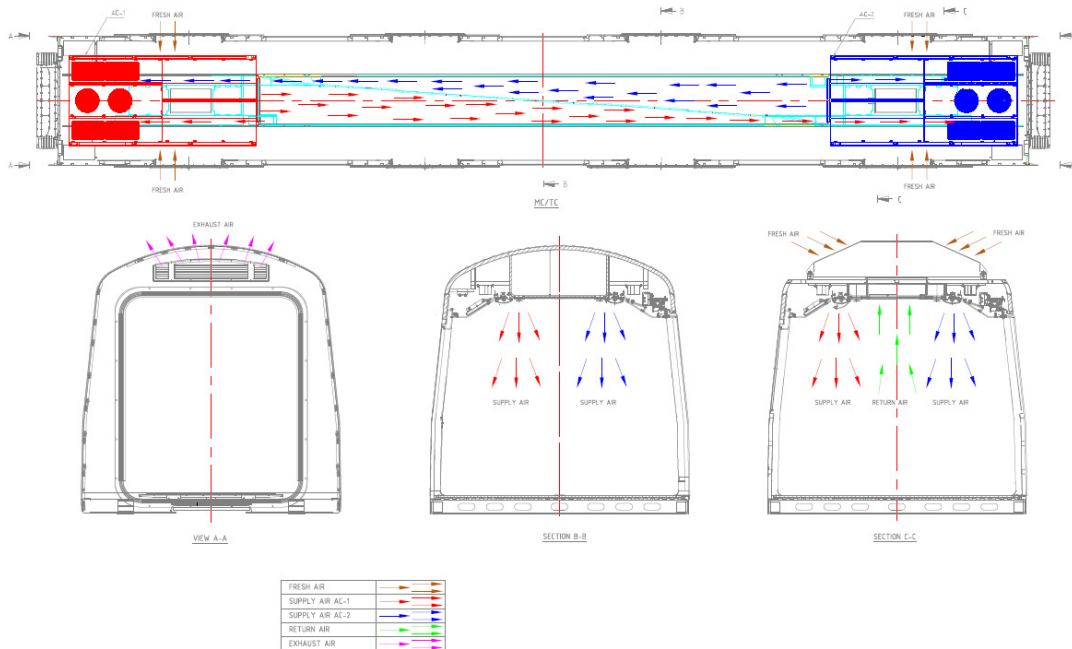


Figure 2: Air flow path

7. Test Details

One car equipped with all interior finish and all under-frame mounted equipment, shall be tested to demonstrate the effectiveness of the equipment in meeting the specified temperature and humidity conditions inside the car. Car will be subjected to following tests

1. Air flow measurement
2. Cooling performance test

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3. Specific Energy Consumption test

Air flow measurements shall be made in preparation chamber while cooling performance test and specific energy consumption tests shall be conducted in a climatic chamber

8. Air flow measurement

Detailed air velocity and air flow measurement tests will be conducted by BEML at BEML test track on the car which will undergo climatic chamber test, before dispatching the car for climatic chamber. However basic airflow measurements shall be made in preparation room at climatic chamber test facility before conducting the climatic chamber tests, to confirm the airflow rates meets the contract requirement. Following flow rates will be measured.

1. Return air flow
2. Fresh air

Brief test procedure for above tests is described below. Subcontractor shall prepare the detailed test procedure and submit to BEML for approval before conducting the tests. Subcontractor may propose better methods of flow measurements. Acceptance of same will be subjected to approval from BEML.

8.1. Return air flow measurement

Return air shall be measure using measuring duct/ hood. Velocity will be recorded at all measurement points of ducts. Average velocity shall be multiplied with the measuring duct inlet area to obtain the return air flow rate. This procedure shall be done at both return air openings located towards either end of the car.

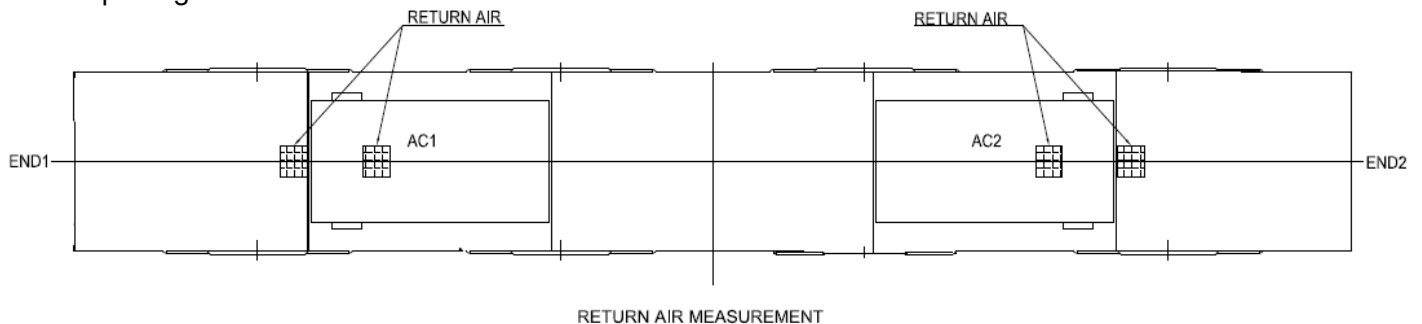


Figure 3: Return air inlet locations in car

8.2. Fresh air flow measurement

Fresh air flow shall be measured at the fresh air openings of VAC unit mounted on the car. Fresh air shall be measured using measuring duct/hood. Measuring duct/Hood shall be mounted on VAC unit.

Velocity will be recorded at all measurement points in the duct. Average velocity shall be multiplied with the measuring duct inlet area to obtain the fresh air flow rate of each opening.

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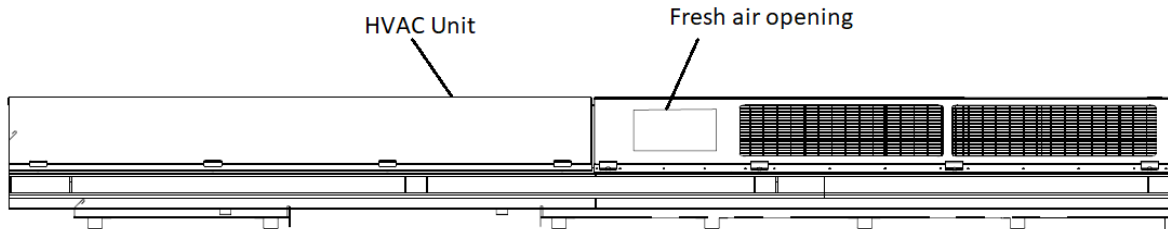


Figure 4: Fresh air inlet locations on VAC

8.3. Test procedure - Return air and fresh airflow measurement

Brief test procedure for air flow measurement tests is described below. Sub-contractor shall prepare the detailed test procedure along with data record sheet and submit to BEML for approval before conducting the tests. Return and fresh airflow rates shall be measure with clean filters under normal ventilation mode

a) Test conditions:

1. Only blower fans “on” (all other equipment “off”)
2. Keep all saloon doors closed
3. Fresh air dampers opening – at AW1, AW2, AW3 and AW4 conditions
4. Return air dampers open
5. Air filters clean

b) Test procedure

Following measurements shall be recorded

1. Return airflow rates at 100% Fresh air dampers opening
2. Fresh airflow rates at 100% Fresh air dampers opening

Flow rate is equal to the product of average flow velocity and cross-sectional area of measurement duct. Flow velocity shall be measured by suitable flow velocity apparatus. Length and width of measurement duct shall be measured by measuring tape.

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9. Cooling performance test

Purpose of these tests is to ensure that VAC performance is as per contract / EN 14750-1 & 2 requirements.

9.1. Test conditions

Test Conditions	External Conditions	Internal conditions
Design point 1	DB 37.3°C 40% RH	25°C 60% RH
Design point 2	DB 34°C 65% RH	25°C 60% RH
Design point 3	DB 31.3°C 80% RH	25°C 60% RH

9.2. Test details

These tests shall be conducted inside a Climate Chamber for judging the cooling performances of the VAC system. Heating and humidifying equipment and all measurement equipment's shall be provided in the car for test purposes. Following tests shall be carried out

- a) Cooling Tests in Design point-1
 - 1) Pre-cooling in AW0, with FAD closed, as per EN 14750-2
 - 2) Regulation for AW4, for 1 hour or 3 cycles, as per EN 14750-2
 - 3) Doors open for 30 sec close for 2 min, for 10 cycles, as per EN 14750-2
 - 4) Measurement of Cooling Capacity as per EN 14750-2
- b) Cooling Tests in Design point-2
 - 1) Pre-cooling in AW0, with FAD closed, as per EN 14750-2
 - 2) Regulation for AW4, for 1 hour or 3 cycles, as per EN 14750-2
 - 3) Doors open for 30 sec close for 2 min, for 10 cycles, as per EN 14750-2
 - 4) Measurement of Cooling Capacity as per EN 14750-2
- c) Cooling Tests in Design point-3
 - 1) Pre-cooling in AW0, with FAD closed, as per EN 14750-2
 - 2) Regulation for AW4, for 1 hour or 3 cycles, as per EN 14750-2
 - 3) Doors open for 30 sec close for 2 min, for 10 cycles, as per EN 14750-2
 - 4) Measurement of Cooling Capacity as per EN 14750-2
- d) High Ambient Temperature Cooling Tests

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9.3. Equipment's

Minimum following equipment's shall be required for conducting above tests

1. Data acquisition system
2. Sensible and latest heat load simulators
3. Measurement instruments for Voltage and current etc.
4. Temperature measuring instruments (air and surface (interior and exterior))
5. Humidity measuring instruments
6. Air flow measuring ducts and hood
7. Energy measurement devices

9.4. Test procedure

Brief test procedure for cooling performance tests is described below. Sub-contractor shall prepare the detailed test procedure and submit to BEML for approval before conducting the tests.

9.4.1. Pre-cooling

Pre-cooling test is performed to determine the time taken by VACs to bring car interior temperature to set-temperature. Test shall be conducted for all design conditions.

a) Test conditions

- 1) Before conducting pre-cooling tests, the test car shall be soaked in the specified ambient temperature and RH of the climate chamber with VACs switched off.
- 2) Before the start of the pre-cooling test, the interior air and surface temperatures shall be stabilized within ± 1 K of the exterior air temperature.
- 3) Feed the set temperature in VAC system
- 4) Doors closed
- 5) Air filters clean
- 6) Solar load 100%, passenger load AW0 and fresh air dampers shall fully close.

b) Test procedure

- 1) Start VACs.
- 2) Record the interior conditions at every interval of time
- 3) Record the time required to bring car interior temperature to set-temperature

c) Acceptance criteria

- 1) Mean interior temp. (Tim) $\leq 25 \pm 2$ °C
- 2) RH $\leq 60\%$
- 3) VACs should not trip

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9.4.2. Regulation test

Regulation test is performed to check stability of temperature achieved in the comfort zone. Test shall be conducted for all design conditions

- a) Test conditions
 - 1) Feed the set temperature to VAC
 - 2) Doors closed
 - 3) Air filters clean
 - 4) Solar load 100% & passenger load AW4
- b) Test procedure
 - 1) Keep the VACs running for 1h or 3 cycles
 - 2) Record the temperatures, humidity and total energy consumption
- c) Acceptance criteria
 - 1) Temperature at 1.1m within 8°C range
 - 2) Temperature at any vertical to be within 8°C range
 - 3) $T_{im} \leq 25 \pm 2$ °C and RH $\leq$ 60%
 - 4) Temp. $\leq$ 70 °C inside all electrical cubicles
 - 5) VACs should not trip

9.4.3. Doors open close test

Door open-close test is performed to check stability of temperature achieved in the comfort zone with AW4 passenger load. Test shall be conducted for all design conditions

- a) Test conditions
 - 1) Feed the set temperature to VAC
 - 2) Air filters clean
 - 3) Doors open/close
 - 4) Solar load 100% & passenger load AW4
- b) Test procedure
 - 1) Keep the VACs running
 - 2) Door open 30 sec – close 2 min on one side of the vehicle, 10 operational cycles
 - 3) Record interior temperatures, humidity
- c) Acceptance criteria
 - 1) $T_{im} \leq 25 \pm 2$ °C and RH $\leq$ 60% at the end of each cycle
 - 2) VACs should not trip

9.4.4. Cooling Capacity

Cooling capacity test is performed to check cooling capacity of VAC unit. Test shall be conducted for both summer and monsoon conditions

- a) Test conditions

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- 1) All VAC run at full cooling capacity during the full test period
 - 2) Air filters clean
 - 3) Fresh air damper closed
 - 4) Return air damper open
 - 5) Doors closed
 - 6) Variable heat load
 - 7) Outside air velocity 5-40 kmph (same to be finalized before testing along with end customer)
- b) Test procedure
- 1) Keep the interior condition $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, $60\% \pm 5\% \text{RH}$ by adjusting the number of heaters and steam generators.
 - 2) Monitor supply and return air temp and RH.
 - 3) After stabilization of parameters, VACs shall keep running for 2 hours and 9 readings of all relevant temperature, humidity and power consumption values shall be taken at 15-minute intervals
 - 4) Measure return air flow 3 times: one just before the test (after temperature stabilization is achieved), one during the test and one just after the test is completed.
- c) Acceptance criteria
- 1) VACs should not trip
 - 2) Cooling capacity must meet the design capacity

9.4.5. Regulation at High ambient

This test is performed to check the operation of VAC units at high temperature

- a) Test conditions
- 1) Car shall be soaked in ambient temperature of 48°C for 2 hours, with doors open, before starting the 45°C tests
 - 2) Feed the set temperature to VAC
 - 3) Doors closed
 - 4) Air filters clean
 - 5) Solar load 100% & passenger load AW4
 - 8) Outside air velocity 5-40 kmph (same to be finalized before testing along with end customer)
 - 6) Outside temperature $48^{\circ}\text{C} (-2 \sim +0^{\circ}\text{C})$
- b) Test procedure
- 1) Keep the VACs running for 1 h
 - 2) Record the temperature, humidity and total energy consumption
- c) Acceptance criteria
- VAC unit should not trip.

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10. Specific Energy Consumption test

a) Test details

SEC test shall be conducted under following conditions:

1. Specific Energy Consumption of VAC system shall be determined by conducting test on one car in climatic chamber
2. Round Trip time (RTT) corresponding to Declared Schedules Speed (DSSP) (RTTDSSP) in phase 2 network for Corridor 3,4 and 5 as mentioned in ERTS-RS clause 2.25.10.a.vi. shall be considered.
3. Dwell time for each intermediate station shall be 30 seconds (including doors opening and closing time).
4. The train operation and the run time between stations corresponding to DSSP as per clause 2.25.10.a.vi. shall be considered for testing during validation.
5. Inside car temperature shall be maintained at 25 °C and relative humidity of 65%. The car inside temperature before opening of the saloon doors at each station shall be within 25°C.
6. Ambient (summer) conditions to be maintained outside the car. Ambient temperature, humidity and air speed of outside car shall be monitored as per EN 14750-2. Energy Consumption test shall be conducted at an air speed of 5-40 kmph. (same to be finalized before testing along with end customer)
7. Loading Condition: Heat load of AW3 numbers of persons as per EN 14750-1, throughout the round trip including the terminal turnaround time.
8. Doors opening and closing as per scheduled to and fro run on the route.
9. For terminal stations, 2 times opening as well as closing of doors shall be considered.

The energy measured on one car (CMRL will inform type of car during design stage) in the climatic chamber will be multiplied by three (3) to determine the energy consumption by VACs of a 3-car train in climatic chamber (SEC_{H-CC}). BEML will provide Cable losses between Auxiliary Converter-Inverter and VAC, Efficiency curve of Auxiliary Converter-Inverter, Cable loss between Auxiliary Converter-Inverter and main transformer and Efficiency curves of Main Transformer during run, turnaround and during dwell time. Energy loss on account of these items shall then be added to the measured value above (SEC_{H-CC}) to determine the value of $SECH$.

The objective of this test is to check if the VAC system meets the requirements of declared Specific Energy Consumption (SEC) for the VAC system for to-and-fro run on Declared Schedules Speed (DSSP) (RTTDSSP) in phase 2 network for Corridor 3,4 and 5 as mentioned in ERTS-RS clause 2.25.10.a.vi. Brief test procedure for Specific Energy Consumption tests is described below. Sub-

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contractor shall prepare the detailed test procedure and submit to BEML for approval before conducting the tests.

b) Test conditions

1. Climate chamber temperature to be set at Design point for testing
2. Feed the set temperature to VAC
3. Air filters clean
4. All lights "on" and equipment load maximum
5. Solar load 100% and passenger load AW3
6. Outside car air velocity 5-40 km/h (same to be finalized before testing along with end customer)
7. One side doors to be opened and closed as per route running timings (for to-and-fro run on scheduled speed).

c) Test procedure

1. car to be soaked in Design point ambient condition.
2. All doors to be close and vestibule opening to be temporarily blocked and sealed.
3. Feed the set temperature to VAC.
4. VACs to be started. Data recording to be started.
5. Pre-cooling to be done without any solar, passenger or equipment heat loads. After reaching stabilised conditions, let the VACs keep running for 1 hour with doors closed.
Note: "Stabilised condition" means that the average interior temperature at 1.1 m (Tim) remains almost constant within the tolerance limit of $\pm 2^{\circ}\text{C}$ with respect to the interior temperature setting while the VACs function under the nominal performance.
6. Add heats of solar load, AW3 passenger load and equipment load. Also switch "on" all the lights. Doors will remain closed.
7. Let the air conditioning system be operated until conditions interior temperatures stabilize. Then the VACs should be kept running under stabilised condition for another 1 hour.
8. After 1 hour of stabilised operation, the testing for SEC will start. Starting time of the test will be marked and recorded.
9. The doors open/close operations to be sequenced as per the run time schedule specified for round trip of the earmarked section.

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10. 4 minutes of turn back operation at last station will be simulated
11. Time of completion of doors open/close cycles for simulated round trip shall be recorded
- d) Data recording
 1. Energy consumption (kWh) by energy meter (at 15 seconds sampling rate)
 2. Data recording by data logger
- e) Acceptance criteria
 1. $T_{im} \leq 25 \pm 2$ °C and RH $\leq 60\%$ under stabilised conditions and before every door opening in the doors open/close cycles for the simulated round-trip run
 2. Temperatures at 1.1m from floor to be within 8 °C range during the entire test.
 3. Temperatures at all three vertical planes to be within 8 °C range during the entire test.
 4. VACs should not trip during the entire test.

11. Scope of work

11.1. General

1. One car will be subjected to the climatic chamber tests. BEML will transport one car from BEML unit to the test facility. BEML team along with VAC supplier reps will participate in the tests. All tests will be witnessed by customer technical team.
2. Sub-contractor shall co-ordinate with transporter to shift the car from the port to the test facility, assist in arranging the required facilities for loading and unloading the car at port and assist in any issues during local transportation of car
3. Unload the car at their test facility
4. All the facilities required for in-house (within sub-contractor premises) movement of car, all material / consumables required for tests, electrical power supply, sensors and measuring instruments, data loggers, heating elements, humidifiers and any material / facility required for testing shall be in sub contractor's scope
5. Manpower required for all activities listed in scope of work shall be in sub contractor's scope.
6. Sub-contractor shall be responsible for conducting all the tests specified in clause no. 8, 9 and 10 of this document.
7. Cooling performance tests (pre-cooling, regulation, cooling capacity tests and specific heat measurement tests) under design conditions specified at clause no 8 and 9 shall be checked and verified by BEML before calling the customer for witnessing the tests.

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8. All tests specified at clause no 8, 9 and 10 shall be conducted in presence of customer (tests done at clause no 11.1.7 above shall be repeated)

11.2. Testing

11.2.1. Test procedure

Brief test procedure for each test is described above. The Subcontractor shall prepare the detailed test procedure for all the tests and submit to BEML for approval. Test procedure shall be mutually discussed and agreed upon. Test procedure shall include following as minimum

- Details of test facility to be used
- Test schedule
- All the data required from car builder and VAC supplier
- Standards to be followed
- Test equipment's and sensors specifications
- Sensor calibration certificates
- Calibration procedures
- Test methodology
- Sensor mounting arrangement at all specified locations
- Heat load simulation details
- Humidity simulation details
- Energy consumption calculations

11.2.2. Air flow measurement

Air flow measurement test include but not limited to following activities

1. Preparation of test plan
2. Preparation of car for the test - closing the gangway openings to make it airtight, electrical power connection to VAC and control system, preparation of test setup
3. Perform all the air flow measurement tests specified in clause no 7 of this document.
4. If the measured values are not meeting the contract requirement, BEML / VAC supplier will take up the required modification on VAC unit and air distributing ducts to adjust the air flow parameters. Subcontractor shall repeat the air flow measurement test after modification

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11.2.3. Cooling performance test

Cooling performance test include but not limited to following activities

1. Preparation of test plan
2. Preparation of car for the test - closing the gangway openings to make it airtight, electrical power connection to VAC and control system, preparation of test setup, installation of sensors, installation of data logging system, preparation of heat loads & humidifiers and all other aspect related to testing
3. Perform all the cooling performance tests specified in clause no 8 of this document. All tests shall be as per EN 14750.
4. If the measured values are not meeting the contract requirement, BEML / VAC supplier will take up the required modification on VAC unit and air distributing ducts to adjust the cooling parameters. Sub-contractor shall repeat the Cooling performance test after modification

11.2.4. Specific Energy Consumption test

Specific Energy Consumption test shall include but not limited to following activities

1. Preparation of car for the test - preparation of test plan to simulate round trip run, preparation of test setup, installation of sensors& energy measurement instruments, installation of data logging system, preparation of heat loads & humidifiers and all other aspect related to testing
2. Pre cooling the car till stabilized conditions achieved inside saloon
3. Perform the Specific Energy Consumption test specified in clause no 9 of this document. All tests shall be as per EN 14750. The doors open/close operations and climatic chamber air speed to be sequenced as per the run time schedule specified for round trip

11.2.5. Test report

1. All test reports shall be prepared by the subcontractor and submitted to BEML/CMRL. Reports shall be in English language. The Test reports shall include, but not be limited to, the followings:
 - i. The reference to the corresponding Test Procedure
 - ii. The date of the test was executed
 - iii. Description of any test conditions, input data, or tester actions
 - iv. Details of test instruments used (Make, Model) along with calibration certificate.

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- v. The test results for each test including a Passed / Failed indication
2. Test reports of all tests performed shall be submitted within 2 weeks of test performance to BEML/CMRL for acceptance.
3. BEML will review the test report and offer comments. Sub-contractor shall modify the test report as per BEML comments as required.

12. List of test and duration

The tentative test list and duration of tests to be conducted in the climatic chamber is listed below. Same may subjected to change based on the requirements of BEML and GC/CMRL.

SN	Test description	Internal / Official	Duration / Days
1	Airflow measurements	Internal	2 days
2	Cooling tests in Design point 1	Internal	1 day
3	Cooling tests in Design point 2	Internal	1 day
4	Cooling tests in Design point 3	Internal	1 day
5	High Ambient Temperature Cooling Tests at 48°C ambient temperature	Internal	0.5 day
6	Specific Energy consumption test	Internal	2 days
7	Measurements of thermal conductivity (K factor)	Internal	1 day
8	Airflow measurements	External	2 days
9	Cooling tests in Design point 1	External	1 day
10	Cooling tests in Design point 2	External	1 day
11	Cooling tests in Design point 3	External	1 day
12	High Ambient Temperature Cooling Tests at 48°C ambient temperature	External	0.5 day
13	Specific Energy consumption test	External	2 days
14	Measurements of thermal conductivity (K factor)	External	1 day

** Test duration /days are may change during the design and test protocol finalization stage.

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13. Submittals with Technical Offer

The subcontractor shall provide as a minimum, the following along with their proposal.

1. Following details about test facility
 - i) Details of the climatic chamber including size of climatic chamber and preparation hall.
 - ii) Available test facilities.
 - iii) Details of instruments like data acquisition system, temperature sensors, humidity sensors.
 - iv) Heat load simulation devices
2. Supporting documents for Qualification Criteria compliance. (Clause 3)
3. Clause-wise comments against the PTS Doc.
4. Brief test procedure.
5. Details of earliest available test slots and tentative test schedule.