

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

BID INVITATION NO: 6300039525

Subject: Design, Manufacture, Supply, Testing & Commissioning, Training & Manuals of Vacuum Circuit Breaker and Earthing Ground Switch including CMC Spares, Consumables and Tools and service activities required for 210 cars of Chennai Metro Rail Project-Phase II (ARE02A).

Quotation/offer are invited from Original Equipment Manufacturer (OEM) or authorized representatives of OEMs of **Vacuum Circuit Breaker and Earthing Ground Switch** for Metro Rolling stock having experience in Design, Manufacture, Supply, Testing & Commissioning of **Vacuum Circuit Breaker and Earthing Ground Switch** in accordance with the enclosed terms and conditions within the tender closing date.

Tender Closing Date: 04.06.2025@17:00 hrs. Further it may be extended for another 7 days

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

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

Please note that bidder should be having a **valid Class-III Digital Signature Certificate** issued by authorized Certifying Authority to submit bid in our SRM e-Procurement system. Interested bidders can contact BEML through e-mail: admin.srm@beml.co.in to obtain the username & password for submitting the quotations In case of any queries, you may contact BEML SRM Team on phone no. **080-22963269**

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

Note: - The tender consists of 58 Nos. 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 document 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 bids, formats which would be part of bids 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

NIT- Notice Inviting Tender	BEML -BEML Limited
TS-Train set	CMRL -Chennai Metro Rail Limited
PTS- Procurement Technical Specification	ERTS - Employer's requirements General Specification
PO-Purchase order	DLP -Defect Liability Period
GTC- General Terms and Conditions	DNP – Defect Notification Period
CMC – Comprehensive Maintenance Contract	PBG – Performance Bank Guarantee
SRM- Supplier Relationship Management	GeM-Government e Marketing
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 SRM 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 **Design, Manufacture, Supply, Testing & Commissioning, Training & Manuals of Vacuum Circuit Breaker and Earthing Ground Switch including CMC Spares, Consumables and Tools and service activities required for 210 cars of Chennai Metro Rail Project-Phase II (ARE02A).**

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
2	Commercial Bid	SRM Portal	Price details to be duly filled in specified field on SRM Portal.Evaluation is based on the total bid value of all the items & services.

2) Details of Items & Services:

1. Equipment with DNP/DLP

Table-1.1 Equipment with DNP/DLP

Sl	Kit Part no	Description	UoM	Qty for 210Cars (70 T. Sets)
1	52421107	Vacuum Circuit Breaker (VCB)	SET	140
2	52421109	Earthing Ground Switch (EGS) along with Pneumatic Interlocking Valve (PIV)	SET	140

Scope shall also cover the following:

1. Testing & Commissioning activities VCB & EGS for one Train for each of three corridors 3, 4 & 5.
Corridor 3 from Madhavaram to Sipcot,
Corridor 4 from Lighthouse to Poonamalle,
Corridor 5 from Madhavaram to Sholinganallur
2. Spares and consumables including Service for Defect Notification period (DNP)/ Defect Liability Period (DLP) as per Section 8 of PTS and ERTS requirements. Detailed BOM for DNP/DLP Spares and Consumables for warranty period.

Table-1.2: Non-Recurring Cost (NRC)

Sl	Description	UoM	Qty
1	Non-Recurring activities- Design and Submission of Design Documents - VCB	AU	1
2	Non-Recurring activities- Design and Submission of Design Documents - EGS & PIV	AU	1

Table-1.3 FAI Reports and Type Test & Report

Sl	Description	UoM	Qty
1	FAI Reports and Type Test & Report - VCB	AU	1
2	FAI Reports and Type Test & Report - EGS & PIV	AU	1

2. Comprehensive Maintenance Contract (CMC) as per Annexure-IV" Scope of CMC**Table 2.1: Spares, Consumables & Tools required on for CMC period**

Sl	Kit Part no	Description	UoM	Qty/Project
1	5242100024	Spares required for Vacuum Circuit Breaker	Set	1
2	5242100025	Tools required for Vacuum Circuit Breaker	Set	1
3	5242100026	Spares required Earthing Grounding Switch (EGS) along with Pneumatic interlocking valve (PIV)	Set	1
4	5242100027	Tools required for Earthing Grounding Switch (EGS) along with Pneumatic interlocking valve (PIV)	Set	1

Scope shall be as per Annexure -A and the bidder has to submit the details of Tools and test Benches in line with Annexure-IV" Scope of CMC"

3. Training & Manuals**Table 3.1: Training**

Sl	Description	UoM	Qty /Project
1	Training on O&M to the CMRL/BEML on Vacuum Circuit Breaker	AU	1
2	Training on O&M to the CMRL/BEML on Earthing Grounding Switch (EGS) along with Pneumatic interlocking valve (PIV)	AU	1

Table 3.2: Manuals

Sl	Description	UoM	Qty /Project
1	Training Manual, System/ Technical Manuals, Software Manuals, Operation Manuals, Maintenance Manuals, Fault Diagnostic Manuals& Spares Part Catalogue.- VCB	AU	1
2	Training Manual, System/ Technical Manuals, Software Manuals, Operation Manuals, Maintenance Manuals, Fault Diagnostic Manuals& Spares Part Catalogue.- EGS & PIV	AU	1

Required Delivery Schedule: For **VCB & EGS**

Sl No	Part No / Description	Total Qty (Trainsets)	Schedule	No of Train Sets
1	Equipment with DNP/DLP	70 TS (210 cars)	Apr'26	1
			Jul'26	3
			Nov'26	3
			Feb'27	4
			May'27	4
			Jul'27	3
			Aug'27	3
			Sep'27	4
			OCT'27	3
			Nov'27	4
			Dec'27	3
			Jan'28	3
			Feb'28	3
			Mar'28	3
			Apr'28	3
			May'28	4
			Jun'28	4
			Jul'28	3
			Aug'28	4
			Sep'28	4
			Oct'28	4
3	Non-Recurring activities- Design and Submission of Design Documents	PDR: Jul-25 PFDR: Mar-26 FDR: Jun-26		
4	FAI Reports and Type Test & Report	Jun.26		
	SIL Certifications and certificate submission as per ERTS Clause 6.3.25	Mar-26		
6	Spares	To be supplied as per BEML requirement		
7	Tools for CMC period	Dec.'26		
8	Training	Jan.'28		
9	Manuals	Jan.'28		

Note: a) Delivery schedule proposed above is tentative. However, it can be mutually discussed and agreed in line with key dates of CMRL contract.

b) CMC shall start after completion of DLP/DNP activity for 70th Trainset and shall end 15 years after the start of CMC.

c) 1 Trainset comprises of 2 DM car and 1 T car

5. SUBMISSIONS OF TECHNICAL BID

<p style="text-align: center;">Technical Bid submission Conditions</p>	<p><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:</p> <ol style="list-style-type: none"> a. Bidders should upload duly filled, signed & stamped Integrity Pact with two witnesses [Appendix – A]. b. Clause by Clause compliance for the BEML Procurement Technical Specification (PTS): Doc no: PTS Doc No GR/TD/7063 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. Formats as per PTS also to be submitted. 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 refer “SCOPE of CMC” [Annexure-IV] enclosed along with this tender document for CMC requirement. g. Bidders to commit that they will support BEML for requirement of any additional equipment, spares, service required at the later stage ie after 1st year of taking over and up to completion of CMC period. (Appendix- D) h. Bidders to upload duly filled, signature & stamped confidentiality agreement in plain paper [Appendix – E] i. Bidders to upload duly filled, signature & stamped Compliance to Land border sharing Clause – [Appendix – F] j. Bidders to upload duly filled, signature & stamped Compliance to purchase preference under public procurement policy – [Appendix – G] k. Bidders to upload duly filled, signature & stamped Compliance to Contact Details of Supplier/ Bidder – [Appendix – H] l. Bidders to upload duly filled, signature & stamped Compliance to Delivery Schedule – [Appendix – I] <p>BEML at its sole discretion reserves the right to seek the Soft/ Hard copies of the documents which are already been uploaded in SRM, 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 SRM Portal in original has to be couriered at the request of BEML. Any irrelevant documents furnished through courier will not be considered.</p> <p>NOTE: Please note Commercial Bid /Price details should not be indicated in TECHNICAL BID, else bid will not be considered for further evaluation.</p>
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6. SUBMISSIONS 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. Equipment with DNP/DLP						
Sl. No	Kit Part no	Description	UoM	Total Quantity for 210 Cars (70 T. Sets)	Unit Rate in INR	Total Quantity for 210 Cars (70 T. Sets)
1	52421107	Vacuum Circuit Breaker (VCB)	SET	140	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
2	52421109	EARTHING GROUND SWITCH (EGS) ALONG WITH PNEUMATIC INTERLOCKING VALVE (PIV)	SET	140	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
3		Non-Recurring activities- Design and Submission of Design Documents - VCB	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
4		Non-Recurring activities- Design and Submission of Design Documents - EGS & PIV	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
5	5241400006	FAI Reports and Type Test & Report - VCB	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
6		FAI Reports and Type Test & Report - EGS & PIV	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
Sub total (Table 1)						
The prices are firm and fixed prices and PVC is not applicable.						

TABLE 2 Comprehensive Maintenance Contract (CMC)						
Sl. No	KIT Part No	Description	UoM	Quantity /Project	Unit Rate in INR	Total Price in INR

1	5242100024	Spares required for Vacuum Circuit Breaker	Set	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
2	5242100025	Tools required for Vacuum Circuit Breaker	Set	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
3	5242100026	Spares required Earthing Grounding Switch (EGS) along with Pneumatic interlocking valve (PIV)	Set	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
4	5242100027	Tools required for Earthing Grounding Switch (EGS) along with Pneumatic interlocking valve (PIV)	Set	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
Sub total (Table 2)						

The prices are firm and fixed prices and PVC is not applicable.

TABLE-3 Training & Manuals

Sl. No	Description	UoM	Qty/Project	Unit Rate in INR	Total Price in INR
1	Training on O&M to the CMRL/BEML on Vacuum Circuit Breaker	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
2	Training on O&M to the CMRL/BEML on Earthing Grounding Switch (EGS) along with Pneumatic interlocking valve (PIV)	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
3	Training Manual, System/ Technical Manuals, Software Manuals, Operation Manuals, Maintenance Manuals, Fault Diagnostic Manuals& Spares Part Catalogue.- VCB	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
4	Training Manual, System/ Technical Manuals, Software Manuals, Operation Manuals, Maintenance Manuals, Fault Diagnostic Manuals& Spares Part Catalogue.- EGS & PIV	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only

Sub total (Table 3)	
The prices are firm and fixed prices and PVC is not applicable.	

Note:

1. Bidder has to quote for all the items in SRM Portal
2. Commercial evaluation will be arrived based on grand total of all the tendered items (i.e. Equipment with DNP/DLP, Comprehensive Maintenance Contract (CMC), Training & Manuals). (i.e. Table-1+Table 2 +Table 3)
3. The commercial bids of the technically acceptable vendors only will be opened for further commercial evaluation.
4. . Acceptable Currencies as per CMRL Contract:
 - a) **INDIAN RUPEE (INR)**
 - b) **EURO (EUR)**
 - c) **JAPANESE YEN (JPY)**
5. For the purpose of arriving the landed cost in INR, the exchange rates for EUR/JPY prevailing as on date of tender opening. (Date of Technical bid opening in case of two bid tender)
6. In case of Foreign bidders, for the purpose of arriving the landed Cost in INR, Freight charges of 4.5% shall be loaded during price evaluation.
7. Reverse Auction will be conducted among technically qualified Bidders in SRM Portal as per procedures and L1 status will be arrived based on total landed bid value (i.e. Table-1+Table 2 +Table 3).
8. Reverse Auction will be conducted at the discretion of BEML

[ANNEXURE – II]

GENERAL TERMS & CONDITIONS (GTC) FOR PROCUREMENT OF MATERIALS:

1. GLOSSARY, DEFINITIONS & INTERPRETATIONS

1. 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, 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(CMRL) Requirement Technical specification (ERTS) & Employer (CMRL) General Condition of contract(GCC) and Employer Particular condition of Contract (PCC)
- i) End-Customer / End-user means: Chennai Metro Rail Limited (CMRL).
- 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) C.F.R /F.O.B / F.D.D / DAP. is to be interpreted in accordance with the provisions of INCOTERMS 2020, 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.

c) General:

- i. If dealers are submitting the bids in place of OEM, Dealer 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 which is also based on Employer's (CMRL) requirement and conditions of contract for ARE02A Project.

3. SUPPLIERS SHARING LAND BORDER WITH INDIA:

Land border sharing Declaration in line with Department of Expenditure's(DOE) Public Procurement Division order vide F. No. 6/18/2019-PPD dated 23.07.2020 & 24.07.2020 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.

5. DELIVERY TERMS:

- a) In case of foreign Supplier: F.O.B (Free on Board) to nearest port basis. The intimation for shipment should be provided 21 days prior to the delivery schedule to our nominated freight forwarder and the consignment to be handed over to our freight forwarder before the cut-off date for sailing.
- b) In case of Domestic Supplier: F.O.R (Free on Road) /F.D.D. (Free Door Delivery), BEML, Bangalore Complex.
- c) For CMC -Supply of Spares, Consumables & Tools:F.O.R- Designated CMRL depots, Chennai

6. PAYMENT:

I. SUPPLIES (Equipment)

a) APPLICABLE TO FOREIGN BIDDERS

- i. TT payment -100% 60 days from the date of receipt of material at BEML stores subject to inspection clearance.
- ii. All bank charges incurred in India shall be borne by BEML and all bank charges outside India shall be borne by the supplier.

b) APPLICABLE TO THE DOMESTIC BIDDERS

- i. Terms of payment are 100% in 60 days from the date of receipt of material at BEML stores subject to inspection clearance & for MSEs in 45 days from the date of receipt of material subject to inspection clearance as per MSME act.

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

II. NON-RECURRING (NRC) AND SERVICE ACTIVITIES:

- i. **NRC:** 100% payable on 60th day after completion of NRC activities subject to acceptance by BEML R&D and for MSEs 45 days after completion of NRC activities subject to acceptance by BEML R&D
- ii. **FAI Reports and Type Test & Report:** 100% payable on 60th day after completion of FAI activities and submission of FAI reports and type test reports subject to acceptance by BEML R&D and for MSEs 45 days after completion of FAI activities subject to acceptance by BEML R&D
- iii. **Services :**100% payable on 60th day after completion of service activities subject to acceptance by BEML R&D /Depot T&C/End Customer and for MSEs 45 days after completion of service activities subject to acceptance by BEML R&D /Depot T&C/End Customer

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.

- iv. TDS (Tax deducted at source) will be applicable for service purchase orders including Foreign Services and will be deducted as per law of land. SAC (Service Account code) shall be indicated by the bidder for the services that are proposed be carried out.

III. **PAYMENT FOR SPARES SUPPLY DURING CMC PERIOD AS PER MUTUALLY AGREED DELIVERY SCHEDULE:**

100% on 60th day from the date of receipt of material as per “Scope of CMC” at BEML stores /Chennai Depot subject to inspection clearance and based on mutually agreed delivery schedule between BEML in line with LCC of the system

For Bidders not agreeing with above terms I,II&III, their prices will be suitably loaded with applicable cash credit interest while evaluation of bids.

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, which ever 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 FOR SUPPLY, NON-RECURRING SCOPE AND DELIVERABLES:

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:

The Supplier guarantees 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 guarantees that the delivery corresponds exactly with the provisions of the agreement, the reasonable expectations of BEML 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 guarantees that the delivery complies with legal requirements applicable in India and other (international) Government regulations, as applicable.

The supplier guarantees 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.

10. WARRANTY:

- a) The supplied goods/stores to the purchaser under the contract shall be of the highest grade, free of all the defects & faults in material and of the best quality, manufacture and workmanship and consistent with the established and generally accepted standards for materials of the type ordered and in full conformity with the contract specification, drawing or sample, if any and shall, if operable, operate properly throughout warranty period.

Any defect/fault & non-conformance to standards & descriptions as aforesaid, found during warranty period shall be rectified /repaired/replaced free of cost & at supplier's risk to the complete satisfaction of BEML / End user, within reasonable time at the ultimate destination.

i. Warranty for Design, Manufacture, Supply, Testing and Commissioning, NRC and Service activities for 210 cars:

The said goods/stores shall be warrantied /guaranteed for a period of 24 months from the date of taking over of last trainset by CMRL.

ii Warranty for towards Spares, Consumables & Tools for Comprehensive Maintenance Contract period:

The said goods/stores shall be warrantied /guaranteed for a period of 24 months from the date of supply of goods at BEML stores/Designated Depots

- b) **Defect Liability Period (DLP) / Defect Notification period (DNP):** Defect Liability Period (DLP) / Defect Notification period (DNP): Defect Liability / Notification period shall start after taking over of first train set by customer and shall end two years after taking over certificate date of 70th train set. During DLP/ DNP, the Contractor shall be responsible for including but not limited to the following scope of activities:

i) Corrective Maintenance

ii) Spares Management

If the Works or sections are not available for usage by the end user (CMRL) for more than 48 hrs, then a penalty shall be paid by the supplier as applicable in same lines as per CMRL contract where the non-usage of due to vendor supply.

As per CMRL contract, "the cumulative amount shall be deducted by the Employer from the subsequent bills submitted by Contractor.

- Rolling Stock: Rs. 25,000 per day/ train

A penalty of Rs. 2 lakhs for each case shall be levied for the failure or malfunction in the Works or sections during passenger operation which interrupt metro operations in the specific corridor for more than 10 mins"

c) Extension of DLP:

- i. Train/System/Sub-system level extension of DLP will be applicable in the case where reliability targets defined as per ERTS 18.6 are not met.
- ii. In case of any retrofits/modifications done by the suppliers in any specific system/sub-system/function/component/software shall be subjected to 24 months warranty from the date of completion of retrofit/modification in that train spares. This specific 24-month warranty is irrespective of the train DLP/warranty
- iii. There shall be no delay in start of CMC period of car, However, If the DLP / DNP extension arose on account of non-fulfilment of the Reliability Demonstration targets for subject aggregate for which the tendering is done (as defined in ERTS-RS clause 18.6), then payments against Rolling stock CMC shall be reduced by 65% by CMRL on payment to BEML. The same will be reduced in payment to the supplier on back-to-back basis

d) Comprehensive Maintenance Contract (CMC):

CMC shall start after completion of DLP/DNP activity for 70th Trainset and shall end 15 years after the start of CMC

Note: In case of optional cars, CMC shall start after completion of DLP/DNP activity for 80th Trainset and shall end 15 years after the start of CMC

e) Guarantee / Warranty replacement:

Guarantee / Warranty replacement shall be dispatched on “DDP / F.O.R – BEML Stores / designated destination” basis for replaceable items during warranty period.

- f) The provisions of this Warranty shall be without prejudice to and shall not be deemed or construed so as to limit or exclude any rights or remedies which the BEML may have against the supplier, whether in tort or otherwise.

If any defect or damage is one requiring immediate attention from safety / environmental view point / operational viewpoint, then BEML has the authority to proceed with rectification in any manner suitable and deduct such sums from the suppliers Bill or purchase order whichever is active.

11. PERFORMANCE SECURITY / PERFORMANCE BANK GUARANTEE (PBG):

Firm shall submit the following 2 Performance Bank Guarantees:

I. FOR SUPPLY OF EQUIPMENTS, NON-RECURRING SCOPE, FAI REPORTS AND TYPE TEST AND SERVICE ACTIVITIES

- a) Supplier should submit Performance Bank Guarantee for amount equivalent to 10% of the Contract value excluding CMC valid till issue of taking over certificate for last trainset by end customer (CMRL). The bank guarantee has to be submitted within 60 days from the date release of Purchase order from BEML but not later than 30 days before

commencement of supplies pertaining to first delivery schedule indicated in the purchase order

- b) In case BEML is constrained to extend the Performance Bank Guarantee to its customer (CMRL), due to the failure of aggregates attributable to the supplies made by the supplier or non-fulfilment of NRC activities as applicable, then the costs involved to BEML for such PBG extensions shall be borne by the supplier.
- c) Performance Bank Guarantee shall be returned back only after completion of issue of taking over certificate for last trainset by end customers (CMRC) and if there is no defect /failure/negligence/complaints and /or any claims notified to BEML on part of supplier in fulfilling the supplies and activities
- 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

II. BANK GUARANTEE TOWARDS SPARES, CONSUMABLES, TOOLS AND TEST BENCHES FOR COMPREHENSIVE MAINTENANCE CONTRACT PERIOD:

- a) Supplier should submit Performance Bank Guarantee for amount equivalent to 10% of the Contract value for supply of spares, Consumables and tools for comprehensive maintenance contract period valid for entire Warranty period for CMC. The bank guarantee has to be submitted within 60 days from the date release of Purchase order from BEML but not later than 30 days before commencement of supplies pertaining Spares , tool and Testbenches indicated in the purchase order
- b) In case BEML is constrained to extend the Performance Bank Guarantee due to the failure of aggregates attributable to the supplies made by the supplier, then the costs involved to BEML for such Performance Bank guarantee/security extensions to its customer (CMRL) shall be borne by the supplier.

a) 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.

PBG shall be returned back only after completion of necessary Warranty /CMC Period and if there is no defect /failure/negligence/complaints and /or any claims notified to BEML on part of supplier in fulfilling the supplies and activities.

- 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 **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.

The Bank Guarantee validity shall be extended as required till the completion of all contractual and warranty obligations in Full.

i) Bank Guarantees has to be submitted in electronic form through NeSL Platform as required by BEML.

12. RIGHT TO VARY QUANTITIES &-QUANTITY OPTION CLAUSE:

- a) BEML reserves the right to increase or decrease the quantity specified in the schedule of requirements without any change in the unit price or other terms and conditions within the agreed delivery schedule
- b) BEML may at its discretion may advice the supplier in writing about the increase of the total quantity up to 10 complete train sets requirement of 3 cars each i.e. 30 cars. and upto additional 50% qty of spares, consumables, tools and Test Benches within CMC period.
- c) Supplier shall be required to supply increased ordered quantities at the contracted terms & conditions and determined prices (Excluding design cost, Type test cost, FAI test cost, Training & Manuals cost and Testing & commissioning cost) and no additional amount on account of quantity variation or escalation or any other account whatsoever payable to the supplier
- d) In case of increase in quantity beyond the original bid quantity, the delivery schedule for the increased quantities shall be mutually decided at the time of exercise of quantity variation by the Purchaser

- e) **CMC obligation for variation quantity:** The CMC obligation as applicable for the base order (70 trainsets of 3 car configuration) quantity shall be applicable for the respective optional trainsets also. The pricing for CMC for the optional trainsets shall be derived accordingly.

13. **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.

14. **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/services 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.

15. 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.

16. 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.

17. 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.

18. 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.

19. 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,
Metro Purchase Department
BEML, Bangalore Complex,
PB No.7501, New Thippasandra post,
Bangalore, Karnataka, India,
Postal Code - 560 075

20. 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.

21. 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.

22. 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.

23. SUPPLY OF SAMPLE: (if applicable)

The Contractor shall produce samples of all materials and shall obtain approval before he places bulk order for the material for incorporation in the works. In respect of materials for which samples are not kept or detailed specifications is not given hereinafter, such materials shall comply with the latest relevant Indian Standard Specifications a published up to the date of issue of this tender. The Contractor shall on demand produce original receipts vouchers/invoices in respects of materials supplied by him.

24. 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.

25. RAW MATERIALS ARRANGEMENT:

The supplier shall make his own arrangement to procure all raw materials required and BEML shall not be responsible for any assistance in such procurement or whatsoever.

26. IDENTIFICATION OF ITEMS / PIECES:

The supplier shall indicate / emboss / engrave, suitable identification marks (Viz. BEML stock number, supplier code number, batch no. etc.,) on each item/piece (or) on all components at convenient non-machinable place as per drawing, wherever applicable.

Also, shall indicate BEML part number, PO No. and date in all delivery documents, invoices and correspondence, wherever applicable.

27. PACKING AND MARKING:

- a) Packing to be in such a way that it should avoid transit/storage/handling damage.
- b) The supplier shall package the deliveries safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by Sea / Air / Rail / Road to its destination suitably protected against loss, damage, corrosion in transit and the effect of tropical salt laden atmosphere. The packages shall be provided with fixtures / hooks and sling marks as may be required for easy and safe handling by mechanical means.
- c) The packing, shipping, storage and processing of the delivery must comply with the prevailing legislation and regulations concerning safety, the environment and working conditions. Items packed with raw / solid wood packing material shall be treated as per ISPM – 15 (fumigation) and accompanied by Phytosanitary / Fumigation certificate. If safety information sheets exist for a delivery or the packaging, the Supplier must always supply these sheets direct (at the same time).
- d) Supplier shall indicate approximate net weight, gross weight and dimension of the package to enable BEML to determine the mode of dispatch. The packing should withstand the weather conditions during transit. The packing should not damage the contents in the package while transporting and handling. The safety and handling precautions should be clearly marked on the packages. The packing should be easily transportable without any damage. Each consignment should have individual packing list.

- e) Marking shall include the following information in sequence on the frame commensurate with the size of package.

**To: M/s. BEML Limited, Bangalore Complex,
New Thippasandra,
Bangalore – 560075,
Karnataka State, India.**

Purchase order number:

Shipper's mark:

Package number:

Identification number:

Caution marks, if applicable:

Net weight, gross weight and cubic measurement, whichever is appropriate for the shipment.

28. 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.

29. 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.

30. 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”

31. 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.

32. 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.

33. 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. In the case of vendor seeking Force majeure then it is discretion of BEML to consider the same based on authenticated documents.

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.

34. 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.

35. 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.

~~36.~~ 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.

37. DIVISION OF PATRONAGE:

BEML at its discretion reserves to issue order 100% on L1. BEML reserves the right to avail the price offered for full quantity of the tender or part thereof or ignore the offer completely without assigning any reason whatsoever.

38. 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

39. 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.

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

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.

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.

41. PROJECT IMPORT REGISTRATION:

Customs duty on input content imported by domestic bidders to manufacture tendered items.

Chennai 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 CMRL. The PIR sponsoring letter should be registered by the bidders with the concerned Customs Authorities at designated Port of Arrival.

The supplier shall submit the following documents 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.

42. INSURANCE COVERED BY BEML UPTO START OF CMC:

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 and designated CMRL depot available till handing over of trainset with 24 months DNP/DLP.

43. RETENTION MONEY:

Retention money shall be deducted at the rate of 5% against each Invoice value of PO (excluding CMC) upto cumulative value equal to 5% of the total Material PO value excluding taxes & duties. Firm to raise Invoice for 100% value indicating that 5% of the Invoice value shall be payable by BEML only after completion of DLP/DNP period of all the trainset.

Upon the request of the Supplier, the purchaser may release the withheld retention money on submission of Bank Guarantee for an equivalent amount in respective currencies from a public sector bank (PSB) of India or Scheduled Commercial Banks in India or any Japanese Bank as listed under Schedule of Commercial Banks by The Reserve Bank of India (RBI).

Retention amount shall be released upon completion of DLP period i.e, a period of 24 months from the date of supply upto taking over of last trainset (70th trainset) by end customer, CMRL

ANNEXURE – III: KEY DELIVERY DATES (CMRL)

ARE02A KEY DATE DELIVERY SCHEDULE																																									
BANGALORE COMPLEX																																									
PROJECT	Activities	Order Qty on Hand	2026				2027												2028												2029										
			Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Chennai Metro ARE02A	Delivery of cars @ Chennai	210	3	0	3	3	0	3	3	0	3	3	3	3	3	12	6	9	9	12	9	12	9	9	9	9	9	6	9	9	9	12	9	6							
	Testing & Commissioning of cars																																								
																	CMC of 15 years will start by Oct-2031 and end by Sep-2046																								
																	Manuals delivery																								
																	Red denote Key Date																								
			2026				2027												2028												2029										
			Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
			<p>CMC: BEML is required to carry out 15 years Comprehensive Maintenance Contract (CMC) for Rolling Stock which shall commence after the TOC date of 70th Trainset and shall end after 15 years from start</p> <p>DLP/RS: Shall start from the date of issuance of Takingover Certificate (TOC) for the 1st trainset and the fleet DNP / DLP ends two years after the TOC date of the 70th TS</p> <p>DLP/MP&P: Shall start on the TOC date of the respective equipment item and will ends two years after the TOC date of the last equipment</p> <p>Total RS DLP period required spares & manpower support for 1st TS = 51 months, 70th TS = 24 months. DLP varies from 1st TS to 70th TS</p>																																						
			<p>Note</p>																																						

ANNXURE-IV SCOPE OF CMC SPARES AND TOOLS

A. SCOPE OF CMC SPARES & TOOLS - VACUUM CIRCUIT BREAKER

1. One Set of Special tools, Jigs, measuring devices, to be considered as per OEM recommendations.
2. Test Benches for one depot to be considered as per OEM recommendations.
3. CMC period list of mandatory Spares to be positioned at the depot in schedule manner. Delivery schedule to be discussed and finalized during techno commercial discussion. Mandatory spares to be placed at the depot after completion of DLP period as per Annexure-A. This particular clause for spares requirement supersedes the ERTS terms and condition for the CMC.
4. Any modifications carried out by OEM During DLP/warranty period, also to be implemented by OEM in spares supplied under this contract.
5. Training for BEML staff to be provided at OEM Factory/ depots for operational & maintenance. This is apart from the training needs to the customer as indicated in the tender line item.
6. On Train Maintenance is Under BEML scope.
7. During DLP warranty period, DLP spares including One Number of Vacuum Circuit Breaker to be positioned and maintained by OEM at the Chennai depot.
8. OEM to give the storage procedure for the spares supplied at the depot.

Annexure-A

(Ref document, PTS of Vacuum Circuit Breaker system, Doc No.: GR/TD/7063, Latest Rev)

Sl.No	Item	Unit	Mandatory spares Qty	Remarks
1	VCB (Complete with connectors)	Nos	1	
2	Control box including auxiliary contact, pressure regulator, etc..	Nos	4	
3	Set of sensors, switches, relays (Set means for one VCB)	Set	4	
4	Set of valves, pressure switch, pressure regulator (Set means for one VCB)	Set	4	
5	Silicon grease for VCB	Kgs	5	

6	Set of minimum electrical items auxiliaries for Vacuum circuit Breaker: Mating connectors (Male/ female connector along with male/female crimp contact), Pins, Terminal blocks, MCB, switches, diodes, ferrules, etc. which are under vendors scope. (Set means for one VCB)	Set	2	
7	Set of minimum mechanical items auxiliary's for Vacuum circuit Breaker: Namely mounting fasteners, Mounting bolts, Washers, rubber items, etc., which are under vendor's scope. (Set means for one VCB)	Set	2	

Note: BOM & BOM quantity after design freeze is applicable for the above.

B. SCOPE OF CMC SPARES & TOOLS - EARTHING GROUND SWITCH

1. One Set of Special tools, Jigs, measuring devices to be considered as per OEM recommendations.
2. CMC period list of mandatory Spares to be positioned at the depot in schedule manner. Delivery schedule to be discussed and finalized during techno commercial discussion. Mandatory spares to be placed at the depot after completion of DLP period as per Annexure-A. This particular clause for spares requirement supersedes the ERTS terms and condition for the CMC.
3. Any modifications carried out by OEM during DLP/warranty period, also to be implemented by OEM in spares supplied under this contract.
4. This is apart from the training needs to the customer as indicated in the tender line item.
5. On Train Maintenance is Under BEML scope.
6. During DLP warranty period, DLP spares including one no. of Earthing Ground switch (EGS) along with Pneumatic interlocking valve (PIV) to be positioned and maintained by OEM at the Chennai depot.
7. OEM to give the storage procedure for the spares supplied at the depot.

Annexure-A

(Ref document, PTS of Earthing Ground switch (EGS) along with Pneumatic interlocking valve (PIV) , Doc No.: GR/TD/7063, Latest Rev)

Sl.No	Item	Unit	Mandatory spares Qty	Remarks
1	Earthing Ground switch(EGS) along with Pneumatic interlocking valve(PIV)	No	1	
2	Earth Braid	Nos	4	
3	Set of switches, Contacts (Set means DMC +TC + DMC cars)	Set	2	
4	Air Bolt	Nos	2	
5	Set of grease	kg	3	
6	Set of cocks, valves (Set means DMC +TC + DMC cars)	Set	1	
7	Set of minimum electrical items auxiliaries: Mating connectors (Male/ female connector along with male/female crimp contact), Pins,	Set	1	

	Terminal blocks, switches, ferrules, etc. which are under vendors scope. (Set means DMC +TC + DMC cars)			
8	Set of minimum mechanical items auxiliary's: Namely mounting fasteners, Mounting bolts, Diagram plate, Washers, shims, gaskets, rubber items, etc., which are under vendor's scope. (Set means DMC +TC + DMC cars)	Set	1	

Note: BOM & BOM quantity after design freeze is applicable for the above.

(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, BEMIL.
- (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)

(For & On behalf of Bidder/Contractor)

(Office Seal)

(Office Seal) Place--

----- Place----- Date -----

----- Date -----

Witness 1:
(Name & Address)

Witness 1:
(Name & Address)

Witness 2:
(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)

COMPLIANCE REPORT FOR PROCUREMENT TECHNICAL SPECIFICATION (PTS)

Compliance to PTS GR/TD/7063				
PTS Clause No	Description	Complied	Not Complied	Remarks
1. Introduction	1.1. General			
	1.2. Car Configuration			
	1.3 Operations			
	1.4 Description of work			
	1.5 Sustainability			
2. Definitions and Abbreviations	2.1 Definitions			
	2.2 Abbreviations			
3. Precedence of Documents				
4. Scope of Supply	4.1 General			
	4.2 Scope of Supply for VCB and EGS along with PIV			
5. System Requirements	5.1. General Requirements			
	5.2 Technical Requirements			
	5.3 Design life			
	5.4. Service-proven design			
	5.5. Designs for refurbishment			
	5.6. Aesthetic appearance			
	5.7 Car general characteristics			
	5.8. Clearance requirement			
	5.9. Trains inter- operability requirements			
	5.10. Environmental criteria			
	5.11. Shock and vibration			
	5.11.1 Component design criteria			

	5.11.2 Vibration generation			
	5.12 Ride Quality and Passenger comfort (Stability analysis)			
6. Performance Requirements	6.1 General			
	6.2 ACOUSTIC REQUIREMENTS			
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	9.6 Training			
10. Comprehensive Maintenance during Comprehensive Maintenance period	10.1 Warranty			
11. Subcontractor responsibilities	11.1 Product and Component responsibility			
	11.2 Weight			
12. Liabilities				
13. Project Management				
14. Quality	14.1 General			
	14.2 Quality Assurance Plan			
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	14.17 Handling			
	14.18 Non-conformance Control			
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	15.2 System Safety			
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	15.9 Materials and workmanship			
16. Routine and Type Test				
17. DNP				
18. Others				
19. Submittals – Technical Offer				
20. List of Documents and Drawings attached- Appendices/Annexures				

Authorized signatory with company seal / stamp

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			
5.	DELIVERY TERMS			
6.	PAYMENT			
7.	PRICE BID VALIDITY			
8.	FIRM PRICE			
9.	INSPECTION			
10.	WARRANTY			
11.	PERFORMANCE BANK GUARANTEE (PBG)			
12.	RIGHT TO VARY QUANTITIES & QUANTITY OPTION CLAUSE			
13.	LIQUIDATED DAMAGES CLAUSE			
14.	RISK PURCHASE CLAUSE			
15.	SECRECY AND CONFIDENTIALITY			
16.	AUTHORITY OF PERSONS SIGNING DOCUMENT			
17.	ACCEPTANCE OF ORDER			
18.	OTHER CONDITIONS			
19.	PRICE, INVOICING AND PAYMENT			
20.	PROGRESS REPORT			

Authorized signatory with company seal / stamp

COMPLIANCE REPORT OF GENERAL TERMS & CONDITIONS

(To be submitted along with Technical Bid)

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

21.	QUALITY & WORKMANSHIP			
22.	QUALITY, CONDITION OF DELIVERY			
23.	SUPPLY OF SAMPLE (If Applicable)			
24.	INSPECTION, TESTING & CONSEQUENCE OF REJECTION			
25.	RAWMATERIALS ARRANGEMENT			
26.	IDENTIFICATION OF ITEMS / PIECES			
27.	PACKING AND MARKING			
28.	APPLICABLE LAWS AND JURISDICTION OF COURTS			
29.	JURISDICTION			
30.	ARBITRATION			
31.	INTELLECTUAL PROPERTY RIGHTS; LICENSES			
32.	BRIBES AND GIFTS			
33.	FORCE MAJEURE CLAUSE			
34.	FALL CLAUSE			
35.	NON-DISCLOSURE AND INFORMATION OBLIGATIONS			
36.	ASSIGNMENT OF RIGHTS AND OBLIGATIONS; SUBCONTRACTING			
37.	DIVISION OF PATRONAGE			
38.	INTEGRITY PACT			
39.	GST TERMS & CONDITIONS			
40.	TAX CLAUSE			
41.	CUSTOMS DUTY ON INPUT CONTENT			
42.	INSURANCE COVERED BY BEML UPTO START OF CMC			
43.	RENTION MONEY			

Authorized signatory with company seal / stamp

COMMITTEMENT TO SUPPLIES
(To be submitted along with Technical Bid)

This is to certify that we M/s against SRM tender No. as a Bidder commit that we will support BEML for requirement of any additional Equipment, Spares, Service required at the later stage ie from of taking overof the First Trainset and up to completion of CMC by end customer CMRL for all the cars of contract Chennai Metro Rail Project-Phase II (ARE02A).

Authorized signatory with company seal / stamp

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.18/1, 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, 2018.
- 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.****2.**

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 18.07.2020 & 19.7.2020 and subsequent orders

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 18.07.2020 & 19.7.2020) 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

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 – G

**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 practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
3. In the event of false declaration, actions as per the above order necessary action will be taken against bidder.

**Authorized signatory with company seal / stamp
APPENDIX –H**

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 :

DELIVERY SCHEDULE

Required Delivery Schedule: For **VCB & EGS**

SI No	Part No / Description	Total Qty (Trainsets)	Schedule	No of Train Sets
1	Equipment with DNP/DLP	70 TS (210 cars)	Apr'26	1
			Jul'26	3
			Nov'26	3
			Feb'27	4
			May'27	4
			Jul'27	3
			Aug'27	3
			Sep'27	4
			OCT'27	3
			Nov'27	4
			Dec'27	3
			Jan'28	3
			Feb'28	3
			Mar'28	3
			Apr'28	3
			May'28	4
			Jun'28	4
			Jul'28	3
			Aug'28	4
			Sep'28	4
			Oct'28	4
3	Non-Recurring activities- Design and Submission of Design Documents	PDR: Jul-25 PFDR: Mar-26 FDR: Jun-26		
4	FAI Reports and Type Test & Report	Jun.26		
	SIL Certifications and certificate submission as per ERTS Clause 6.3.25	Mar-26		
6	Spares	To be supplied as per BEML requirement		
7	Tools for CMC period	Dec.'26		
8	Training	Jan.'28		
9	Manuals	Jan.'28		

Note: a) Delivery schedule proposed above is tentative. However, it can be mutually discussed and agreed in line with key dates of CMRL contract.

b) CMC shall start after completion of DLP/DNP activity for 70th Trainset and shall end 15 years after the start of CMC.

c) 1 Trainset comprises of 2 DM car and 1 T car

PERFORMANCE BANK GUARANTEE

Bank Guarantee No.....
Dated
Amount
Valid upto
Claim upto

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 at least 6-months (six months) longer than the anticipated expiry date of defect liability period / Warranty period as stated in Clause 11 of Annexure IV - Notice Inviting Tenders.
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.



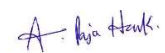
Signature.....
Name.....
Address.....


Witness 2.

Signature.....
Name.....
Address.....

	BEML LIMITED BANGALORE R & D CENTER	DOC. No.	GR/TD/7063
		DATE	08.05.2025
		REV. No.	01
		PAGE NO.	1 / 72

**Procurement Technical Specification of
Vacuum Circuit Breaker and Earthing
Ground Switch along with Pneumatic
Interlocking Valve for Chennai Metro Rail
Project - Phase-2 ARE02A**

Approved	08.05.2025	SADHASIVAM M	
Reviewed	08.05.2025	LIXON THOMAS T	
Prepared	08.05.2025	RAJA ALAPATI	
	Date	Name	Signature

	Procurement Technical Specification for Vacuum Circuit Breaker and Earthing Ground Switch along with Pneumatic Interlocking Valve	DOC. No.	GR/TD/7063
		DATE	08.05.2025
		REV. No.	01
		PAGE NO.	2 / 72

REVISION DETAILS

REV. NO.	CLAUSE NO.	PAGE	CHANGES	DATE
0	All	All	FIRST ISSUE	10.04.2025
01	3	12	Table updated	08.05.2025
	10	47	Added sentence related to Annexure A	
	20	72	Added Annexure A	




	Procurement Technical Specification for Vacuum Circuit Breaker and Earthing Ground Switch along with Pneumatic Interlocking Valve	DOC. No.	GR/TD/7063
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1 Introduction

1.1 General

This document describes the technical requirement for Vacuum Circuit Breaker and Earthing Ground Switch along with Pneumatic Interlocking Valve to be procured by BEML for CHENNAI METRO RAIL PROJECT - PHASE-2 ARE02A (210 cars).

The CMRL Metro Phase – 2 Project will be approximately 118.9 km long, operating within three corridors i.e.,

- Corridor 3 from Madhavaram to Sipcot of 45.8 Km,
- Corridor 4 from Lighthouse to Poonamalle of 26.1 Km,
- Corridor 5 from Madhavaram to Sholinganallur of 47 Km

And their inter-corridor operations in the Chennai Metro Rail Phase - 2 Project. The route will be approximately 76.3 km elevated and 42.6 km underground.

The Complete network will be electrified at 25kV AC 1 ϕ , 50Hz with auto tensioned Overhead Flexible catenary & contact wire system and overhead rigid catenary system. This overhead catenary system shall be available in elevated, underground, and at-grade system. The Vacuum Circuit Breaker and Earthing Ground Switch shall be designed accordingly.


The trains shall be able to operate in GoA4 immediately after commissioning and from the initial stage of passenger operations. Unattended Train Operation (UTO) shall be the predominant mode of train operation. In case if BEML does not engage UTO for any reason, at any stage of passenger operation or non-passenger operation, the Train Operator will deploy staff to drive the train under ATO or Manual Mode (under ATP).

The subcontractor shall be responsible for all works required in this PTS with regard to Design, Development, manufacture, supply, testing, training, delivery, commissioning, integrated testing and comprehensive maintenance during DNP and CMC of light weight fully furnished modern passenger cars.

The Vacuum Circuit Breaker and Earthing Ground Switch shall comply in all respects with CMRL - Phase-2 ARE02A Employer Requirements of ERTS-RS, ERTS-DM&P and ERTS-CMC of RS & DM&P.

BEML shall carry out all required works and activities as Supplier to the Employer for CMRL - Phase-2 ARE02A project while the subcontractor shall be responsible for all works required in this PTS with regard to Vacuum Circuit Breaker and Earthing Ground Switch and shall be responsible for the supporting the BEML (contractor) for CMRL - Phase-2 ARE02A project.

The scope of work covers design, development, manufacture, testing, supply, delivery, commissioning and integrated testing of the Vacuum Circuit Breaker and Earthing Ground Switch and the training of Operation and Maintenance personnel of the CMRL/BEML on the Vacuum Circuit Breaker and Earthing Ground Switch.

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The scope of work includes all items of work which may be required to meet the performance requirements, reliable and efficient operation of trains and meeting the best international practices even if not specifically mentioned in this PTS.

1.2 Car Configuration

The rake configuration of 3-car Trainsets is of *DMC + TC + DMC* car configuration in order to achieve 67% propulsion. The Trainsets shall operate in Grade of Automation-4 (GoA4) / Unattended Train Operation (UTO).

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).

DMC: Driving Motor Car,
MC: Non-driving Motor Car,
TC: Trailer Car

Where,
*: Fully automatic coupler (with electrical head)
+: Semi permanent coupler.

1.3 Operations

BEML/CMRL plans to operate 365 days a year, from approximately 4.00Hrs to 00.00Hrs Monday through Sunday during the complete fleet operation conditions.


Rakes will operate in revenue service in as 3 car trainsets initially and shall be increased to 6 car trainsets later in case of increased passenger patronage. Under normal operating conditions, trains may be coupled and uncoupled during maintenance and in rescue modes.

Based on operational requirement, rakes may have to be operated in GoA2 mode with driver / in GoA3 mode with attendant / in GoA4 (UTO). However, the Phase 2 project is planned with operations in GoA4 (UTO) from the initial passenger service inauguration itself.

The maximum allowable operating speed of the vehicles shall be 80 kmph. The maximum design speed of the train shall be 90 kmph. Minimum headway shall be 90 seconds to satisfy normal peak ridership.

During the complete fleet operation conditions of this project, the trains may travel an average of 1,50,000 km per year.

Operating Schedule Speed: The minimum average Round-trip Operating Schedule Speed shall be 32 kmph.

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The operating modes are defined as follows:

a) Normal Mode: The train shall achieve the required Operating Schedule Speed whilst driving under normal Tractive / Braking Effort characteristics with a minimum 8% of coasting and keep to timetable factoring the defined dwell times (excluding turnaround time at terminal stations). Brake blending shall utilize regenerative braking to the most extent possible. Normal mode will be used when trains are running on time and the timetable can be maintained.

b) All-out Mode: Shall be the same as normal mode except that there shall be no coasting in order to exceed the Operating Schedule Speed. All-out mode will be used to make up time when trains are running late. When the train is in UTO / ATO mode, the train will get appropriate commands from Signalling system.

1.4 Description of work

The specified work includes the Design, Manufacture, Supply, Testing & Commissioning, Training of Personnel and Comprehensive Maintenance Contract for fifteen (15) years of standard gauge metro Rolling Stock (Electrical Multiple Units) and Depot Machinery & Plant (DM&P).

1.5 Sustainability

The sub-contractor shall apply the highest standards for application of sustainability (with proven design) in the design and construction of the trains to effect overall life-cycle cost savings and environmental benefits. Life-cycle analysis shall be conducted and used for rationalizing all sustainability inputs. Sustainability consideration will provide heavy emphasis on delivering energy efficiency of system and subsystems, energy conservation and regenerative braking, potential and kinetic energy conservation systems and light weightiness to effect reduced traction power energy consumption.

2 Definitions and Abbreviations

The following definitions and abbreviations are applicable to the PTS.


2.1 Definitions

The following definitions and abbreviations are applicable to the PTS.

“CMRL” means the Employer for the Mass Rapid Transport System (MRTS) for Chennai

“BEML” means the Customer to procure the Vacuum Circuit Breaker and Earthing Ground Switch along with Pneumatic Interlocking Valve for CMRL phase-2 contract.

“Subcontractor” means the subcontractor of Vacuum Circuit Breaker and Earthing Ground

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Switch along with Pneumatic Interlocking Valve to BEML for CMRL phase-2 Project.

“ERTS-RS” means Employer’s Requirements Technical Specifications – Rolling Stock of CMRL phase-2 contract for CMRL Metro Project

“ERTS-DM&P” means Employer’s Requirements Technical Specifications – Depot Machinery & Plant of CMRL phase-2 contract for CMRL Metro Project

“ERTS-CMC & DP&M” means Employer’s Requirements Technical Specifications – Comprehensive Maintenance Contract of Rolling Stock and Depot Machinery & Plant of CMRL phase-2 contract for CMRL Metro Project

“PTS” means BEML’s Procurement Technical Specification.


"GTC" General Terms & Conditions of BEML for the procurement of the Vacuum Circuit Breaker and Earthing Ground Switch along with Pneumatic Interlocking Valve

"Engineer / Project Manager / CMRL's Representative " means any person nominated or appointed from time to time by the employer to act as the Engineer / Project Manager for the purpose of the contract and notified as such in writing to the contractor.

"Engineer's / Project Manager's Representative" means any assistant of the Engineer / Project Manager appointed from time to time by the Engineer.

2.2 Abbreviations

ATC:	Automatic Train Control
CMRL:	Chennai Metro Rail Limited
CDRL:	Contract Data Requirement List
CTC:	Centralized Train Control
CMC:	Comprehensive Maintenance Contract
DLMP:	Defect Liability Maintenance Period
DM&P	Depot Machinery & Plant
EMC:	Electro-Magnetic Compatibility
EMI:	Electro-Magnetic Interference
FAI:	First Article Inspection
FDR:	Final Design
FMEA:	Failure Mode and Effects Analysis
FMECA:	Failure Modes, Effects and Criticality Analysis
GoA:	Grade of Automation
ERTS:	Employer's Requirement Technical Specification

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GCC:	General Condition of Contract
LRU:	Line Replaceable Unit
VCB:	Vacuum Circuit Breaker
EGS:	Earthing Ground Switch
PIV:	Pneumatic Interlocking Valve
MDBF:	Mean Distance Between Failures
MDBCF:	Mean Distance Between Component Failures
MTTR:	Mean Time To Repair
BOM:	Bill Of Material
PDR:	Preliminary Design
PFDR:	Pre-Final Design
PTS:	Procurement Technical Specification
PCC:	Particular Conditions of Contract
RS:	Rolling Stock
TCMS:	Train Control and Management System


3 Precedence of Documents

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.

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.

This PTS in no way relieves the sub-contractor 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	CMRL Phase-2 ERTS-RS and ERTS-CMC & DP&M
2	PTS
3	NIT/GTC/SCC

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This PTS shall in no way relieve the subcontractor from any requirements specified in the ERTS.

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.

Also, in the event of any conflict among the requirements of particular parts of the PTS and ERTS, 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 Scope of Supply

4.1 General

The sub-contractor shall meet the VCB and EGS requirements of ERTS-RS and ERTS-CMC & DP&M for the design, development, interfacing with designated contractors, manufacture, supply, testing, delivery, commissioning and integrated testing and suitable for UTO operation, including the training of operating and maintenance staff of the Depot, for CMRL ARE02A.

The Subcontractor shall provide all the VCB and EGS equipment but not be limited to as per the scope of supply given in the Cl. No.4.2 of this PTS.


Subcontractor shall design and submit to BEML the arrangement of each VCB and EGS aggregates including the internal schematics wiring/drawings along with description of each electrical aggregates for VCB and EGS.

The subcontractor shall provide all the necessary details of components used in the VCB and EGS aggregates to BEML and if there is any problem in the aggregates of VCB and EGS, the subcontractor shall, at his own expense, take whatever action is deemed necessary, such as, rectification, readjustment or design changes to the satisfaction of BEML and CMRL.

Subcontractor shall consider ERTS-RS and ERTS-CMC & DP&M of CMRL phase-2 ARE02A contract during design of the electrical aggregates of VCB and EGS for achieving the desired performance.

4.2 Scope of Supply for VCB and EGS along with PIV

The Subcontractor shall provide VCB and EGS but not limited to as per the scope of supply given in Table-1, 2, 3 & 4 below for CMRL phase-2 ARE02A contract. In the event of any additional requirement of component/aggregate/modification required for smooth operation of the train to meet the performance requirement as per ERTS-RS and ERTS CMC & DP&M, the same shall be provided by the sub-contractor.

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The subcontractor shall also provide, not limiting to the following:


- The 3D step (CATIA) files of VCB and EGS along with PIV required for the Car Body Integration/ Installation.
- The technical specification of all the equipment connectors and cable terminals along with the catalogue. The subcontractor shall mutually discuss with BEML the technical details of the connectors & Cable terminals.
- All the mating connectors set with pins for all the equipment to carryout car body side wiring. The subcontractor shall supply 5% additional pins as applicable (male/ female) to cater to damages/ loss during wiring.
- The recommended specification (size, material etc.) of mounting hardware with the recommended Torque shall be provided.
- Two complete sets of equipment side connectors of VCB and EGS in scope of supply, with the pins shall be provided for the Dielectric testing jig.

The Scope of supply and Scope of Work of sub-contractor shall be as per below:


Sl. No.	EQUIPMENT	Quantity		ERTS Clause ref.
		DMC	TC	
1	Vacuum Circuit Breaker along with LV connector and HV cable glands	-	2	
2	Earthing Ground Switch along with Pneumatic Interlocking Valve		2	
3	Training and Operation & Maintenance (O&M) Manuals	As per CMRL ARE02A contract		
4	Deliverables for CMRL ARE02A project	As per CMRL ARE02A contract		
5	Hardware's and Consumables required during manufacturing	As applicable		
6	Spares, Special tools & Consumables for maintenance during Comprehensive Maintenance period	As per CMRL ARE02A contract		
7	First Article Inspection (FAI), Equipment type test, documentation for design documents	As defined in PTS		
8	Any other scope items required as per ERTS	As per ARE02A contract		

Table 1: Scope of Supply

- Any design changes of equipment arise during mock-up/proto-train review, shall be reflected to mass production of the equipment.
- All the special cable and tools shall be provided by subcontractor.
- BOM of Aggregates related to VCB and EGS updated as per the agreed design during design phase to comply for the ERTS-RS requirements.
- The subcontractor shall proactively available for the interface meetings related to VCB and EGS.
- The VCB and EGS along with PIV shall be compatible to each other.

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6. The EGS key provided by the subcontractor shall meet the requirements and comply with the safety key box of propulsion supplier. This can be discussed during design stage.
7. Equipment side connectors for Di-electric test: Subcontractor shall supply two full set of connectors and its contacts as mounted on the equipment for each car-type to carry out vehicle level voltage withstand test at BEML factory. Detailed list shall be decided and finalized before first supplies.
8. The supplies as per Table1 including complete mating connectors set for car-body side wiring & the complete mounting hardware for installation of equipment on the roof.
9. In the event of any additional requirement of component/ aggregate required for smooth operation of the VCB and EGS, the same shall be provided by the sub-contractor.
10. Testing and commissioning activities of VCB and EGS along with PIV for one Train for each of the three corridors 3, 4 and 5.
11. The subcontractor shall support BEML to carry out integrated testing and commissioning of cars on the section in coordination with other designated contractors and all statutory tests and trials on cars necessary for obtaining sanction of Competent/Statutory Authorities for opening the system for public carriage of passengers and provide assistance and information as required by the appropriate statutory authorities in India.
12. The subcontractor shall be responsible for any defect or failure attributable to defective design, material or workmanship during the DNP period and shall also ensure that the technical support be made available in timely manner.
13. The subcontractor shall fully comply the requirements of repair and or replacement of failed components and equipment and installation of repaired/replaced components/equipment during the DNP period with no commercial obligation to BEML.
14. The sub-contractor shall oblige to ensure that the train design incorporates and provides all necessary equipment, systems or sub-systems, facilities, interface etc., generally used/provided in recent operational UTO/GoA4 trains within quoted price, notwithstanding whether these have been specifically mentioned in the ERTS or otherwise. In case of any necessary provision required to be incorporated in conformance to this clause the subcontractor shall commit to incorporate the same into design at any stage for ensuring full compliance to this ERTS clause.
15. The circuit design, logics, software/hardware & interfaces proposed/ agreed during design will be subjected to review and updating / rectification/ modification etc. during DNP and CMC based on the operational, maintenance reliability or safety requirements, the sub-contractor shall abide by the Engineer's specific instructions in writing for modifications without any additional cost.
16. Subcontractor shall provide spares and consumables including service for Defect Notification Period (DNP) / Defect Liability Period (DLP) as per ERTS requirements.
17. Detailed BOM for DNP/DLP spares and consumables for warranty period and all categories of spares and tools for CMC period.

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5 System Requirements

5.1 General requirements

This chapter establishes the performance, environmental, and design criteria for the Trainset. Included are dimensional, environmental, weight, ride quality, performance, acoustical, and electrical noise requirements, etc.

This rake as constructed, manufactured, assembled, and delivered shall fully conform to all provisions of those requirements unless otherwise specified in these provisions and shall be furnished with components, materials, equipment, and systems that comply fully with those requirements.


The rake shall consist of a 3-Car Trainset (also able to operate in a 6-car formation comprising of two (2) coupled consists) during initial revenue operation. The possibility of conversion to a single consist six-car rake at a later date shall also be achievable within the chosen design concept.

Trainsets shall be operated bi-directionally and shall have equal performance in either direction.

Prototype Train Program: Following the successful completion of all design review activities the BEML will begin production of a Prototype Train, which consist of the manufacture of two Diving Motor Cars and one Trailer Car, which will make up a 3-Car trainset. Upon delivery, these three cars shall then constitute the Prototype Train. The Prototype Train shall be considered a "proof of design" first article after being exercised in test and simulated revenue service, and the adequacy of all aspects of the design and manufacturing activities have been substantiated. The Prototype Train program shall be conducted in three phases:

- (i) Phase 1 – The first 3-car trainset shall precede all other cars in production and shall be considered the prototype train. Components and cars shall be tested according to the requirements in ERTS-RS chapter 17, as applicable. Components and cars shall also be offered for first article inspection as specified in ERTS-RS chapter 17 at the sub-contractor facility or the BEML facility. All adjustments and/or changes required shall be completed prior to shipment to CMRL's facility.
- (ii) Phase 2 - Upon arrival at CMRL, the Prototype cars shall be on-site qualification tested for required functional characteristics as per ERTS-RS Chapter-RS 17.
- (iii) Phase 3 - When the on-site delivery testing requirements have been satisfied, the three Prototype cars shall be united to form a Prototype Train. The Prototype Train shall then undergo operational testing as required in ERTS-RS Chapter 17 followed by proof of performance testing as a 3-Car rake. This shall include all specified system interface testing on CMRL's property.

Any adjustments / changes found necessary during the Prototype Train program are properly documented and incorporated into the following production cars configuration at no additional charge, unless approved by the BEML/CMRL. It is intended that except where otherwise approved or required by BEML/CMRL, the

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Prototype Cars' manufacturing quality level after the completion of all required modifications shall be the standard for all following cars.

Automatic coupler with mechanical, pneumatic, and electrical head shall be provided at the front end of each DMC cab. For the 3-Car rake configuration, semi-permanent couplers shall be provided between the DMC and the Trailer Car. Both automatic and semi-permanent couplers shall comply the requirements specified in ERTS-RS Chapter 04. Semi-permanent mechanical, pneumatic and jumper cables shall be used between the DMC and TC for the 3-Car consist configuration shown below.

3-Car rake: *DMC + TC + DMC* (67% Traction power)

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 following 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)

Notes:

- The symbol * denotes a fully automatic coupler (with electrical head)
- The symbol + denotes a semi-permanent coupler.
- DMC denotes Driving Motor Car
- TC denotes Trailer car (with pantographs)
- MC denotes Motor Car

Cars shall be equipped to operate normally as a single rake. Trainsets shall be equipped for emergency towing operation without any manual intervention for coupling or any purpose.

The rake shall be designed and manufactured to operate successfully within the environments of CMRL's dedicated right-of-way.

Environmental conditions for the equipment on board the cars shall conform to EN 50125-1.


Electronic equipment shall be designed, constructed and tested in accordance with EN 50155.

When fully mated, the connectors for internal use (i.e., fitted within car body) shall achieve a seal rated to at least IP 53 in accordance with IEC 60529 if the sealing is not provided by the cabinet in similar. Connectors fitted externally to the car body shall achieve a seal rated to at least IP 65.

It shall be demonstrated that all electronic equipment shall be immune to surge and transients typically expected in the Rolling Stock environment in accordance with EN 50155.

The main electrical protection of the Traction Power Supply to each car shall comply with the requirements of IEC 60077. The inductors used shall comply with the requirements of IEC 60310 (2004) or latest.

The subcontractor equipment functions have to meet the all the criteria defined in ERTS-RS Clause 10.3 and 10.4.

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The sub-contractor shall identify and implement any design and/or interface Works required to ensure the ARE02a Rolling Stock fleet achieves the following objectives for interoperability:

-

- a) The fleet shall serve all three (3) corridors of the CMRL Phase-2 network.
- b) Be capable of running in mixed traffic operational diagrams; alongside up to two (2) additional fleet variants of passenger Rolling Stock as well as maintenance vehicles.
- c) Have limited cross-compatibility with other passenger Rolling Stock fleets (ARE03a/ARE04) to the extent that is defined by the technical requirements elsewhere in this Contract (E.g. emergency train rescue requirements).
- d) Complies with any other interoperability requirements identified during the course of coordinated interface Works with other Designated Contractors (as defined in ERTS-RS Appendix-C) or as may be required to ensure the safe operation of the railway.

The Sub contractor shall comply with all the Statutory requirements and guidelines related with Research Designs and Standards Organization (RDSO), Ministry of Railways (MoR), Commissioner of Metro Railway Safety (CMRS), Ministry of Housing and Urban Affairs (MoHUA) or any other bodies related to the sanction and operation of metro rolling stock.

All electrical and electronic components shall comply with the EMC and EMI requirements of EN 50121 (all parts), IEEE 16, EN 55011 and IEC 61000 standards or other equivalent international standards. The requirements of EMC EMI requirements referred in ERTS-RS clause 10.19 & ERTS-RS clause 2.18 of the rolling stock shall be met.


Fire properties of the materials used shall comply with EN 45545 part 1 to part 7 latest editions (Category 4-A, Hazard level HL3) as a minimum or better international standard applicable for similar Metro applications. Requirements of ERTS-RS clause 2.26 shall be met. Material requirements of all sub systems of train shall be compliant with the requirements of ERTS-RS Chapter 19.

Multi-Consist Configuration

- a) The functionality of all Train subsystems shall be fully available when Trainsets are operated in a 6-car multi-consist configuration.
- b) Hardware & Software of all subsystems (including but not limited to Traction system, APS system, PAPIS & CCTV system, TCMS system, Pneumatic & Brake system, Saloon Door system, VAC system, Train lines, Signalling system, Telecommunication system, PSD system, etc.) shall be automatically reconfigure as required whenever a coupling or decoupling command is initiated by OCC or the Train Operator.

The sub-contractor shall meet completely, the system requirements for VCB and EGS in accordance with following chapters of Chennai ARE02A Section VI A: ERTS-RS.

- | | | |
|-----------|---|--------------------------------------|
| Chapter 1 | : | System Description |
| Chapter 2 | : | System Requirements |
| Chapter 3 | : | Vehicle body |
| Chapter 5 | : | Emergency Operators Desk (5.4) |
| Chapter 9 | : | Auxiliary Electrical Equipment (9.4) |

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Chapter 10	: High Voltage & Propulsion System
Chapter 12	: Pneumatic and Brake Equipment (12.4.14, 12.6.9.4, 12.9)
Chapter 14	: Train Control Management System (TCMS) (14.4.5 (f), 14.5)
Chapter 15	: System Support
Chapter 16	: Management Program
Chapter 17	: Test Program
Chapter 18	: Systems Assurance
Chapter 19	: Materials and Workmanship
Chapter 20	: Software Management Requirements
Appendix A	: Abbreviations
Appendix B	: International Standards
Appendix C	: Interface
Appendix D	: Guidelines and Drawings
Appendix G	: Documentation & Drawing Requirements
Appendix I	: Train Withdrawal Scenarios For 3-car Trains
Appendix B	: International Standards
Appendix C	: Interface
Appendix D	: Guidelines and Drawings
Appendix G	: Documentation & Drawing Requirements


The sub-contractor shall meet completely, the system requirements for VCB and EGS in accordance with following chapters of Chennai ARE02A Section VI C: CMC of RS & DM&P.

Chapter 1	: Comprehensive Maintenance Contract (CMC) Requirements
Chapter 3	: Operation Plan

5.2 Technical Requirements

The technical requirements of VCB are listed but not limited to the following:

Sl.No.	Description	Rating/Type
1	System	25 KV AC, 1 ϕ , 50Hz
2	Normal variation in voltage	19 ~ 27.5 KV
3	Occasional maximum voltage	30 KV
4	Occasional minimum voltage	17.5 KV
5	Cut off voltage	16 KV
6	Frequency variation	47 ~ 52 Hz

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7	Type of VCB	Single bottle and roof mounted type
8	Short circuit rating	400 MVA
9	Electrical and Mechanical Endurance	3,00,000 operations
10	Protection class	IP 67 for external portion IP 20 for internal portion
11	Creepage distance of insulator	≥900mm
12	Control supply of VCB	110 V DC
13	Service life of auxiliary switches	15 years

5.3 Design life

The Contractor shall (no later than Preliminary design stage) propose a suitable VCB and EGS (with PIV) with a service life of at least 35 years in the Chennai environment (as defined in the specification), based on an average annual operating distance of 150,000 km per rake without requiring structural repair or replacement for any reason other than collision damage, vandalism, natural disasters, or misuse. The submitted proposal shall be supported by calculations which demonstrate compliance with all applicable ERTS requirements for CMRL's review.


All other equipment shall be designed for a minimum service life of 18 years' subject to routine maintenance, overhaul, or replacement. Major subassemblies and/or LRU's requiring overhaul or replacement to meet the requirements of this Chapter shall be identified at Preliminary Design Review (PDR), Pre-Final Design Review (PFDR) and Final Design Review (FDR).

Unless agreed otherwise by BEML/CMRL, the rakes shall utilize subassemblies that minimize the life-cycle costs of the car. If requested by BEML/CMRL, the sub-contractor shall submit a cost-benefit analysis for review.

5.4 Service-proven design

The equipment's shall conform to EN 12663:2000 or any other standard as applicable to Cars of an urban rail transport system Category P-III. Car, system and subsystem designs shall be service proven. BEML/CMRL will evaluate the applicability of "service proven" according to the risk associated with each particular design. In general, "service proven" shall mean the system, subsystem, equipment or components, etc. which shall comply with requirement's specified in Part 1 - Section III: Evaluation and Qualification Criteria of the contract document.

To establish a design's service-proven history, the sub-contractor shall submit as part of the proposal specific details of the application history. The sub-contractor is free to propose design improvements; provided the service proven design basis is substantially unchanged. Proposed changes to the design or method of manufacture must be supported by reasonable justifications such as resolution of obsolescence, meeting specific BEML/CMRL technical requirements or for the improvement of product reliability. Submitted change proposals must specify the reason for the proposed changes and be supported by evidence to demonstrate the risk of adversely affecting operation and performance is mitigated. For such service proven designs, the sub-contractor shall produce for BEML/CMRL review and approval test

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documents from the other systems/projects for which the sub-contractor is providing the proven design application. Evidence documenting service proven design shall be furnished as part of the proposal for the VCB and EGS (with PIV).

BEML/CMRL may waive some requirements for detailed design review and design conformance testing when service-proven equipment is provided. In general, the decision to waive design and test requirements will be based on BEML/CMRL understanding of the historical success of the equipment applications.

5.5 Designs for refurbishment

The passenger rake shall be designed to simplify future overhaul and refurbishment, including repair and replacement of all systems and their constituent parts. Removal and replacement of system equipment shall be possible without causing damage to other systems or to the car body.

It shall be possible to easily separate and move a car for the purposes of repair, overhaul, or refurbishment, with electrical connections having quick-disconnect connectors. Pneumatic connections between the cars shall use flexible hoses and quick disconnects. Interior panels and equipment shall be of a modular design suitable for future refurbishment.

5.6 Aesthetic appearance

The rake's exterior design shall present a smooth, sleek, and attractive appearance. A purely functional layout is not sufficient.

To the greatest extent possible, consistent with regulatory requirements, safety, satisfactory performance and maintainability, equipment shall be hidden from sight.


Equipment cases shall consist of a dust and damp protecting enclosure manufactured with sealing rating of IP 65 in accordance with EN 60529.

5.7 Car general characteristics

Passenger Capacity

The following data and assumptions shall be used by the sub-contractor for all normal and degraded performance requirements and calculations. For a 3-Car metro rake composition, minimum seating and standing capacity shall comply with EN 15663.

	DM car	T car	M car
Seats	44	50	50
Wheelchair	1	-	-

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Standees (AW3 condition)	210	210	210
Standees (AW4 condition)	280	280	280
Total capacity (3-car) AW4 condition	$(44+1+280) + (50+280) + (44+1+280) = 980$		
Total capacity (6-car) AW4 condition	$(44+1+280) + (50+280) + (50+280) + (50+280) + (50+280) + (44+1+280) = 1970$		


The general dimensions of the rake are indicated in Table 5. Tolerances for these dimensions shall be approved by CMRL.

Dimension	Values
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 centerlines	$14,850 \pm 250$ mm
Dynamic outline	Rake shall not exceed the dimensions shown in ERTS-RS Appendix D

Table 2: Car Dimensions

5.8 Clearance requirement

The Kinematic Envelope of the Car shall be in accordance with Schedule of Dimensions in ERTS-RS Appendix D. The Contractor's calculations of the static and kinematic envelope of the vehicle shall be calculated in accordance with UIC 505 and/or equivalent International Standard. The vehicle and attached equipment shall be designed to operate within the Kinematic Envelope shown in ERTS-RS Appendix D, under all worst conditions of speed, passenger load, sway, roll, side play, wear, including wheel and rail wear and failures other than structural failures on level tangent track. The method and details of the calculations shall be submitted for the approval of CMRL as a separate design submission.

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The clearance envelope is limited through stations by the station platform. The Contractor shall assess the reduced car clearance envelope present through stations. Interference with station platform due to lateral and vertical displacements and all conditions of passenger load, sway, roll, side play, wear of wheel, and rail and a single point failure shall be included in the assessment.

The sub-contractor shall submit for approval design configuration drawings showing the static and kinematic clearance envelope for the cars, indicating compliance with ERTS-RS clause 2.7 and 2.8.

The sub-contractor shall perform tests as specified in ERTS-RS Chapter 17 to demonstrate compliance with the static and kinematic clearance requirements.

The sub-contractor shall ensure that the cars conform to the latest version of Schedule of Dimension (SOD) without any addition cost to CMRL.

5.9 Train's inter-operability requirements

Metro passenger trains of this contract shall be designed for operation in all corridors of CMRL Phase 2 network.

All the requirements of Interface suggested in ERTS-RS Appendix C shall be taken care during the design of the Rolling stock.

Trains shall be able to be maintainable & stabled in all the depots of CMRL Phase 2 network. Hence all the related interface with various depot machines and track systems suggested in ERTS-RS Appendix C – Section 6, Section 10, Section 11 shall be achieved.


Trains shall be compatible with combined operation with other type of trains in CMRL Phase 2 network. Hence all the related interface with other Rolling stock systems suggested in ERTS-RS Appendix C & Section 14 shall be achieved.

All the requirements of interface suggested in ERTS-RS Appendix C shall be taken care during the design of rolling stock.

5.10 Environmental criteria

Environmental conditions for the on-board equipment shall conform to EN 50125-1. The rake shall be capable of being operated, stored, and maintained at specified performance levels within the environmental conditions of the Chennai area as shown in Table 3.

Note: The details mentioned above are tentative and it shall be sub-contractor responsibility to confirm these values from relevant resources.

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Condition	Maximum	Minimum
Climate	Tropical Wet, Dry, and humid	
Ambient temperature	45 °C	16 °C
Monsoons	October through December	
Rainfall	1333 mm average annual. (Very heavy/continuous with heavy lightning discharges).	
Relative humidity	100 % saturation during rainy season which may be as long as 3 ~ 4 months. Other times, 82 % humidity.	
Atmosphere during hot season	Extremely dusty	
Maximum wind speed	130 kmph	
SO ₂ level in atmosphere	5 ~ 40 micro g/m ³	
NO _x level in atmosphere	10 ~ 40 micro g/m ³	
Respiratory Suspended Particles Matter in atmosphere (RSPM)	45 ~ 100 micro g/m ³	
Total Suspended Particles Matter in atmosphere (TSPM)	150 ~ 320 micro g/m ³	
Altitude	Sea Level	
Conditions in stations	All underground stations will be A/C. Above ground stations will have A/C for certain designated rooms only.	


Table 3: Environmental Conditions of Chennai Area

The temperature of stationary rake exposed to sun for long periods may go as high as 70°C. The equipment shall not be adversely affected in any way due to exposure to such high temperatures.

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.

The rakes shall be continuously exposed to highly corrosive, salty atmosphere along with industrial pollutants.

The Water used in Chennai for washing is likely to have a high level of dissolved matter which may aid corrosion

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5.11 Shock and vibration

5.11.1 Component design criteria

All car equipment shall be designed to operate without damage or degradation of performance when subjected to vibration and shocks encountered during normal service.

Equipment design and mounting arrangements shall be based on the specific location of the equipment on the rake and shall take into account the influence of adjacent components as well as the effect of normal car operation. It shall be the car supplier's responsibility to assure that the operating environments specified below are not exceeded.

The sub-contractor shall ensure that equipment will withstand all normally occurring random shock and vibration magnitudes transmitted through the car axles and suspension, during VCB open/close and present at the support points for each piece of equipment.

All mechanical, electrical and electronic equipment fitted to the rake shall operate without damage or suffer any reduction in reliability when subjected to the shock and vibration occurring in normal service for the Service Life of the equipment.

To demonstrate compliance with this requirement, each equipment shall have been subjected to a series of shock and vibration tests, or simulations, representing the real environment. In the case of a proven design component/equipment which has been previously tested, the sub-contractor may submit the previous test results for BEML/CMRL review and approval, and not have to re-conduct the shock and vibration test.

Where acceptable results from prior testing are not available for any item of equipment, tests shall be performed in accordance with IEC 61373 or EN 12663.


The equipment design and mounting arrangements for testing shall be based on specific mounting locations on the rake and shall take into account the influence of adjacent components when mounted in-situ.

In cases where components are mounted in a partially sprung environment, the sub-contractor shall be responsible for defining the environment to avoid failure of the components.

5.11.2 Vibration generation

For a stationary car, equipment and auxiliaries mounted at any position on the car or bogie shall not cause vibration on any portion of the car floor, side-walls, ceiling panels, stanchions, handholds, seat frames, doors, electrical cabinets and their panels, windows, any passenger seating or holding components in excess of 2.0 mm peak-to-peak amplitude for the frequency range from 1.4Hz to 20Hz, and in excess of 0.8 mm per second peak vibration velocity for the frequency range above 20Hz.

All equipment's, sub-assemblies and components listed above shall be capable of withstanding shock and vibrations of the rolling stock satisfactorily such that they do not fail prematurely on this account earlier to the designed life. To establish this requirement, all of equipment's, sub-assemblies and components shall be subjected to shock and vibration testing as per standards mentioned above.

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5.12 Ride quality and passenger comfort (Stability analysis)

Any vibration emitted by the rake, caused by the operation of any equipment or machines (compressor set, blowers, electromagnetic equipment, circuit breakers, motors etc.) shall not be a source of discomfort to the passengers or the Driver.

6 Performance requirements

6.1 General

The sub contractor's design shall comply with the supply voltages and quality of voltage specified in the requirements of IEC 60850. The general particulars of 25 KV, 50 HZ, Single Phase AC Traction Power Supply System shall be as follows:

Normal voltage	25 KV
Normal variation in voltage	19 ~ 27.5 KV
Occasional maximum voltage (Cut off)	30 KV
Occasional minimum voltage	17.5 KV
Cut off voltage	16 KV
Voltage for guaranteed performance	22.5 KV
Frequency variation	47 ~ 52 Hz

The power control system(s) shall ensure that when oscillation (or momentary fluctuations) of line voltage occur; there shall be no instability or damage caused to any train systems (in accordance with IEC 60850).

The equipment shall be able to accept intermittent Traction Power Supply voltage without any damage.


The present tender is for procurement of a 3 car trainset. However, the design of the rolling stock would be such that if need be in future, it shall be possible to integrate 3 cars (M+M+T) unit and convert it to 6 car trainset. The design of 3 car train shall take in to account future addition of one T and two M car (if required) and the VCB and other equipment ratings of the T and M car shall be optimally decided to form 6 car train. The design details and performance parameters of 6 car train shall be submitted by the sub-contractor during designed stage and got approved from BEML/CMRL.

6.2 ACOUSTIC REQUIREMENTS

6.2.1 General

The subcontractor shall comply with the acoustic requirements specified in ERTS-RS 2.17 to design of equipment in obtaining quiet operation.

All equipment shall be designed to eliminate rattling and resonance at all speeds up to 10%

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above maximum normal operating speed by the use of damping, gaskets, resilient mounts, or similar methods.

Enclosures, baffles, seals, acoustical absorption, and body panels with adequate sound transmission loss, vibration isolators, or other appropriate methods shall be incorporated into the equipment design to attenuate noise and vibration. The sub-contractor shall select the optimal design to meet the noise requirements, subject to BEML/CMRL approval. Unless otherwise specified, all measurements shall be made in accordance with ISO 1683, EN ISO 3381:2005 & EN ISO 3095:2005.

The following are the reference standards:

ISO 3381: Measurement of Noise inside rail bound vehicles

ISO 3095: Measurement of Noise emitted by rail bound vehicles

ISO 3744: Determination of sound power levels of noise source

ISO 9614: Part 1 & Part 2: Determination of sound power levels of noise sources using sound intensity.

The subcontractor shall support during trials / testing of noise and vibration analysis of complete 3-car train and if required improvements shall be made to VCB. The details shall be submitted and finalized during design phase.

Designs based upon ISO 3095 (external) and ISO 3381 (internal), as well as, ANSI S1.4 / IEC 61672-2:2013, ANSI S1.6, ANSI S1.11 and ANSI S1.13 will be acceptable.

6.2.2 Noise and Vibration Requirement Target

Operation of the VCB shall have no objectionable noise and vibration and contribute minimally to the total noise and vibration levels allowed in section 2.13 and 2.17 of ERTS-RS.

The supplier shall devote particular attention to the design of equipment to obtain quiet operation and shall ensure that the specified noise and vibration are not exceeded.


Vibration isolators, enclosures or baffles (silencers), acoustical absorption, and other appropriate noise and vibration reduction methods shall be incorporated into the equipment design to adequately attenuate noise and vibration. Subcontractor shall provide the natural frequency of the rotating equipment.

Test conditions and methods for measuring specified values should follow the international standards listed below. Test procedures should be submitted to BEML for review and approval. Measurements shall be carried out according to the approved test procedure. The fulfillment of the specified levels is to be verified by the subcontractor, witnessed by BEML/CMRL Engineer.

The unit to be tested shall be positioned on the test jig similar to the complete car.

Test shall be carried out as per the following Standards:

- ISO 9614: Part 1 & Part 2: Determination of sound power levels of noise sources using sound intensity
- ISO 5348:1987: Mechanical Vibration and shock – Mechanical mounting of

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accelerometer

- ISO 7626-5 Vibration and Vibration and shock - Experimental determination of mechanical mobility.
- ISO 3381: Measurement of Noise inside rail bound vehicles.
- ISO 3095: Measurement of Noise emitted by rail bound vehicles.
- ISO 3744: Determination of sound power levels of noise source.

6.3 Electrical noise control requirements

6.3.1 General

The sub-contractor shall comply with the requirements of the international standards EN50121-1 to EN50121-5:2003 and related standards and the IEC 61000 series, or equivalent standards. EMC considerations shall be incorporated in the sub contractor's procedures for functional safety and engineering verification.

Meeting these emission limit requirements is the first level of defining the interface between the rake and its intended environment. The sub-contractor shall be responsible for reducing emission limits, if necessary, to prevent interference with any existing railway or non-railway systems, and shall work jointly with BEML/CMRL and others designated by BEML/CMRL to ensure compatibility between the sub-contractor equipment's and any BEML/CMRL equipment and with the operating environment.

The sub-contractor shall employ design techniques, construction methods, and whatever apparatus is required to prevent interference caused by internal sources from affecting the proper operation of the equipment and external systems.


In addition to coordinating frequencies, EMC levels, and susceptibility levels, the sub-contractor shall provide the necessary on-board grounding, balancing, filtering, shielding, modulating techniques, and isolation to maintain signal-to-noise ratios within clearly workable limits and to reduce the undesirable effect of interference.

Electrostatic and magnetic electrical shielding methods shall be employed to minimize the effect of stray signals and transient voltages on cables. Power and signal cables shall be physically separated where practicable and shall be shielded where necessary. Suppression devices shall be employed on relay and magnet-valve circuits to protect low-voltage circuits from relay transients.

Components and functional circuits shall be grouped according to their similar sensitivities to electrical interference and power supply needs and grouped to reduce the effects of voltage drops in ground circuits. Power and return leads shall be routed in the same Cable duct or harness. Suppression devices shall be used on power supply leads where necessary to suppress interference at the inputs to sensitive circuits.

Train lines shall be located and arranged to minimize voltage induction due to VCB.

Any harmonic currents produced by the sub-contractor equipment in the running rail shall not interfere with the normal operation of the signaling system, including cab Signalling.

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6.3.2 Guideline for EMI/EMC Plan

The following guideline is the minimum to be included on the EMI/EMC plan.

- Measures to reduce conducted, induced and radiated emissions to acceptable levels as specified by the relevant international standards. Measures to increase immunity of the train and all its system.
- Basic protective measures proposed for electrical/electronic equipment and components.
- Measures to be adopted for selected systems and components. Measures to test EMI/EMC.
- Analysis of EMI/EMC impacts on the design of the train, all other train- borne equipment and track-side equipment as well as the general environment.
- Grounding, bonding, shielding, filtering and cabling arrangement.
- The name and title of a person acting as single point of contact on EMC matters. Any subsequent change of nominated person shall be subjected to approval.
- An organization chart.

6.3.3 Electro-Magnetic Compatibility performances (EMI & EMC)

The Subcontractor who provides electronic/electrical equipment to BEML for CMRL project shall make and submit EMC control plan. The EMC control plan, at least, must include the following information.

The Subcontractor shall ensure that his equipment is designed and constructed in accordance with the EMC control plan.


The Subcontractor shall ensure that his equipment is designed and constructed in accordance with the EMC control plan.

Items	BEML	Subcontractor	Remarks
1. Train Level	✓	✓	Including the interface management with all designated contractors
2. Equipment Level			
2.1. BEML Supply	✓		
2.2.Subcontractor Supply		✓	

BEML and Subcontractor shall conform to EMI/EMC specification specified in ERTS-RS the requirement of Interfacing and the interface documents.

Subcontractor shall be responsible for the requirement of EMI/EMC for the equipment in Subcontractor Scope of Supply and shall follow the BEML/CMRL guidelines, ERTS-RS for procedures, plans & test criteria.

Subcontractor will provide detailed EMI/EMC plan for their equipment in accordance with ERTS-RS to BEML/CMRL. Subcontractor shall conform to the EMI/EMC requirement for their

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equipment and shall achieve the EMI/EMC performance by conducting type tests as per the standards/criteria defined in ERTS-RS and submit the type test reports to BEML/CMRL.

BEML/ Subcontractor are responsible to carry out EMI/EMC test on the 3-car train at BEML's factory / depot & mainline. In the event of EMC test not conforming to the agreed test criteria due to issue in Subcontractor equipment, Subcontractor shall immediately take remedial action in order to achieve the agreed EMC test criteria.

Subcontractor shall provide recommendation/advice regarding to minimize EMC/EMI effect for laydown cables which are connected to their equipment. (i.e., data cable, temperature sensor to card connection cable).

6.3.4 Radiated Emission Limits

Sub-contractor equipment's shall comply with following or equivalent Standards: EN 50121-2:2000.

Each mounted equipment shall be tested in accordance with the sub contractor's EMC Test Plan which shall be based on the requirements of the relevant part of EN 50121 and the results shall be submitted for approval of the BEML/CMRL.

The maximum levels of radiated EMI of any individual mounted equipment shall not exceed the levels specified in EN 50121-3-2. The emissions of the rake shall not exceed the levels specified in EN 50121-3-1. These limits shall apply under all normal conditions.

6.3.5 Conductive Emission Limits

All electrical and electronic equipment shall not exceed the conducted interference levels as defined in EN 50121-3. These limits shall apply under all normal conditions.

6.3.6 Susceptibility of Rake borne equipment


All electrical and electronic equipment shall be immune to any radiated electromagnetic energy produced by other pieces of Rolling Stock equipment and external sources as required by EN 50121-3.

The mounting of sensitive equipment in the vicinity of the mounted rake radio antennas shall be avoided.

6.3.7 Electrostatic Discharge

Any equipment sensitive to electrostatic discharge likely to be touched by personnel shall be protected against electrostatic discharge. Equipment shall be tested to 3 kV with contact discharge, as defined in EN 50121-3.

These criteria shall be a part of the electromagnetic compatibility (EMC) control plan, as defined in this Chapter and ERTS-RS Chapter 17.

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6.3.8 Audio Frequency Interference

It is essential that equipment emissions not interfere with the proper operation of power frequency (PF) track circuits, or cab signals. Therefore, design techniques and construction methods shall be employed that ensure suppression of any interference emissions.

In addition, since equipment boxes and cabling will be removed, inspected, and/or replaced on a routine basis, the equipment shall be designed to ensure proper sealing of boxes, cables, etc., during routine maintenance procedures.

6.3.9 Control and test plans

The sub-contractor shall submit for approval an EMC control plan, addressing complete supplied equipment's and system requirements, before purchase specifications are issued.

The plan shall ensure that proper emphasis will be placed on the control of interference, interface design from the earliest stages of equipment design. The EMC control and test plans shall describe the sub contractor's approach to ensure that the specified EMC requirements are met.

At a minimum, the sub contractor's EMC control plan shall include the following:


- General design and mitigation techniques to be applied to the complete equipment's
- Analysis of the susceptibilities of equipment and the standards and criteria to be applied to system designs
- Analysis of wayside and non-railroad susceptibilities applicable to equipment design, as well as overall EMC emission requirements as defined herein
- Requirements for emission limits for one complete sub-contractor equipment's.

The following design requirements shall be included in the EMC control plan:

- All magnet valves relay and contactor coils, and other inductive devices shall have transient suppression.
- The absence of suppression for performance reasons will require approval.
- The number of suppression devices shall be kept to a minimum.
- Equipment design, wiring techniques, and enclosures shall shield equipment from any effects resulting from the operation of a hand-held transceiver.
- Equipment design, wiring techniques, and enclosures shall shield equipment from any effects resulting from the operation of cellular telephones, including when cellular telephones are operated near the equipment or on the passenger platforms.
- Equipment design, wiring techniques, and enclosures shall shield systems to prevent the equipment and its systems from causing undesired effects to external equipment and systems, with particular emphasis being placed on safe operation with the wayside signal and communications systems. The sub-contractor shall ensure that this program confirms that operational sensitivities of the wayside signal and communications systems, and interference-free operation, are within design parameters.

The EMC test plan shall address how the susceptibility and emission limits will be verified. The sub-contractor shall conduct EMC tests in accordance with an internationally recognized standard, and ERTS-RS Chapter 17.

BEML/CMRL approval of the EMC control and test plans does not relieve the sub-contractor

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from the requirement to provide equipment that functions safely and properly in the transit environment.

6.4 Fire performance

6.4.1 General

Materials used in the construction of components shall be selected to reduce to the maximum extent practical the heat load, rate of heat release, propensity to ignite, rate of flame spread, smoke emission and toxicity of combustion gases as per ERTS-RS clause 2.26.

The subcontractor shall furnish the relevant data, fire load calculations (as per formats shared), certifications etc., of the items considered in fire load calculations separately for above & below the floor level as per ERTS-RS 2.26. For complete requirements of Fire Performance refer to ERTS-RS 2.26. The maximum heat release rate per car shall be restricted to low levels.

Fire load calculation for all non-metallic materials have to be calculated with heat release rate data tested in accordance with EN 45545 (Part 1 to 7), Category 4- A, Hazard level HL3. The calculations shall be included in the Fire safety plan submitted as the source of heat value.

The fire performance deliverables shall be provided in accordance with following table.


Sl.No	Deliverables	Remarks	Submission Schedule
1	Fire safety plan	As per EN 45545 (Part 1 to 7), Category 4- A, Hazard level HL3	Preliminary Design stage
2	Fire safety Test Reports of the items including heat release rate for standard items common with other projects of the subcontractor	As per EN 45545 (Part 1 to 7), Category 4- A, Hazard level HL3	Pre-Final Design stage
3	Fire safety Test Reports of the items including heat release rate for all other items	As per EN 45545 (Part 1 to 7), Category 4- A, Hazard level HL3	Final Design stage

The design and the materials used in the equipment's shall conform to fire safety requirements of EN45545 Part 1 to 7 (Category 4-A, Hazard level HL3) latest editions or better international standards for similar metro operations, subject to the acceptance of BEML/CMRL.

The sub-contractor shall submit a plan to BEML/CMRL for review which shall describe the process that will be used to systematically identify and eliminate fire hazards, to avoid the use of combustible materials whenever practical and to reduce to the extent practical the energy content and heat release rates of the combustible material that are used.

Material used in the equipment's shall meet the Flammability, Smoke Emission and Toxicity requirements of the chosen Specification and shall comply to latest standard.

In case of occurrence of fire in the train, the details shall be sent as an audio-visual alarm to the TCMS and RSC consoles of OCC, BCC & DCCs. The details shall display the actual location of the incident.

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6.5 Life cycle cost

The subcontractor shall comply the requirements as per the ERTS-RS 2.27 and submit the Life Cycle Cost calculation document (as per format shared) in the technical offer for Scope of equipment.

The sub-contractor shall develop a life cycle cost plan in accordance with IEC 60300-3-3 with an aim to minimize the overall life cycle cost whilst meeting the safety, quality, availability, maintainability, and reliability requirement of this particular specification.

The LCC shall include the capital cost, cost of operation, maintenance (both material and labor), depreciation, refurbishment, inflation etc.

The subcontractor shall declare the useful life (years) / life class of the electronic equipment as per EN 50155 for Life Cycle Cost (LCC) evaluation.

Items/equipment having an OEM rated design-life that will lapse during the course of the DNP shall be replaced by the sub-contractor (on or before expiry) as part of the obligations of the comprehensive maintenance scope.

List of such items shall be submitted as part of Spares in the technical offer for DNP and CMC and shall be updated based on the final design.

6.6 UTO operation

The design of equipment's and its relevant components shall support for the UTO / GoA4 in the CMRL Phase 2 corridors defined in ERTS-RS Chapter 1. Trains shall be operated in GoA4 / UTO mode from the initial stage of commissioning and revenue operations. Hence all the feed-backs, information and train controls which are available on TCMS screen shall also be available in OCC (operational control Centre) and DCC (Depot Control Centre) for smooth operation of passenger service.


7 Interface Responsibilities

7.1 General

The location of mounting points and the design of equipment installation of VCB and EGS (with PIV) shall be defined by the Subcontractor and approved by BEML/ CMRL in order to avoid the mechanical interference with other equipment of the vehicle. Also, subcontractor shall provide the mounting method and the material for mounting the VCB and EGS aggregates in the car body.

Subcontractor shall be responsible for defining the technical requirements and the design information and shall be discussed with BEML/CMRL for approval.

The Subcontractor shall define the power consumption and inrush current of the VCB and cable size required/ installed to BEML, besides connecting with vehicle wiring.

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Further the subcontractor shall meet the interface specification of Propulsion system, Auxiliary power supply and any other equipment. BEML will facilitate direct face to face/VC meetings between other sub-system either at sub-contractor works/ BEML / other sub-supplier works or at.

Any changes of the components comprising of VCB & EGS shall be defined by sub-contractor and approved by BEML in order to avoid the mechanical interference with other equipment for the vehicle.

The Subcontractor shall be responsible of deputing his engineer to BEML for the technical meeting. The installation method and location point of all equipment's comprising of VCB and EGS shall be designed by the Subcontractor and approved by BEML in order to avoid any mechanical interference with the other equipment of the vehicle.

Sub-contractor shall liaise with BEML/Propulsion/TCMS supplier for finalizing the interface documents with TCMS and propulsion system.

7.2 Mechanical Interface

The location of the mounting points and the design of equipment installation comprising of the VCB & EGS shall be defined by the Subcontractor and approved by BEML in order to avoid the mechanical interference with other equipment for the vehicle.

Subcontractor shall be responsible for confirming the mounting method and providing all materials for mounting the VCB & EGS as specified in the drawings. BEML shall be responsible for defining the technical and the design constraints and the technical requirements. The Subcontractor shall be responsible for the optimum design of VCB & EGS, the submission of design information (drawings, technical documents and 3-dimensional modeling data) and the execution of test & inspection in a timely manner without any delay. The Subcontractor shall have full responsibility to declare and clarify if there is any required information or data from vehicle side and/or running/operating conditions to prevent any design defect under revenue service in the main line.

The Subcontractor shall be responsible for all costs of labor and material, for defect identification and location, and for removal, repair or replacement of defective parts, and for alteration, repairs, tests and adjustments in connection therewith made to fully comply with the requirement in PTS, ERTS-RS and Contract Specification, all such repaired shall be guaranteed for the reminder of the warranty period.

The following is a brief of requirements for Mechanical Interface:

Outline dimension.

Electrical connection position.


Fastening, point & torque.

Demands, free space for installation and maintenance of cover.

Weight and center of gravity.

Earth position.

Thickness of flitting frame & Size and distance dimension of fitting hole.

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Cooling

Interface with car body roof

7.3 Electrical/Communication Interface

The subcontractor shall provide the interface specification between VCC, TCMS, Propulsion system and any other equipment.

Time to time BEML will facilitate direct face to face meeting between other sub-supplier either at subcontractors works, BEML works, other sub-supplier works or at customer place. Subcontractor is responsible to resolve the interface issues to achieve the ERTS requirement.

The following is a brief of requirements for Electrical Interface:

- Power requirements.
- Technical specification.
- Rated current, voltage characteristic and consumption.
- Cable specification (Power, control and grounding).
- Connector (male and female) with pin and socket part no.
- Signal input/output list and interface specification.
- Connector/terminal arrangement
- Cable inlet/outlet diagram. (Size for cable gland of holes)
- Both equipment side and car side mating connectors, pins & required tools etc. will be under sub-contractor's scope.

BEML and the subcontractor will comply with and be responsible for the interface requirement and develop the interface specification on his scope of supply.

Necessary Electrical interface shall be supported and implemented by sub-contractor during execution phase for successful completion of project even if it is explicitly not mentioned in ERTS and PTS.


8 Design Responsibilities

The overall responsibility of each system will be allocated to both BEML & Subcontractor. System responsibility includes the elements listed in the below section:

8.1 Vehicle general arrangement

The responsibility for the overall layout design is with BEML.

Subcontractor will assist BEML in the detailed layout for Subcontractor scope and provide BEML with the drawings for Subcontractor scope equipment in electronic files (AUTOCAD 2019 (latest), CATIA V14, .dxf format & CATIA STP format) as well as hardcopy. Subcontractor

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will provide BEML with all required information for installation in the car body of BEML.

8.2 Car body

Subcontractor will submit 2D dimensional drawings (with template) to BEML for all equipment of their scope of supply in the First angle of projection.

The drawings shall show detailed dimensions (including thickness of mounting bracket, etc.), fitting method etc. They shall also include the information of weight, Center of gravity, Cable entries, the position and tolerance of the attachment points etc., which information shall be submitted within the agreed time schedule.

Subcontractor shall provide the necessary maintenance clearance required for the Subcontractor scope of equipment and any changes shall be indicated in the drawings with revision history, on mutual discussions.

Subcontractor will provide all the accessories, such as anti-vibration resilient pad, Recommended Mounting Hardware, connector specifications etc. required to mount Subcontractor equipment.

8.3 HV and Propulsion System

Subcontractor shall be responsible for interfacing with the HV and propulsion system for meeting the requirements specified in chapter 10 of ERTS-RS.

9 Design Submission & Approval Responsibilities


BEML & Subcontractor shall have an approval of their respective drawings and design documents from CMRL in accordance with ERTS-RS appendix G - "Documentation and cad drawing requirements" and ERTS-RS chapter – System support.

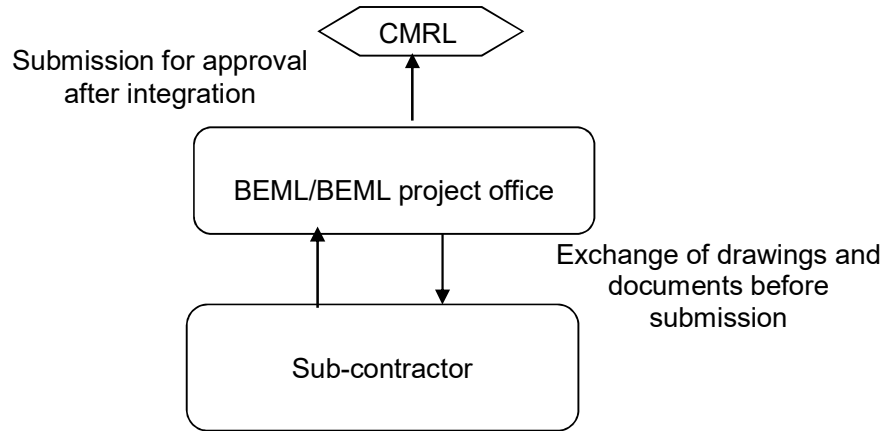
BEML & Subcontractor shall be responsible for the approval of design documents and drawings for respective scope of areas. BEML and Subcontractor will exchange their documents and drawings & review the same before submission to CMRL for a preliminary interface checking of mechanical and electrical parameters.

The drawings and documents related to interface shall be combined and integrated with the main principal part of system to form one combined material for submission to the client for approval.

The sub-contractor shall comply ERTS-RS clause 16.6 to 16.13.

The work procedure for design submission to be followed is as below:

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The sub-contractor shall submit three (03) hard copies and electronically (in PMIS) all documents and drawings in agreed format to CMRL/BEML & GC. The sub-contractor shall also submit knowledge sharing presentations / drawings / documents to BEML/CMRL & GC.


The documents shall be submitted in the following software unless otherwise stated, for the various electronic submissions required. Any formulae / micros / programs used therein shall not be hidden / masked and must be visible and transparent without any compromise and shall be validated for the submissions. The following software compatible for use with Intel-Windows based computers shall be used, unless otherwise stated, for the various electronic submissions required:

Document Type	Electronic Document Format
Text Documents	MS office (latest) Professional version
Spread Sheets	
Data Base Files	
Presentation Files	
Programs Version 2.0a	Primavera for Windows or any latest better tools
AutoCAD Graphics	AutoCAD 2019 (latest)
Photographic	Adobe Photoshop, Ver.4.0 or latest version
Desktop Publishing	Page Maker 6.5,5
CADD Drawings	AutoCAD 2019 (latest)

9.1 Design Information

The Subcontractor shall provide BEML with all necessary documents, drawings, software, reports, calculations, technical data and similar documents of design, system assurance, quality assurance, manufacturing and testing with respect to PTS according to the time schedule.

Detailed design submission list will be finalized during design stage. Further, if any additional documents demanded by end customer /statutory authority same shall be submitted by the subcontractor.

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The subcontractor shall maintain the index of submissions with the revision dates & previous submission dates. The index of submission shall be included in every submission, even in case of a single document/ drawing submission.

The drawings and documents shall be written in English with data format of respectively, latest AUTOCAD 2019 (latest), CATIA release. (Document – MS word, spread sheet – MS excel, Data base files – MS Access, Presentation file – MS Power point).

Three sets of all drawings, test procedures, manuals and documents shall be submitted to BEML including preliminary, pre-final and final design submissions, the final contract document, and all other submission both in the hard copies and soft copy. The subcontractor shall comply with the requirements specified in ERTS-RS.

General:

The Supplier shall provide, but not be limited to, the following general information in accordance with the schedule approved by BEML before contract award. The subcontractor in accordance with the requirement of PTS shall provide to BEML for review and approval the following information,


- a) Project Management Plan
 - 1) Data Submission Plan
 - 2) Design Submission Plan
 - 3) 1st Production Plan
 - 4) Type Test & FAI
 - 5) Mass Production after Testing and Delivery Plan
 - 6) Training Plan
 - 7) O&M Manual Plan
 - 8) As Built-In Drawing Plan.
- b) Preliminary Inspection and Test Plan (ITP)
- c) Preliminary Quality Assurance Plan (QAP)
- d) Preliminary Technical system/product/function description (including Lay-Out Drawing)
- e) Supplier's Option Suggestion about PTS requirements
- f) Clause by Clause commentary for PTS.

Design:

The Subcontractor shall be held responsible to provide sufficient support and information for obtaining No Objection Advice for complete design documents of PDR/PFDR/FDR/FDD including O&M manuals pertaining to VCB and EGS for the complete 3-car/6-car design in accordance with ERTS-RS. Failure to submit such deliverables in time by subcontractor may attract Liquidated damage as defined in GTC.

The Subcontractor shall comply with ERTS-RS chapter 2 & for PDR design documents submission, PFDR design documents submission, FDR design documents, FDD design documents submission, As-built drawings submission as per ERTS-RS chapter 15, 16 and 17.

The Subcontractor shall comply with PTS, ERTS-RS and shall provide, but not be limited to, the following design information of the VCB and EGS aggregates in accordance with the time

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schedule approved by BEML

(a) Detailed Drawings

SI.No.	DRAWINGS
1	Outline drawings: VCB, EGS and PIV
2	Schematic Diagram of protection and interface circuit
3	Arrangement of VCB, EGS and PIV
4	Any other essential drawings, not listed & if requested by BEML/CMRL then sub vendor shall provide the document

(b) Detail Documents with Description

SI. No.	TITLE
1	Specification of VCB (required detailed description about all the parts of VCB)
2	Specification of EGS along with PIV (required detailed description about all the parts of EGS)
3	Any other document, not listed & if requested by BEML/CMRL then sub vendor shall provide the document

(c) Test specifications/procedures


SI. No.	TITLE
1	Type/Routine Test Procedure of VCB, EGS along with PIV
2	Test specification / reports for VCB and EGS along with PIV

(d) Test Specification/Procedures at Car Builder Factory

SI.No.	TITLE
1	Test Procedure for VCB and EGS on Complete Train
2	Any other tests as advised by CMRL/BEML Engineer then sub vendor shall provide the document

(e) Test Specification/Procedures at Depot/Mainline

SI.No.	TITLE
1	Test procedure of VCB on main line (Type tests and Routine tests)
2	Routine standstill test procedure in depot for VCB

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3	Any other tests as advised by CMRL/BEML Engineer
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(f) List of Type Test Reports

Sl.No.	TITLE
1	Type test report of VCB
2	Type test report of EGS


(g) List of Manuals related to Subcontractor portion only

Sl.No.	TITLE
1	Maintenance Training manual (For Training to Maintenance personnel)
2	Operators Training Manual (For Training to Train Operator)
3	O & M Manuals
4	Fault Diagnostic Manual
5	Spares, Special Tools part Manual
6	Training plan
7	As-built drawings
8	Requirement for management plan <ul style="list-style-type: none"> • Project Management plan • Interface Management Plan • Work Management Plan • Quality Assurance Management Plan • EMC Management Plan • System Safety Assurance Plan • Reliability, Availability & Maintainability Assurance Management Plan • Site Safety Management Plan • Software Quality Assurance Management Plan • Environmental Management Plan • Inspection, Test and commissioning Management Plan • DNP Management Plan • Maintenance Plan

(h) Stage wise Submission Documents

The design submission shall be submitted to BEML according to the following stages:

Sl.No	Description of Stage	Submission from subcontractor to BEML (from LOI / contract award)
1	Preliminary design completion (PDR)	2 weeks
2	Pre final design completion (PFDR)	4 weeks
3	Final design completion (FDR)	12 weeks


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4	Final design document delivery (FDD)	24 weeks
5	VCB and EGS along with PIV delivery to BEML factory	55 weeks
6	Testing & commissioning of VCB & EGS (Type, Routine, Mainline & Integrated tests)	68 weeks

Note: All above listed stages of Design documents related to scope will be closed up on receipt of CMRL approval certificates.

The subcontractor shall submit, but not be limited to, the following design information.

Design Stage	Document/Deliverables	Submission date required (from LOI / contract award)
Evaluation Stage	Supporting documents for Qualification criteria as per EQC clauses	Along with Technical Offer
	Vendor approval documents including QAP, ITP company profile with infrastructure facilities	
	ERTS-RS, ERTS-CMC of DM&P & RS and PTS clause by clause compliance.	
	VCB and EGS 3D and 2D model with mounting detail for installation	
	General description of VCB and EGS	
	Preliminary outline diagram and Part list	
	Relevant drawing, estimated weight, schematic diagram, electrical circuit diagram and wiring diagram	
	Interface requirement	
	Project Management Plan	
	Spares technical offer including recommended mandatory spares, recommended consumable spares and recommended special tools, jigs and fixtures.	
PDR	System description of VCB and EGS	Within 1 month. Shall update/ submit whenever any change
	Update technical specification, testing programs, drawings equipment's, schematic diagram, electrical circuit diagram and wiring diagram	
	Interface information	
	Concept design Drawings (Dimensional Mounting and Installation Drawings: AutoCAD 2019 (latest)	
	Freezing of Weight	
	Life cycle calculation of VCB and EGS	

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Design Stage	Document/Deliverables	Submission date required (from LOI / contract award)
	Spare part list	happens.
	Consumable material list	
	Preliminary list of the special tools and test equipment	
	Installation manual of VCG and EGS in roof	
	Storage, Equipment handling manual for VCB and EGS	
PFDR	Product description of VCB and EGS	Within 2 months. Shall update/ submit whenever any change happens
	Test Plan and schedule including inspection check sheets	
	Required test equipment list with technical Specification	
	Test procedure of VCB	
	FAI procedure of VCB	
FDR	Commissioning procedure of VCB at BEML work and on site	Within 3 months. Shall update/ submit whenever any change happens.
	Type/Routine Test specification of VCB and EGS	
	FAI report of VCB and EGS	
	Type/Routine Test report of VCB at BEML and on site	
	List of spare part with catalogues	
	Detailed list of special tools and test equipment with catalogues and specific test procedure	
	Operation and maintenance manuals	
	Training proposal and training course	
	Training manual as built drawing	

Note:


1. Over and above-mentioned document, subcontractor shall submit any additional documents required by BEML/CMRL.
2. Bill of Material will be approved after CMRL acceptance and approval.

BEML/ CMRL will furnish the review comments about the submission to the subcontractor. The subcontractor shall meet with BEML& CMRL to discuss the review comments. if BEML/ CMRL deem the submission to be unacceptable, the subcontractor shall revise and re-submit the submission as soon as possible.

All detailed drawings, documents, test procedures; etc. as listed above tables shall be submitted along with the offer. In addition to above, any other documents required by CMRL for approval shall be provided.

9.2 Operation & Maintenance Manuals and Spare Parts Catalogues

The Subcontractor shall provide the operation/maintenance/ spare parts manuals and spare

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parts catalogues for the VCB and EGS aggregates both in the hard copies and electronic format (editable copy of word document in BEML provided template) as required in ERTS-RS chapter 15 and appendix G.

The subcontractor shall provide the operation/maintenance manuals and spare parts catalogues to BEML for approval of CMRL according to the time schedule defined by BEML.

Failure to submit the deliverables in time by subcontractor may attract Liquidated damage as defined in GTC.

Submissions

The Supplier shall submit the draft of all manuals to BEML for approval of CMRL/BEML. The final manuals shall be provided after duly incorporating the changes indicated.

9.3 Electronic Manuals

The subcontractor shall provide manuals in electronic format (editable copy of word document in BEML provided template). This is in addition to the submission of manuals in hard-copies.

9.4 Spares, Special Tools and Testing Equipment


The subcontractor shall hand over the spares, special tools and testing equipment in accordance with the delivery schedule of BEML. The supplier shall maintain the VCB & EGS aggregates and supply of spares for at least 20 years from the last date of taking over of whole of Works.

The sub-contractor shall comply the requirements specified in ERTS Section IV C – Comprehensive maintenance contract (CMC) requirements.

Spares and Consumables (herein referred to only as Spares) shall include but shall not be limited to the following subcategories, as applicable to both Rolling Stock

- a) Unit exchange spares
- b) Mandatory spares
- c) Recommended spares
- d) Consumable spares
- e) Special Tools, Jig, Fixtures, Gauges, Testing and Diagnostic Equipment
- f) Overhauling Spares
- g) Any other items required for maintenance (identified by the sub-contractor / BEML / CMRL / OEM).

The list of the above spares, consumables, special tools, special equipment and ordinary tools/equipment shall be as per the agreed design in train configuration and recommendation indicated in the OEM O&M Manuals.

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9.5 Storage, Packing Crating and Marking

The subcontractor shall provide all packing, crating and markings in accordance with the requirements specified in ERTS section VI A chapter 18.5. When handing over, hand over the complete VCB & EGS and the spare parts, special tools and testing equipment.

The subcontractor shall provide the instruction for proper storage, handling and logistic functions of components supplied by the subcontractor before handing over the first complete VCB and EGS. All items shall be labeled with the maker's name and the type and form of the piece or item, discrete serial number and rating, and the date of manufacture of the particular piece of equipment. For detail information refer to ERTS section VI A chapter 18.5.

9.6 Training

The subcontractor shall provide comprehensive training to the CMRL/ BEML Employer's staff (maintenance, operating, training and engineering) in accordance with the training activities and works for the VCB and EGS specified in ERTS Section VIA Chapter 15 shall be approved by BEML.

The subcontractor shall provide according to requirement of BEML and CMRL training schedule, time, method and site etc.

The subcontractor shall provide a training proposal, one original and five copies and electronics copies of the training manual for use by CMRL / BEML for conducting in-house training.

The detailed requirements are specified in ERTS Section VIA Chapter 15.

The Subcontractor shall provide the training materials (presentation, student guide, Instructor's guide) and training activity for the required days to assure that the Employer's staff is thoroughly trained in the operation, maintenance, and overhaul of the equipment supplied under this PTS.


Milestone activity	No of Days
Training of Employer's operating personnel in India	TBD
Training of Employer's maintenance personnel at Employer's Metro Rail works (CMRL depot).	20 Man days

The Subcontractor shall propose the required days for the supplied equipment for Operation and Maintenance staffs. Additionally, the Subcontractor shall be quoted on daily basis for the further training course for Employer's staffs.

The subcontractor shall submit CV of instructor and training material of proposed training at least 6 weeks in advance of actual training schedule.

Subcontractor shall dispatch the trainer(s) to the end user works/depot and/or BEML's plant for based on the relevant duration of each training course.

The Subcontractor shall provide the training according to BEML's Training Plan for End user.

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The Subcontractor shall provide, but not limited to, training materials (Hard copies & Electronic files), tools and equipment.

In addition to the training material, subcontractor shall provide computer based inter-active tutorial module. These interactive tutorials modules may include animation, videos, flash programs, etc.

Repair service training should provide the explanation and practical experience about the technical competence and operation of the system for the trainees who are responsible for troubleshooting and repairs.

Subcontractor should provide training program about operating and maintaining all the system devices provided. Training should be provided enough so that the corporate personnel may practice and learn how to use the operation, interface with other devices and testers.

The program should also contain the theoretical background and practical experiences for troubleshooting, repairing procedure and preventive maintenance to the trainees, who should be provided with the training about personally operating the systems and using testers/maintenance devices in case failing to troubleshoot.

Sub-contractor shall also submit training evaluation module.

The training material and the entire training program shall be approved by BEML.

Subcontractor shall propose necessary hours for each subject.

If End user or BEML request more training courses, subcontractor should provide them.

All expenses for trainings are to be borne by Subcontractor.

The Technical Documents and Training section, specification requires some very specific guidelines for the development of the technical documentation. These guidelines are but not limited to the following:


This section lists extensive requirements for the development and implementation of the training.

Specifies include;

- General Program Outline
- Instructor Manuals with Lesson Plans
- Participant Manuals
- Supplemental training materials
- Training aids
- Classroom attendance requirements

Specific Objectives for operating and maintenance personnel;

- Proficiency in operation, inspections, maintenance, servicing, troubleshooting and repair of cars to instruct and train other personnel
- Qualify individuals as Qualified Maintenance Person (QMP) or Qualified Person (QP) Daily and periodic inspections
- Understand and effectively use the technical documents developed
- Select, order and stock replacement parts

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Course Categories

- Introduction and Familiarization
- Major systems and sub-systems
- Operation and fault isolation
- Servicing and maintenance
- Detail maintenance and fault isolation
- Special tools and test equipment

Personnel by function Maintenance

1. Field – daily inspections and running repairs
2. Electrical
3. Non-electrical
4. Shop – periodic inspection and heavy repair

Classroom and hands-on

- Sufficient time in both to do all diagnostics correct malfunction and use special tools

Instructor qualifications

- Fluent in English
- Experienced trainers
- Adult education techniques


Lesson Plans to include:

- Student prerequisites
- Safety, fault isolation and inspections up to 5-year level
- Time frames for each unit
- List of training aids and other training technology
- Set-up time and equipment lists for hands-on
- Safety, protective equipment, hazards
- Instructor preparation
- Student preparation
- Evaluations of students
- Lesson summary
- Student application of material
- Student assignments

Training Aids and Standards (all training aids and lesson plans become the property of End-User)

Manuals, catalogs, OEM's

- i. VCB & EGS compatible format (no overhead projections)
- ii. Specifics – visual aids
 - Component locations, cutaways, schematics, wiring diagrams
 - Flow direction on hydraulic, pneumatic, air conditioning
 - Maintenance schedules, diagnostic process diagrams, special tools usage, test equipment application
 - Engineer approval electronic medium for review

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- iii. Training aids list
 - Test equipment considered training aids used to troubleshoot, diagnose, inspect, vehicle operation except meters, meggers, oscilloscopes, laptops)
 - Actual mechanically-operable devices without dismantling – non-examples as diagrams, cut-away views.
- iv. Schematic wiring diagrams sectionalized – single line functional diagrams for each system and component

Classroom Instruction:

- Outlined in classroom and hands-on information
- Qualified instructors
- Field Instruction
- Instructor must be qualified
- All materials available and ready
- Access to cars per authority
- Participants must demonstrate competency

It is subcontractor's responsibility to provide sufficient support and information for obtaining No Objection Advice for Training pertaining to sub-supplier

10 Comprehensive Maintenance during CMC Period

The sub-contractor shall at all times throughout the Comprehensive Maintenance Contract (CMC) period, maintain VCB and EGS along with PIV of Rolling Stock in accordance with the provisions of the Contract, Applicable Laws, Applicable Permits and Good Industry Practices. "Spares" and "Tools" shall include all types of Spares and Consumables, Special Tools, Jigs, Fixtures, Gauges, Testing and Diagnostic Equipment, Mechanical & Electrical Measuring and Testing Equipment, Mechanical, Pneumatic and Electric Tools, test benches and any other items required for all types of maintenance activities carried out on Rolling Stock for VCB and EGS along with PIV as per ERTS Part- 2: Section VI C, CMC -RS & DMP.


Spares requirement shall be as per Annexure-A of the document.

10.1 Warranty

Refer ERTS-RS and ERTS-CMC & DP&M related clauses of the tender.

Sub-contractor shall ensure minimum spare parts that he intends to make available during the installation, erection, commissioning and warranty period.

The sub-contractor shall keep on site, throughout the installation, erection, commissioning and warranty period, stocks of spare parts, to enable rapid replacement of any item found to be defective or in any way in nonconformance with the specification.

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11 Subcontractor Responsibilities

The responsibility of the subcontractor scope of equipment and works as described below

A. Design and engineering works on the major Electrical equipment on the train

- All equipment of subcontractor scope for VCB and EGS
- HV Protection & distribution system
- System description and function description of subcontractor equipment
- Earthing information for VCB and EGS
- Cable specification of subcontractor equipment
- Male & female connectors which are mounted on subcontractor equipment including pins/sockets to be used for the connection of subcontractor equipment
- Cable glands (water-proof type) of equipment

B. Drawings and circuit diagram for subcontractor equipment

- Detail outline drawings of SUBCONTRACTOR equipment
- Circuit Diagrams
 - a) Schematic Diagram of VCB
 - b) Interface circuit
 - c) Wiring diagram
 - d) Pin arrangement of electric equipment on wiring diagram of subcontractor equipment

11.1 Product and component responsibility


The product and component responsibility of the subcontractor scope of equipment and works as described below:

Product responsibility includes the following;

- Design
- Manufacturing and delivery
- Testing (routine and type tests) including submission of test reports
- Delivery according to agreed schedule
- Warranty

Design responsibility includes;

- Meeting the customer's specification (According to ERTS-RS of CMRL)
- Meeting the specified standards, Appendix B of ERTS-RS
- Meeting the requirement of RAMS and Hazard Analysis,
- EMI/EMC, noise, fire load, weight management
- Design drawings to be completed for production
- Design drawings (customer's documentation) delivery according to schedule
- Strength calculations
- Meeting the technical performance requirements

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- Labels and signs
- Documentation (according to tender specification)
- Customers training
- Spare parts lists
- Inspection and test plan
- Test program (routine and type tests)
- Integrated Testing & Commissioning according to ERTS-RS
- Painting specification
- Corrosion protection specification

11.2 Weight

The subcontractor shall submit estimated weights of the components of the VCB and EGS along with PIV to BEML.

The total weight of the VCB shall be less than 120 KG.

The total weight of the EGS shall be less than 13.5 KG.


12 Liabilities

Subcontractor will be responsible for the trouble-shooting & rectification/replacement of components/aggregates for their scope of supply during the DNP and CMC Period.

13 Project Management

The subcontractor shall assist BEML to smoothly carry out Project management, Co-ordination with designated and other contractors, Design submission, Software management and control, etc. according to the requirements specified in ERTS section VI A chapter 16.

The subcontractor shall comply with the detailed requirements to be specified later by BEML/CMRL if any.

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14 Quality

14.1 General

This section describes quality assurance program required to assure the quality of products supplied from the Supplier to BEML. The supplier shall assure the quality of product and maintain quality system to achieve high quality of the product.

14.2 Quality Assurance Plan

The sub-contractor shall develop and submit Quality Assurance (QA) Program Plan. The QA plans shall include a company policy statement, which defines the authority and role of QA within the subcontractor's or other supplier's organization, particularly with regard to schedules and cost. The plan shall be formatted in accordance with ISO 9001, which shall be used as the guiding document for all QA activities. Other suppliers QA plans shall be approved by the sub-contractor and submitted to BEML during Pre Final Design stage.


Submission of QAP shall not be later than 30(thirty) days after purchase order by BEML. The plan shall illustrate how the Supplier intends to meet the quality assurance requirements of this Technical Specification and shall include as a minimum:

- An organizational chart, including a definition of the responsibilities of personnel thereon, for receiving inspection, defect material handling (especially related to material found malfunctioning during production conformance testing), production conformance testing verification, process specification implementation, equipment calibrations, etc.
- The methods and procedures used to control the daily manufacturing processes and material quality.
- Flow charts of paperwork for the acceptance or rejection of material, for identification and disposition of Unacceptable items resulting from inspections, for the specific accountability of material found malfunctioning during production conformance testing, and configuration verification of the items to be Included in the submittal and etc.
- Forms to be used to convey, track and account for design changes implemented in the product regardless of their state of completion and any other forms necessary for the program. Each form shall be serial numbered.

The Quality Assurance plan shall have a live document status. Any changes must be submitted to Quality Control team of BEML. Changes affecting the project will be subject to approval by Quality Control team of BEML.

14.3 Organization

The organization of the Supplier's Quality Assurance (QA) Program shall have sufficient, well-defined responsibility and organization. It shall report directly to the General Manager of the Supplier's facility or the Supplier's Project Manager. The QA/QC personnel shall have complete freedom to identify and evaluate problems; to recommend solutions; to verify implementation of solutions; and to control further processing, delivery, or installation of a Non-conforming or deficient item until proper and documented disposition has been obtained.

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The QA/QC organization shall be arranged to promote a control function that operates in an independent, objective manner unbiased by schedule, cost, and authority limitations imposed by personnel other than the Suppliers high level management starting with the General Manager or equivalent.

14.4 Certification of Personnel

The Suppliers QA/QC personnel performing inspections and tests shall be certified for such work. Certification of personnel shall be by the virtue of those skills which are obtained by experience or training and verified by testing. Manufacturing personnel performing special processes, such as welding, brazing, painting, crimping, NDT (Nondestructive tests), etc. shall be certified for such work. Records of personnel certifications shall be maintained and monitored by the Suppliers Quality Assurance personnel. These records shall be made available to the Engineer of BEML for review.

14.5 Evidence of Compliance

The Supplier's QA/QC personnel shall maintain objective, verifiable evidence of compliance with the Technical Specification as it pertains to hardware configuration, purchasing, inspecting, handling, assembling, fabricating, production conformance testing, storing, shipping and warranty/repair work in the interest of quality.


14.6 Certificates of compliance

The Supplier shall submit to BEML the certificate of compliance for each delivery lot of products. The certificate shall contain inspection/test result data in accordance with the specification of the product. The inspection/test result shall be summarized to an inspection / test report (or record) in which the specification and inspection/test result are described clearly.

And, the inspection / test report (or record) shall contain information, as a minimum, of Product name (description), Part number, Serial number(if specified or necessary), Drawing number, Specification number, Revision number of drawing & specification, Software name(description) & Software version of the product (if software's installed to the product), Barcode number of the product(if barcode system is specified in the specification of product), Project name, Supplier's & Manufacturer's name, Inspection / test date, Acceptance decision, Name & Signature of inspector and approver and etc.

Each shall clearly identify the lot certified by the certificate and be signed by an authorized representative of the Supplier, stating the product complies in all respects with the specification of the product.

Each certificate shall contain the information specified for samples, the name and address of the organization performing the tests, the date of the tests and the quantity of materials shipped and also, if a test is performed by a licensed test laboratory, the test certificate issued by the laboratory shall be attached to the certificate of compliance of the Supplier.

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14.7 Calibration

The Supplier shall demonstrate an effective time or usage cycled calibration program for testing of measurement equipment and tools. Validity of measurements and tests shall be ensured through the use of suitable inspection, measurement and test equipment of the range and type necessary to determine conformance of items with the specification. At intervals established to ensure continued validity, measuring devices shall be verified or calibrated against certified standards. Tooling used as a media of inspection shall be included in this program. Furthermore, every device so verified shall bear an indication attesting to the current status and showing the date (or other basis) on which inspection or recalibration is next required. Devices suspected of being out of calibration before the stated recalibration date shall be promptly recalibrated. Inspections performed with devices proven to be out of calibration must be re-inspected. All calibration certifications shall be recorded and become part of the Quality Assurance records.

14.8 Procedure Documents

The Supplier shall establish and maintain written procedures defining his Quality Assurance Program. The procedures shall encompass all phases of the program to include, but not be limited to, control of suppliers, inspection, production and process control, functional testing, discrepancy control, measuring and test equipment calibration, configuration control, quality assurance records, shipping inspection and other quality specifications to meet the requirements of the Contract. All such documents shall be made available to the Engineer of BEML upon request.

14.9 Quality Assurance Activities


The Supplier shall address, as a minimum, the following activities and shall provide a means of self-correcting any shortcomings in his Quality Assurance Plan (QAP) as per ERTS section VI A clause 18.8.

14.10 Procurement

The Supplier shall document in writing the methods to be used for the selection and control of suppliers. These methods shall identify a means of:

- Selecting qualified procurement sources.
- Communicating and approving all product quality requirements and changes thereof.
- Monitoring the supplier's quality performance through the evaluation of procured items against purchase order requirements and/or through audits.
- Providing for early and effective information feedback and correction of non-conformances, especially of items found malfunctioning during production conformance testing.
- Approving special processes.

The Supplier shall require each supplier to be responsible for maintaining and retaining records. Furthermore, the Supplier shall require each supplier, as a minimum, to submit with each shipment appropriate certifications, final inspection results and test results.

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Requirements shall be included for chemical or physical testing records in connection with the purchase of raw materials by the suppliers.

14.11 Manufacturing Inspection

Inspection shall occur at appropriate points in the manufacturing sequence to ensure quality consideration for compliance with drawings, test specifications, process specifications and quality standards. BEML may designate inspection hold (or witness) points into the Supplier's Inspection and Test Plan (ITP) upon review of the Supplier's efforts. Inspection/test shall be 100% (one hundred percent) unless there is a specified sampling plan in the specification of BEML. Non-conforming materials shall be identified as discrepant, and shall be segregated and reviewed for disposition.

14.12 Production Conformance Testing

The Supplier's QA/QC personnel shall perform all Production Conformance inspections/tests and verify proper configuration of the equipment inspected/tested. If any item does not satisfy all performance or design criteria, the item shall be re-inspected/retested until the inspections/tests are passed with the necessary adjustments or repairs documented and certified by a witness.

14.13 Receiving Inspection


The Supplier's receiving inspection activities shall provide for the inspection of all incoming materials. These inspection measures shall use to preclude the use of incorrect or discrepant materials and to ensure that only correct and accepted items are used and installed. All material certifications and test reports used as the basis for acceptance by the Supplier shall be preserved. Inspection measures shall identify any item at any stage of production to an applicable drawing, specification or other pertinent technical document. Permanent physical identification shall be used to the maximum extent possible.

14.14 Shipping Inspection

The Supplier's Quality Assurance Program shall provide and enforce procedures for the proper inspection of all products to assure completion and conformance as required by the Contract prior to shipment. All shipments shall be prepared as require precluding damage during shipment. The inspections and preparation for shipment shall be verified by the Supplier's QA/QC personnel.

14.15 Ensure Inspection with Latest Revisions/ Changes

The Supplier shall ensure that inspection and tests are based on the latest approved revision

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or change to drawings and specifications. The Supplier shall ensure that obsolete drawings and change requirements are promptly removed from all points of issue and use. Means of recording the effective points of changes shall be employed.

14.16 Identification of Items using tags etc.

The Supplier shall maintain a system for identifying the progressive inspection status of materials, components, sub-assemblies and assemblies as to their acceptance, rejection or non-inspection. The system shall provide for ensuring that required inspections and tests are performed and that the status of items with regard to inspections and test performance is known throughout manufacturing, installation and testing. Nonconforming items shall be identified by physical segregation and status indicators such as tags, serialization, markings, stamps and inspection records. The identification system shall ensure that only items that have passed the required inspection and tests are used or installed.

14.17 Handling

The Supplier's Quality Assurance Program shall provide for adequate surveillance work and inspection instructions for the handling, storing, preserving, packaging, marking and shipping to protect the quality of products.

14.18 Non-conformance Control


The Supplier shall establish and maintain an effective and positive system for controlling nonconforming material and workmanship, including procedures for its identification, segregation and disposition.

The supplier shall assure that nonconforming materials are not used. To assure prompt Correction, Corrective action Compensation and any necessary actions for any nonconformity caused by the Supplier or Supplier's suppliers, the Supplier shall establish nonconformity control procedure and includes it in the QAP.

All nonconforming issues shall be positively identified to prevent unauthorized use, shipment or intermingling with conforming material.

Corrective action and related information shall be documented and made available to BEML upon request. Corrective action shall extend to the performance of all sub- suppliers and include as a minimum:

- Immediate response, prompt action and prevention of recurrence for nonconformity.
- Analysis of data and examination of discrepant products to determine extent and causes with corrective action implemented in an expeditious manner prior the next shipment, order or inspection.
- Submission of detail documents (specifications, drawings, repair procedure, analyzed data, test/inspection data, measures, action plan and etc.) required to resolve nonconformity detected.
- Introduction of required improvements and corrections, initial review of the adequacy of such measures, and monitoring of the effectiveness of corrective action taken.

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e) Analysis of trends in processes or performance of work to prevent nonconforming products.

15 Quality Audit

The Supplier shall permit Quality Audit by BEML and/or the Customer of BEML. The scope of the audit will be only the field related with the implementation of this project and the Supplier's QAP. If any Nonconformity is detected during the audit, Corrective Action request will be issued to the Supplier. For the Corrective Action Request, the Supplier shall prepare and submit appropriate action plan within 10 (ten) days, perform the action plan and reply the result to BEML QC team.

15.1 Inspection and Test Plan (ITP)

ITP shall be submitted to BEML QC team for review and approval as following no later than 30 days after purchase order by BEML.


- 1) The ITP shall include all the major inspection and test activities planned prior and during the design, procurement and installation phases. The (ITP) shall include, as a minimum, the following:
 - a) Introduction of ITP (purpose, application scope and etc.)
 - b) Description of Symbols, Abbreviations and Definitions
 - c) Sampling Procedure if it is necessary.
 - d) Inspection/Test Notification procedure
 - e) General inspection/Test process/flow
 - f) Manufacturing and Inspection/Test flow (block diagram) which describe & manufacturing flows and inspection/test points.
 - g) Description of Inspection, test activity and item.
 - h) Kinds of Inspection and Test such as Design Qualification Verification test (Type test), FAI, Routine inspection/test
 - i) Inspection/Test Level such as 100%, Sampling, 1/Lot and etc.
 - j) References of the inspection/test such as specification, procedure and etc.
 - k) Responsible entity of the inspections and tests
 - l) Places of the Inspection and test
 - m) Witness/hold points of BEML and/or the Customer of BEML
 - n) Description of Reports /checklists required and the Submission (A table format) is recommended to describe the Items (g) & (n).

2) Witness/Hold point of Inspection/Test

After review of the ITP received from the Supplier, BEML will designate witness/hold point (if required) of BEML and/or the Customer of BEML and notify them to the Supplier.

- Witness point of Inspection/test

To be witnessed randomly by BEML and/or the Customer of BEML. It requires the notification of inspection/test schedule written by the Supplier. The supplier can

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proceed to his next process without agreement with BEML and/or the Customer of BEML if there is no written answer or intention from BEML and/or the Customer of BEML to witness the notified inspection/test.

- Hold point of Inspection/test
To be witnessed by BEML and/or the Customer of BEML. It requires the notification of inspection/test schedule written by the Supplier to BEML. In case of hold point, Supplier can do the next process after acceptance of the inspection/test or waiver (or agreement) by BEML and/or the Customer of BEML. Generally, Type Test (Design verification/qualification test) and First Article Inspection (FAI) are designated as the Hold Point.

3) Inspection/Test Notification of Witness/Hold point

After receiving of ITP, BEML will inform Notification schedule and procedure to the Supplier according to the Main contract between BEML and the Customer of BEML.

15.2 System Safety

15.2.1 System Safety Assurance Management

The subcontractor shall meet the System Safety Assurance Management Plan compliant with the requirements specified in ERTS section VI A chapter 18.

The responsibility of safety assurance for the train level is with BEML.

subcontractor will be responsible for the requirement of safety Assurance for the equipment in subcontractor Scope of Supply and shall follow the BEML/ CMRL guidelines and ERTS-RS for procedures, plans & test criteria.

subcontractor shall comply with the quantitative reliability levels for the equipment group of the train as specified in ERTS-RS.

Subcontractor shall provide Safety Assurance Management Plan to BEML during the preliminary design stage in accordance with ERTS-RS.


Subcontractor shall achieve their reliability targets for their equipment group by the end of the reliability demonstration period.

BEML/ CMRL will review the subcontractor's targets and inform the results to subcontractor.

The responsibility of RAMS for train level will be with BEML. Subcontractor shall be responsible for meeting the requirement of RAMS and hazard analysis for the equipment in the scope of supply.

15.2.2 Safety Requirement

The supplier shall demonstrate that the VCB and EGS aggregates / Equipment provide adequate protection against other hazards, by showing compliance with the CMRL Hazard Classification Matrix (Refer ERTS-RS). There shall be no hazards associated with the VCB

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aggregates / Equipment which are classified as Unacceptable (risk reduction must be achieved) or Undesirable (high priority to be given to reducing risk in accordance with Principle) Frequency of occurrence of hazards shall be assessed across the whole of the fleet in service. To meet the safety requirement, the Subcontractor shall submit the following documentations as a minimum.

- System Safety assurance plan as per ERTS section VI A chapter 18.
- Hazard Analysis including preliminary hazard analysis, sub-system Hazard Analysis, operating and support hazard Analysis and interface hazard analysis as per ERTS section VI A clause 2.26.
- FMECA (Failure Mode, Effects and Criticality Analysis)
- Fault Tree Analysis (FTA) for Safety Critical Events

The subcontractor shall fully compliance with the RAMS (Reliability, Availability, Maintainability and Safety) requirements given in the ERTS-RS and ERTS-CMC & DP&M.

The subcontractor shall comply with the safety requirements set forth in this Contract and particular Applicable Laws including but not limited to 'Metro Railway General Rules (MRGR), 2020 and amendments thereof.

15.3 Hazard Analysis

The subcontractor shall provide the reports of hazard analysis, Fault tree analysis and Failure Modes Effects and Criticality Analysis (FMECA) of the VCB aggregates / Equipment and assist the contractor to perform the interface hazard analysis compliant with the requirements specified in ERTS section VI A clause 18.5.


15.3.1 The Program of system assurance

System assurance tasks shall include the following:

- a) Theoretical system assurance analyses
 - Preliminary Hazard Analyses
 - Deterministic safety analysis (at system level)
 - Interface Hazard Analysis (excluding EMI)
 - Subsystem Hazard Analysis
 - Operating & Support Hazard Analysis
 - Hazard analysis shall provide input to the BEML Hazard log for the train
 - FMECA

The FMECA shall be used to identify the consequences of single failures, and shall identify any failures of the VCB and EGS aggregates / Equipment for inclusion in the Train Failure Register, which shall be maintained by BEML. The reliability Prediction for the VCB aggregates / Equipment shall identify the contribution to system reliability from each of the system failures entered in the Train Failure Register.

RAM Modelling and Predictions shall be prepared based on data from similar equipment operating in a similar environment. Where such data's not available, predictions may be based on Mil Std and other equivalent generic data sources.

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Safety Verification; The VCB and EGS aggregates / Equipment supplier shall provide support to the System Engineering Manager as required to Log have been incorporated in the system design and have been confirmed during manufacture and test as required.

- b) Safety Verification
- c) RAM Testing/ Commissioning
- d) RAM Performance Demonstrations
- e) Failure Reporting and Corrective Action System

The Hazard Analyses shall provide data for inclusion in the BEML train Hazard Log in the format in accordance with TS.

The FMECA shall be used to identify failures of the VCB / Equipment for inclusion in the Register of Train Failures, which shall be maintained by BEML in accordance with TS.

RAM predictions shall be prepared as an estimate of MTBF, MDBF per VCB aggregates / Equipment given the following service conditions:

The detailed MTBF of VCB and EGS aggregates / Equipment shall be specified by the subcontractor.

15.4 Reliability & Availability

The subcontractor shall comply with the reliability and maintainability requirements prepared by BEML in accordance with the requirements specified in per ERTS section VI A chapter 18, ERTS section VI C 3.2 and 3.3.

15.4.1 Reliability Target

The VCB aggregates / Equipment shall achieve the reliability targets specified.


The MDBCF (Mean Distance Between Component Failure) per 3 car train-set shall be as follows:

S.N	System / Equipment	MDBCF target (Equip-km)	Failure Rate (1/MDBCF)
(ii)	VCB and EGS	9.3E+06	1.08E-07

* Operation Conditions as per ERTS section VI A chapter 2

Annual Operation Distance: 150,000 km

The reliability performance shall be assessed by the following measure:

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$$MDBC F = \frac{\sum \text{Travelled kilometer per train set}}{\sum \text{Number of Service Failures}}$$

Where,

Mean Distance Between Component Failure (MDBC F): The MDBC F of a system is the ratio of the total operating distance accumulated by the total population of identical items in the available fleet of the trains to the total number of Service failures occurring within the population identical items.

Service Failure: As per ERTS section VI A chapter 18, ERTS section VI C 3.2, 3.3 and ERTS Appendix I, Failures that result in a service operational delay of a specific train for more than 2 minutes at any location of the mainline or during induction from depot to the mainline of CMRL Phase 2 Network. This category of failures also includes an unscheduled withdrawal of a trainset from revenue service.


A list of anticipated scenarios which may lead to an unscheduled withdrawal is provided in ERTS Appendix I of Part 2 Section VIA). It is clarified that when such failures occur, the incident will not be categorized as a Type-1 / Service Failure if the train had continued running until the end of service without affecting punctuality.

The discretion of declaring a train as Not available to start Commercial/Revenue service after successful completion of pre-departure checkout or withdrawing a train from Commercial/Revenue service on account of any relevant failure rests solely with the BEML/CMRL Project Manager & shall be final.

Relevant failure: As per ERTS section VI A chapter 18, ERTS section VI C 3.2, 3.3 and ERTS Appendix I, a relevant failure of an item is an independent failure which results in a loss of function of that item as a result of a fault/defect in an equipment or sub-system of the train while operating within its design and environmental specification limits or a maintenance error by the sub-contractor in undertaking its obligations during CMC period. Improper operation, maintenance, or testing of the item as a result of erroneous documentation supplied by the sub-contractor or Failures of transient nature (including those with post investigation status as 'No fault found'), shall be considered as a relevant failure if in the opinion of BEML/CMRL these are attributable to rolling stock. The decision of BEML/CMRL shall be final.

Withdrawal Scenario: The train withdrawal scenario described in per ERTS section VI A chapter 18, ERTS section VI C 3.2, 3.3 and ERTS Appendix I and includes possible anticipated failure scenarios which can affect safety, punctuality and passenger comfort. Reasonable changes to the list can be proposed by the subcontractor for CMRL's consideration.

Pattern Failure: Repeated occurrence of three or more relevant failures of the same replaceable part, item or equipment in same manner in identical or equivalent applications when they occur at a rate which is inconsistent with the predicted failure rate of the part, item or equipment. The detailed methodology for identification of pattern failures shall be finalized during the design stage. The decision of the BEML/CMRL shall be final.

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Deboarding: Any failure attributable to the sub-contractor resulting in passenger de-boarding in mid-section or any station. Refer ERTS appendix I

Penalty: For each case of de-boarding of commuters on account of reasons attributable to the subcontractor, CMRL may at their sole discretion impose a penalty as per ERTS section VI A chapter 18, ERTS section VI C 3.2, 3.3 and ERTS Appendix I. Engineer's decision to impose the penalty for de-boarding/availability damage shall be final as specified in ERTS section VI A chapter 18, ERTS section VI C 3.2, 3.3 and ERTS Appendix I. Same will be imposed on the subcontractor.

15.5 Availability Requirements

15.5.1 Definitions

Commercial / Revenue Hours of Operation: This defines the period when trains are expected to run according to a timetable to convey passengers. It is expected that this shall ordinarily be between 04:00 hrs - 00:00 hrs. However, CMRL may at its sole discretion apply minor changes to the start / end times to allow for flexibility in the timetable.

Non-Revenue Hours: Defines the period when trains are not required to convey passengers and is expected to be between 00:00 hrs - 04:00 hrs.

Morning Peak Hours: Defines the anticipated morning rush hours, during which shorter headways will be planned. It shall ordinarily be between 08:00 hrs - 11:00 hrs on Weekdays.

Evening Peak Hours: Defines the anticipated evening rush hours, during which shorter headways will be planned. It shall ordinarily be between 17:00 hrs - 20:00 hrs on Weekdays.


Peak Hours: Shall be taken to mean either Morning Peak Hours, Evening Peak Hours or the combination of both as the case may be. CMRL may at its sole discretion apply minor changes to the nominal Peak Hours to respond to changes in passenger demand.

Availability shall be assessed by the following measure:

$$\% \text{Availability} = \left[1 - \left(\frac{\text{DT(SC)} + \text{DT(OPM)} + \text{DT(CM)}}{\text{Total Time}} \right) \right] \times 100$$

Total Time Where:

- Total Time is the time in hours during the assessment period multiplied by the total number of trains of the fleet.
- DT (SC), or Down Time due to service checks, is the total down time in hours due to service checks summed over all the trains during the assessment period.
- DT(OPM), or Down Time due to Other Preventive Maintenance, is the total down time in hours due to Preventive Maintenance other than service checks, summed over all sessions carried out on all trains during the assessment period.
- DT (CM), or Down Time due to Corrective Maintenance, is the total down time in hours due to corrective maintenance or retrofit modifications in trains, summed over all

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sessions carried out on the trains in revenue operation during the assessment period. Any unreasonable delay in handing over the train for repairs for reasons not attributable to the Contractor shall be excluded. Time spent on train integrity inspections after train reformations arising from corrective maintenance work shall be included.

- (v) DT(CM) shall be counted starting from the moment when the defective train is handed over to the Contractor and shall end when the train is restored to service condition.
- (vi) The down times DT (SC), DT (OPM) and DT (CM) shall also cover the full content of the maintenance work concerned, including safety precautions, inspections, servicing, replacement of equipment, defect detection and rectification, testing and restoration to service condition.

15.5.2 Availability targets

The sub-contractor shall ensure that Trains are offered and made available for operation at the respective Depot as per the Train Operation Plan and in accordance with the procedures agreed upon during execution phase. The entire process pertaining to monitoring of Train Operation Plans shall be administered through DCC / PPIO. Detailed procedures for placement and withdrawal of the Trains, daily availability monitoring of trains and anything necessary to apply the above-mentioned requirements shall be finalized and agreed during the execution phase.

CMRL shall prepare the monthly Train Operation Plan (TOP) indicating the scheduled placement and withdrawal timings of Trains from the train handover point and inform the same at least 7 (seven) days before start of each month.

In some emergency / festive scenarios, TOP can be changed subject to condition that it will be informed at least 24 hours in advance and for not more than 15 days in a calendar year.

At the time of major maintenance such as major overhaul of trains, the availability targets as applicable will be revised by CMRL, decision of CMRL shall be final and binding.


The fleet of trains supplied shall achieve a minimum average availability target of 95.0% overall for the assessment durations mentioned in ERTS section VI C clause 3.3.3.

15.5.3 Availability demonstration during CMC period

The availability of trains shall generally be more than 95% during CMC period.

The average availability of the trains shall be assessed during CMC period under the Contract. The total down times for all trains shall be collected by the CMRL on monthly basis, and the average availability during the preceding three (3) months (assessed quarterly of respective year) shall be worked out from the above-mentioned formula in ERTS section VI C clause 3.3.1.

The assessment period for the availability calculation shall be scheduled from the actual date of start of CMC Works and assessed separately for each quarter of respective year for the entire duration of CMC period. The sub-contractor shall submit monthly reports and the calculation of availability demonstration as below,

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$$ADQ = (AD1 + AD2 + AD3) / 3$$

Where ADQ is the average availability demonstration of the monthly score AD1, AD2, AD3. If the availability target mentioned in ERTS section VI C clause 3.3.2 (e) is not achieved for any assessment period duration, availability penalty/damages is applicable as per ERTS section VI C clause 3.3.4 of this chapter.

15.5.4 Availability damage

Trainsets shall be considered as 'Available' provided they are offered for revenue service at least 30 minutes prior to the scheduled departure time as per the Train Operation Plan.

As far as reasonably practicable, no trainset shall be inducted on mainline with a defect, the Contractor may however, prepare and submit the list based on previous experience for CMRL review and acceptance.

Penalty / Damages on not meeting Availability targets: Penalties for not meeting Availability targets shall be imposed on the sub-contractor through a reduction of the certified payment for Price Center RS-CMC. Availability performance shall be calculated on a Monthly basis. The assessment period against the targets defined in below Table shall be on a quarterly basis throughout the entire CMC period.


SL No.	Availability target	Penalty / Damages
1	> 95%	No penalty shall be imposed during the respective quarter when this target is met.
2	> 93% to ≤ 95%	0.5% Penalty on the respective quarter Price Center RS-CMC apportioned amount.
3	> 90% to ≤ 93%	1% Penalty on the respective quarter Price Center RS-CMC apportioned amount.
4	≤ 90%	2% Penalty on the respective quarter Price Center RS-CMC apportioned amount. If availability ADQ is ≤ 90% consecutively for 3 (three) times, the CMC Works is liable for termination as per the provisions of GCC.

15.5.5 Penalties on service failures

Penalties on account of service failures: If train is withdrawn from service as per withdrawal scenario present in ERTS Appendices I of Section VI A Part 2 then penalty shall be imposed on sub-contractor as per below table.

Trainset available with delay: A Trainset shall be considered as available with delay if such Trainset is offered with a delay such that it affects its scheduled departure time as per the Train Operation Plan. Availability damages in such cases shall be as per the Number of trip(s) delayed / cancelled as defined and penalty shall be imposed on sub-contractor as per below table. CMRL shall return the trains as per TOP ordinarily.

Non-Available Trainset: A trainset can be classified as non-available if the sub-contractor is already accruing penalties outlined in SL No. 3 of below table or is attending to a fault/defect (service failure/relevant failure) in the train(s) that are attributable to the sub-contractor.

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The subcontractor shall comply to ERTS section VI C 3.3 for availability of trainset for commercial services.

Detailed list of different conditions and corresponding penalty / damages which shall be levied on the sub-contractor are outlined below.


SL No.	Conditions	Penalty / Damages per incident (Figures in INR)
1	Passenger De-boarding & Train withdraw in mid-section due to train immobilization	20,00,000
2	Passenger De-boarding & Train withdrawn at station due to train immobilization	15,00,000
3	Passenger De-boarding at any Station, but train not immobilized	1,00,000
4	Train withdrawn at terminal Station during Peak Hour	20,000
5	Train withdrawn at terminal Station during Non- Peak Hour	10,000
6	>2 minutes ≤5 minutes (Trip Delay)	10,000 per trip delay
7	>5 minutes	20,000 per trip delay
8	Trip Cancellation	75,000 per trip cancellation

Note:

1. Penalty / Damage figures shall prevail for the entire CMC Period.
2. Where a failure arising on a single trainset causes scenarios 1 – 5 to occur on multiple Trainsets; only one penalty shall be imposed on the sub-contractor derived by the scenario attracting the highest penalty amount.
3. Delays shall be calculated according to the time deviation from Timetable recorded at the destination station (one-way trip). BEML judgement shall be final and binding on the sub-contractor.
4. In case of partial trip cancellation, penalty corresponding to 8 of table above shall be applicable on pro-rata basis.
5. The damages mentioned above are calculated on a per train incident basis and shall be recovered by deduction from the certified payment amount for Price Center RS-CMC
6. Escalation of 5% compounded annually shall be applicable for the figures mentioned under Penalty / Damages from the Commencement date of the Contract.

Penalties as defined in Table above shall not be applicable to the sub-contractor for delay / withdrawal / de-boarding due to faults in equipment which are maintained by CMRL or other designated Contractors viz. Signalling, Telecom etc.

Incorrect troubleshooting by Train Operators / Attender / Station Controller shall not relinquish the sub-contractor from failure attribution.

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15.6 Reliability and Maintainability

15.6.1 Maintainability targets

The plan for maintainability shall conform to EN 50126. Reliability of electronic components shall conform to IEC 61709 or equivalent international standards

The sub-contractor shall ensure that the design of the equipment and system gives maximum consideration to maintenance, troubleshooting, component removal, repair, and inspection requirements. The objective shall be to minimize maintenance labor and materials costs, passenger car downtime, and the need for especially skilled or highly skilled service personnel.

The sub-contractor shall comply the requirements specified in the ERTS section VI A clause 18.7.

The maintainability of a given maintenance operation shall be measured by the arithmetic mean of the times required to complete a sample of the same operation.


After the maintenance operation the train involved shall be restored to service condition. The mean time to repair

(MTTR) of equipment should be less than the specified value in below table:

SI No.	Equipment	MTTR (Hours)
1)	Vacuum Circuit Breaker	≤2

15.6.2 Reliability and Maintainability Demonstrations

During Defects Liability Maintenance Period, the values of the R&M target shall be calculated from the records of all faults and service failures. In the event that the R&M target is not achieved, the sub-contractor shall, at his own expense, take whatever action to meet the R&M target specified.

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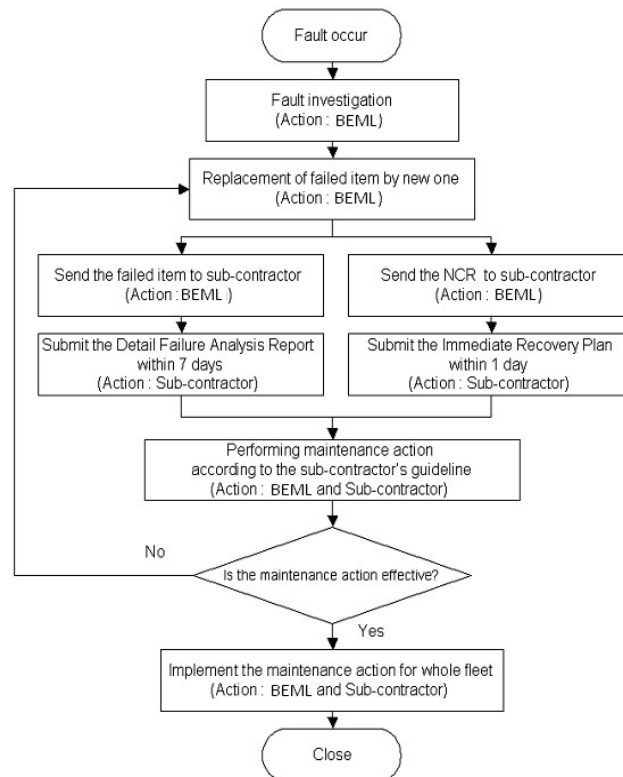


Figure: Maintenance Procedure

The sub-contractor shall comply the requirements specified in the ERTS section VI A clause 18.6.


The sub-contractor shall support an active A/S for high availability. The A/S procedure of BEML is shown in the above figure: Maintenance Procedure. Therefore, the sub-contractor should comply with BEML's procedure. If some failure needed the sub-contractor 's support, the sub-contractor should dispatch engineer as soon as possible. Also, the sub-contractor shall impart training to BEML's maintenance engineer.

The sub-contractor shall provide sufficient spare part for high availability. The sub-contractor shall submit a spare part list and recommended quantity at the maintenance depot.

The subcontractor shall assist BEML to complete a final report to enable the Employer's Representative to assess acceptability of the vehicle and its components for reliability, maintainability and system safety. The detailed requirements are specified in ERTS section VI A clause 18.5, 18.6, 18.7 and section VI C chapter 3.

15.6.3 Time required for maintenance

The subcontractor shall comply with the maintenance requirements until DNP and CMC period.
Preventive Maintenance: Elapsed time to perform preventive maintenance (exclusive of servicing) on each Car shall not exceed 4 hours. Preventive maintenance shall not be required

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more frequently than every 12,000 km or 45 days, whichever occurs first.

Servicing: Servicing shall be restricted to the replenishment of consumables (such as oil, grease and other fluids); cleaning or replacement of filters; and inspection of brake pads. Servicing shall not be required more often than every 5,600 km or 30 days, whichever comes first, and shall not require more than one hour in elapsed time nor more than two person-hours per car. A 30-day interval will be acceptable for the HVAC filter cleaning under dusty conditions. Interior and exterior cleaning and refilling of windshield washing fluid containers are excluded from this requirement.

Component Change-Out Requirements: In addition to the above, the sub-contractor shall design the equipment or system such that the component change-out requirements listed in Table below can be met. The person-hours are based on fully trained maintenance personnel using standard tools and test equipment.

Item	Maximum Person-Hours
VCB (complete)	2.00


Maintenance Type	Interval (Service time or Running Distance)
A Service Check	15 days or 6,000km
B1 Service Check	45 days or 18,000km
B4 Service Check	180 days or 72,000km
B8 Service Check	360 days or 150,000 km
C1 Intermediate Overhaul1	Minimum 4 years+ or 600,000km+
C2 Periodic Overhaul1	Minimum 8 years+ or 1200,000 km+
C3 Intermediate Overhaul2	Minimum 12 years+ or 1800,000km+
C4 Periodic Overhaul2	Minimum 16 years+ or 2400,000 km+
C5 Mid-life refurbishment	Minimum 18 years+ or 2700,000km+

Preventive Maintenance Interval should be compliance with the interval specified in the above table.

15.6.4 RAMS Deliverables

The subcontractor shall submit the following RAMS Deliverables.

- 1) RAMS Plan during preliminary design
- 2) Product Breakdown Structure during Preliminary Design Stage
- 3) Reliability Analysis with train withdrawal scenarios as per ERTS Appendix-I
- 4) Reliability Block Diagram and Reliability Prediction during Pre-Final Design Stage
- 5) Hazard Analysis including PHA, Subsystem Hazard Analysis, Operating and Support Hazard Analysis and Interface Hazard Analysis during Pre-Final Design Stage

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- 6) Preventive and Corrective Maintenance Analysis during Pre-Final Design Stage.
- 7) Master Maintenance Schedule during Pre-Final Design Stage
- 8) FMECA (Failure Mode, Effects and Criticality Analysis) during Pre-Final Design Stage
- 9) LRUs list during pre-final design stage
- 10) Safety FTA during Final Design Stage
- 11) Life Cycle Cost Analysis (CM, PM & OH) during Final Design Stage
- 12) List of LRU
- 13) RAM Analysis (MDBCf, MDBCsf & MTTR)
- 14) Maintenance Schedule (CM, PM & OH)
- 15) Reliability Block Diagram (RBD)
- 16) Hazard Analysis
- 17) Subsystem Hazard Analysis (SSHA)
- 18) Interface Hazard Analysis (IHA)
- 19) Operating Hazard Analysis (OHA)
- 20) Fault Tree Analysis

15.7 Safety-related System Interference


Special attention must be given to the interference with safety-related operations and equipment such as the signaling systems. Special tests must be designed to ensure that the full range of emissions, whether conducted, induced, or radiated, individually or in combination with one another, conform to the specific requirements of these safety-related systems. Adequate safety margins must be ensured between the immunity levels of these safety-related systems and the emission levels of the rolling stock specified by prevailing international standards.

The subsystems and components which could possibly give rise to the level of emissions under both normal and fault conditions (conducted, induced or radiated) that may affect the safety-related systems must be identified. The quantified risk assessment must be carried out as part of the Hazard Analysis to determine the probabilities and effects of such interference. Measures must be taken to reduce such emissions. The reliability of subsystems and components as well as the additional measures, e.g., filter, must be investigated.

These shall include both long and short-term reliability and shall conform to guidelines given in, but not limited to:

- (i) IEC60571 Electronic Equipment Used on Rail Vehicles,
- (ii) IEC60300-1 Dependability Programme Management,
- (iii) IEC60319 Presentation of Reliability Data on Electronic Components
- (iv) IEC60300-3-2 Dependability Management — Pt. 3-2: Application Guide Collection of Dependability data from the Field.

The probabilities of various conditions which could lead to an unsafe operation must be determined. An appropriate technical construction file suitable for safety audit must be developed to demonstrate EMC compliance to the Employer's Representative.

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15.8 Design information

15.8.1 General

The Subcontractor shall provide all necessary documents, drawings and etc. for BEML/ CMRL according to the time schedule defined by BEML. The time schedule is defined according to design submission program compliant with the requirements specified. Subcontractor shall provide the interface information and the time schedule required to provide documents shall be indicated.

The detailed requirements are specified in ERTS-RS.

15.8.2 Design and Performance Requirements

The subcontractor shall develop the design based on the specification of ERTS-RS and on sound proven and reliable engineering practices. The design details shall be submitted with technical data and calculations to BEML and CMRL for review and approval. The design of subcontractor shall meet the requirements specified in ERTS-RS.

15.8.3 Design Submission Requirements

Drawings and CAD data shall comply with the requirements of ERTS-RS.

The documents, drawings and CAD data shall be provided in both paper copies and electronic format in accordance with the requirements of ERTS-RS.

The format and quantity of the documents and drawings shall meet the requirements specified below.


- Document & drawings; the format specified in General specification (Drawing and CAD standard).
- The quantities of the submission of documents, drawings and CAD to be submitted will be specified later by BEML.

If BEML should deem the submission to be unacceptable, the subcontractor shall revise and resubmit the entire submission within two weeks.

15.9 Materials and workmanship

The Subcontractor shall be responsible for meeting the requirement of constructional details, material, workmanship and cables. All materials and workmanship shall be in every respect in accordance with the proven up-to- date best practice.

The requirements for material and workmanship of VCB and EGS aggregates shall meet the requirements as per ERTS section VI A chapter 19.

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16 Routine and Type Test

The routine and type tests shall be performed according to the applicable standards as per ERTS. The subcontractor shall propose the type and routine tests to be performed for VCB, EGS and PIV.

Type tests for certain equipment may be waived if these were carried out earlier on equipment of identical design, witnessed by a reputed organization, and the service performance of such equipment was found to be reliable. The subcontractor shall submit a proposal in this regard to the BEML and CMRL for review. The waiver of type test is entirely at the discretion of the BEML and CMRL.

However, in the event, new vendors / new design is being identified for CMRL project, necessary approval is to be taken from CMRL and type test if any required shall be conducted at sub-contractor's cost.

Test procedure shall be submitted to BEML for review and acceptance during PFDR and FDR at least ninety (90) days in advance notification of actual testing. All procedure must be approved prior to notifying the test witness request.

The routine test is required to verify that the VCB, EGS & PIV aggregates has been built in such a way that it satisfies the requirements of the Approved Design Data as verified by the Type Test.


Records from Routine test shall be held by the Subcontractor and made available timely for BEML and/or CMRL's inspection.

Copies of the approved routine test results shall be submitted together with the associated log-book. Additional copies of records of all tests/inspections result shall also be held at the Subcontractor work to be made available to BEML and/or CMRL on demand.

Test items, applied standards and its procedures can be changed or added due to Employer's request. In case of test item addition, subcontractor shall carry out the additional test with no additional cost.


17 DNP

- 1) Refer General Conditions & ERTS and related clauses of the tender.
- 2) DNP shall start from start of revenue service of last trainset + 24 months.
- 3) The sub-contractor shall remedy, at no extra cost to BEML, the defect or failure (fair wear and tear excluded) after any part of the work until the end of defect Liability Period.
- 4) The sub-contractor shall be responsible for any defect attributable to defective design, material or workmanship during warranty period. The sub-contractor will not be liable for damages caused BEML or any other third parties did not follow the written operation and maintenance instructions or did not use the metro trains in accordance with the technical documents.
- 5) The sub-contractor shall be responsible for any defect attributable to defective design,

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material or workmanship during warranty period. The sub-contractor will not be liable for damages caused BEML or any other third parties did not follow the written operation and maintenance instructions or did not use the metro trains in accordance with the technical documents.

- 6) "Defect Notification Period" shall mean the defect notification period stated in the PO calculated from the date of taking over of whole of the scope of supplies and not any sub-section or part thereof. Provided that, if any part of the scope of supplies or sub-systems or component of that part has been replaced, renewed or repaired, the "Defect Notification Period" in respect of that part or sub-system or components of that part shall start from the date of such replacement, renewal or repair has been completed to the satisfaction of BEML.
- 7) The sub-contractor shall ensure implementation of all improvements/corrective actions against all technical issues reported (during Design, Manufacturing, Installation, Commissioning, Interface Testing, Operation & Maintenance etc.) in earlier projects/supplies of their system/equipment and submit the compliance documents during design stage. The supplier shall certify the implementation of such engineering change proposals, before dispatch of items.
- 8) The sub-contractor shall attend & close all snags, defects, deficiencies, punch points with respective suppliers' system/equipment reported by BEML/ CMRL in various stages of the project (at BEML Factory & CMRL Depot) promptly before ROD (revenue operation date) of Trains. The list of unattended pending issues (which does not affect the operation of train) along with action plan & timeline to attend/close the same shall be submitted by the supplier.
- 9) The sub-contractor shall be required to investigate any design issues, interface issues, field failures (conveyed through NCRs, CMRL Inspection Notes, Minutes of meetings etc.) of supplied system/equipment in detail & submit investigation report along with corrective action report to BEML in a time bound manner for obtaining CMRL's approval. Based on CMRL's approval, the sub-contractor shall be required to implement the corrective action (viz. Hardware modification), without any additional cost, in all Trains during entire DNP.
- 10) The sub-contractor shall not convey their recommendations on replacement of items/anything related with DNP process directly to CMRL without prior information to/consent of BEML.
- 11) Sub-contractor shall ensure minimum spare parts that he intends to make available during the installation, erection, commissioning and DNP/DLP/Warranty period.
- 12) The sub-contractor shall keep on site, throughout the installation, erection, commissioning and warranty period, stocks of spare parts, to enable rapid replacement of any item found to be defective or in any way in non-conformance with the specification.
- 13) If the sub-contractor recommends any spares/consumables/other items besides the items quoted to BEML during the PO/Design finalization stage, then the sub-contractor should supply these items free of cost for entire DNP of all trains.
- 14) The sub-contractor shall provide Training of their system/equipment to BEML T&C personnel for familiarization of their sub-system in terms of testing, commissioning & comprehensive maintenance.
- 15) Submission of detailed hardware modification fleet replacement proposal based on detailed investigation to address the recurrence of the fault/improving the reliability of sub-system towards closure of CMRL Inspection Notes/MOM Points/Open Technical Issue/Punch points/Epidemic Failures etc.
- 16) Implementation of hardware modification/fleet replacement of component/complete

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unit/complete sub-system in all Trains as well as in supplied Spares. Monitoring of sub-system/Train's performance after implementation of hardware modification/fleet replacement.

- 17) Submission of OEM Maintenance Manuals, Maintenance Work Instructions, Maintenance Schedule [Specifying the frequency of various inspections/service checks synchronized with Master Maintenance Schedule of Train (As Per RAMs documents viz. Daily, 72 Hrs., A, B1, B4, B8, C1, C2, C3, C4 service checks, C5 Midlife refurbishment etc.), detailed scope of work during such inspections/service checks including facilities & manpower requirement, Down-time of Train etc.] of supplied sub-system. Finally, the frequency of various inspections/service checks shall be followed as per approved Train level "Operation & Maintenance Manual" and "Master Maintenance Schedule".
- 18) Handling obsolescence issues of supplied system/equipment component/sub-assembly / assembly /maintenance terminals/tools/special tools/ spares/consumables or any item related with supplied sub-system during Life cycle of the supplied sub-system.
- 19) Failures of 3-Car/6-Car Train sets caused by the failures of the individual equipment/subsystems or any other defects shall only be treated as warranty failures. BEML decisions in this regard shall be final.
- 20) The final acceptance will not cancel the particular conditions specified in the contract, such as hidden defects, reliability requirements, life span, etc.

18 Others

The delivery format of all deliverables (design submission, maintenance manuals, training manuals and etc.) shall be approved by BEML/ CMRL.

Any discrepancy in specifications can be clarified after the discussion between BEML and the subcontractor.

19 Submittals – Technical Offer


The sub-contractor shall provide the following as part of technical offer for technical evaluation,

1) Complete Technical offer for Vacuum Circuit Breaker, Earthing Ground Switch and Pneumatic Interlocking valve along with drawings.

2) Clause wise compliance against the following,

- a) PTS - Doc no. GR/TD/7063.
- b) CMRL ERTS (Refer Compliance Matrix format)
- c) CMRL Project Wide Interface Document (Rolling stock Interface)

- Compliance Matrix document shall be filled as per the provided format i.e. category, Method of compliance, Sub-system, Document Reference.

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Offers with Non-compliance and deviations to any of the ERTS, PTS & Interface clauses with regard to VCB, EGS and PIV are liable for rejection.

20 List of Documents and Drawings attached- Appendices/Annexures

- 1. ERTS CMRL phase-2 ARE02A**
- 2. Compliance Matrix format**
- 3. Vendor Subcontractor Suppliers Credentials Format**
- 4. RAMS formats**
- 5. LCC format**
- 6. Annexure-A: CMC Spares and Tools Requirement**
