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: 6300039498 **Dt:.09.05.2025**

Subject: Design, Manufacture, Supply, Testing & Commissioning, Training & Manuals of Passenger Door System including CMC Spares, Consumables Tools & Test Benches and service activities required for 210 cars of Chennai Metro Rail Project-Phase II (ARE02A).

Tender Closing Date: 10.06.2025@15:00 hrs. Further it may be extended for another 7 days

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

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

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

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 64 Nos. of pages including this page.

2. TABLE OF CONTENTS

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 Passenger Door System Equipment including CMC Spares & 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 List of Passenger Door System Equipment

Sl	Kit Part no	Description	UoM	Qty for 210Cars (70 T. Sets)
1	5241400001	Passenger Door System with EED & EAD LH (Threshold LH & Weatherstrip LH) conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	140
2	5241400002	Passenger Door System EED & EAD RH (Threshold RH & Weatherstrip RH) conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	140
3	5241400003	Passenger Door System with EED & EAD conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	560
4	5241400004	Passenger Door System with EED conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	280
5	5241400005	Passenger Door System with Crew switches (inside & Outside) & EED conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	420
6	5241400012	Passenger Door System with long stop push button & EED conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	140

Scope shall also cover the following:

1. **Testing & Commissioning activities Passenger Door System 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) asper 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	AU	1

Table-1.3 FAI Reports and Type Test & Report

Sl	Description	UoM	Qty
1	FAI Reports and Type Test & Report	AU	1

Table-1.4 Deliverables

Sl	Kit Part no	Description	UoM	Qty/Project
1	5241400006	Deliverables as per ERTS Clause 6.3.14	Set	1
		SIL Certifications and certificate submission as per ERTS Clause 6.3.25	AU	1
		Printed Circuit Boards (PCB) details asper ERTS 19.55	AU	1
		Microprocessor Details as per ERTS19.57	AU	1

2. Comprehensive Maintenance Contract (CMC) as per Annexure-IV" Scope of CMC"

Table 2.1: Spares, Consumables,tools &Test Benches required on for CMC period

Sl	Kit Part no	Description	UoM	Qty/Project
1	524610004	Spares as per Annexure-A for Door System	Set	1
2	524610005	Tools and Test Bench for Door System	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 Door system	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.	AU	1

Required Delivery Schedule: For **Passenger Door System**

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		
5	Deliverables	Apr.26		
	SIL Certifications and certificate submission as per ERTS Clause 6.3.25	Mar-26		
	Printed Circuit Boards (PCB) details asper ERTS 19.55	Mar-26		
	Microprocessor Details as per ERTS19.57	Mar-26		
6	Spares	To be supplied as per BEML requirement		
7	Tools and test benches 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

Technical Bid submission Conditions	**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 as indicated below: a. Bidders should upload duly filled, signed & stamped Integrity Pact with two witnesses **[Appendix – A]**. b. Clause by Clause compliance for the BEML Procurement Technical Specification (PTS): Doc no: PTS Doc No GR/TD/7066 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]** 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. **NOTE**: Please note Commercial Bid /Price details should not be indicated in TECHNICAL BID, else bid will not be considered for further evaluation.

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	5241400001	Passenger Door System with EED & EAD LH (Threshold LH & Weatherstrip LH) conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	140	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
2	5241400002	Passenger Door System EED & EAD RH (Threshold RH & Weatherstrip RH) conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	140	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
3	5241400003	Passenger Door System with EED & EAD conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	560	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
4	5241400004	Passenger Door System with EED conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	280	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
5	5241400005	Passenger Door System with Crew switches (inside & Outside) & EED conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	420	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
6	5241400012	Passenger Door System with long stop push button & EED conforming to PTS Doc. No. GR/TD/7066 latest revision.	SET	140	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
7		Non-Recurring activities- Design and Submission of Design Documents	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
8		FAI Reports and Type Test & Report	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
9	5241400006	Deliverables as per ERTS Clause 6.3.14	Set	1	Price to be uploaded in	Price to be uploaded in

					commercial bid only	commercial bid only
10		SIL Certifications and certificate submission as per ERTS Clause 6.3.25	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
11		Printed Circuit Boards (PCB) details asper ERTS 19.55	AU	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
12		Microprocessor Details as per ERTS19.57	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	524610004	Spares as per Annexure-A	Set	1	Price to be uploaded in commercial bid only	Price to be uploaded in commercial bid only
2	524610005	Tools and Test Bench for Door System	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 Door System	AU	1	Price to be uploaded in	Price to be uploaded in

				commercial bid only	commercial bid only
2	Training Manual, System/ Technical Manuals, Software Manuals, Operation Manuals, Maintenance Manuals, Fault Diagnostic Manuals& Spares Part Catalogue. AU 1	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 and Test Benches :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 and Test Benches 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) Preventive Maintenance

iii) Cleaning of trainsets

iv) Asset and Maintenance Management system (AMMS)

v) Coordination with OCC/BCC/DCC/PPIO

vi) 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 Passenger Door System 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, DELIVERABLE 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, tools and test benches 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 with stand 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 oof 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	12	6	9	9	12	9	12	9	9	9	9	9	9	6	9	9	12	9	6							
	Testing & Commissioning of cars													3	3	3	3	3	3	3	6	9	12	9	12	6	6	9	9	9	18	9	9	6	9	9	12	9	6	9	6
	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

Note

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

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
DLP/M&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

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**

ANNXURE-IV SCOPE OF CMC SPARES AND MANPOWER

1. Test Benches as applicable for one depot to be considered as per OEM recommendations.
2. One Set of Special tools, jigs, measuring devices etc. To be considered as per OEM recommendations.
3. 3no's of Maintenance terminal to be considered with 18 years of software support from OEM. BEML will buy the laptops as per OEM specifications.
4. 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.
5. Any modifications carried out by OEM During DLP/warranty period, also to be implemented by OEM in spares supplied under this contract.
6. 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.
7. On Train Maintenance is Under BEML scope.
8. During DLP warranty period, DLP spares to be positioned & maintained by OEM at the Chennai depot.
9. OEM to give the storage procedure for the spares supplied at the depot.

Annexure-A

(Ref document, Door system PTS, Doc No.: GR/TD/7066 Latest rev)

Sl.No	Item	Unit	Mandatory spares Qty	Remarks
1.	Door operating mechanism without door leaf (Each type)	Set	01	
2.	Saloon door leaf (LH & RH)	Set	02	
3.	Saloon Door Glass	No.s	06	
4.	Door control unit	No.s	48	Two train set material.
5.	Door motor including gear mechanism if any	No.s	8	One car material.
6.	Set of rollers if any (Set means for one door LH+RH)	Set	48	Two train set material.
7.	Set of sensors/ Limit switches of saloon doors (Set means for one door LH & RH)	Set	48	Two train set material.
8.	EAD along with Bowden cable	No.s	16	Two car material.
9.	EED along with Bowden cable	No.s	16	Two car material.
10.	EAD Bowden cable	No.s	16	Two car material.
11.	EED Bowden cable	No.s	16	Two car material.

12.	Kick plates, if any	No.s	16	two car material.
13.	Seal fitted with electrical sensitive edge	No.s	8	One car material.
14.	Mechanical isolation device (Both Internal & External)	No.s	16	Two car material.
15.	Threshold plate for door with safety walk/anti-skid strip, if any	No.s	8	Two train set material
16.	Lower guide rail	No.s	8	One car material
17.	Upper guide rail	No.s	8	One car material
18.	Screw switches	No.s	12	Two train set material.
19.	Long stop push buttons	No.s	6	Three train set material
20.	Door bottom aluminum strips, if any	Nos	48	One car material
21.	Door Bottom Guide wear strip(One set means one door RH+LH)	Set	48	Two train sets
22.	Guide screw rod with nut or Liner guide way LH	No.s	24	One train set
23.	Guide screw rod with nut or Liner guide way RH	No.s	24	One train set
24.	Set of Mechanical items auxiliary's: Namely mounting fasteners, Mounting bolts, Washers, shims, rubber items , weather strips , End stoppers, middle stoppers, guide pins etc.. (Set means One door LH+RH)	Set	24	one train set material
25.	Set of all electrical items auxiliary's: Namely connectors with pins, lugs, Terminal block set with all cables, MCBS, Name plate, diodes, TB markers (Set means One door LH+RH)	Set	24	One train set material.
26.	Saloon door labels, Emergency device operation stickers, door stickers, etc. which are under Door OEM scope (set means One door LH+RH)	Set	24	One train set material.
27.	Consumables as recommended by OEM	Set	20 Train Set Material for one year	

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

APPENDIX- A

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

INTEGRITY PACT

Between

BEML Limited (BEML) hereinafter referred to as "The Principal"

And

……. hereinafter referred to as "The Bidder/Contractor"

Preamble

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

...……

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

Section 1 – Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

b) The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

c) The Principal will exclude from the process all known prejudiced persons.

(2) If the principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act, or it 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)/Contactor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

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

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

Section 4 – Compensation for Damages

(1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

(2) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the contract value or the amount equivalent to Performance Bank Guarantee.

Section 5 – Previous Transgression

(1) The Bidders declares that no previous transgressions occurred in the last three years with any other Company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprises in India that could justify his exclusion from the tender process.

(2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealings".

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

(1) The Bidder(s)/ Contractor(s) undertaker(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.

(2) The Principal will enter into agreement with identical conditions as this one with all Bidders, Contractors and subcontractors.

(3) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

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

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

Section 8 – Independent External Monitor / Monitors

(1) The Principal appoints competent and credible Independent External Monitor for this Pact.

The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement

(2) The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. It will be obligatory for him to treat the information and documents of the Bidders/Contractors as confidential. He

reports to the CMD, BEML.

(3) The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Subcontractor(s) with confidentiality.

(4) The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

(5) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non- binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

(6) The Monitor will submit a written report to the CMD, BEML, within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise submit proposals for correcting problematic situations.

(7) If the Monitor has reported to the CMD, BEML, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BEML has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.

(8) The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

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

Section 10 – Other provisions

(1) This agreement is subject to Indian Law. Place of performance and jurisdiction is the Corporate Office of the Principal, i.e. Bangalore.

(2) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

(3) If the Contractor is a partnership or a consortium, this agreement must be signed

by all partners or consortium members.

(4) Should one or several provisions of this agreement turn out to be invalid, the reminder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intensions.

(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:	***Witness 1:***
(Name & Address)	(*Name & Address*)
----------	----------
----------	----------
Witness 2:	***Witness 2:***
(Name & Address)	(*Name & Address*)
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Appendix A-1

(Applicable Agents / Suppliers to Sign, Seal & Upload / Submit)

GUIDELINES FOR INDIAN AGENTS OF FOREIGN SUPPLIERS

1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BEML LTD shall apply for registration in the prescribed Application-Form available on *www.bemlindia.in*.

1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/remuneration/ salary/ retainer ship being paid by the principal to the agent before the placement of order by BEML LTD.

1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.

2.0 DISCLOSURE OF PARTICULARS OF AGENTS/ REPRESENTATIVES IN INDIA, IF ANY:

2.1 Tenderers of Foreign nationality shall furnish the following details in their offer:

2.1.1 The name and address of the agents/representatives in India, if any and the extent of authorization and authority given to commit the Principals. In case the agent/representative be a foreign Company, it shall be confirmed whether it is real substantial Company and details of the same shall be furnished.

2.1.2 The amount of commission/remuneration included in the quoted price(s) for such agents/representatives in India.

2.1.3 Confirmation of the Tenderer that the commission/ remuneration if any, payable to his agents/representatives in India, may be paid by BEML LTD in Indian Rupees only.

2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:

2.2.1 The name and address of the foreign principals indicating their nationality as well as their status, i.e, whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/representatives.

2.2.2 The amount of commission/remuneration included in the price (s) quoted by the Tenderer for himself.

2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/remuneration, if any, reserved for the Tenderer in the quoted price (s), may be paid by BEML LTD in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.

2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission /remuneration, if any payable to the agents/representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.

2.4 Failure to furnish correct and detailed information as called for in paragraph-2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BEML LTD. Besides this there would be a penalty of banning business dealings with BEML LTD or damage or payment of a named sum.

Signature
(For & On behalf of Bidder/Contractor)

APPENDIX B

COMPLIANCE REPORT FOR PROCUREMENT TECHNICAL SPECIFICATION (PTS)

Compliance to PTS GR/TD/7066				
PTS Clause No	Description	Complied	Not Complied	Remarks
1. Introduction	1.1. General			
	1.2. Train Configuration & Passenger Door System Arrangement			
	1.3 Car Weights			
	1.4 Environmental Conditions			
	1.5 Vehicle Performance Requirements			
	1.6. Track structure Parameters			
	1.7. Current Collection System			
	1.8. Platform Interface			
	1.9. Signalling System			
	1.10. Car Dimensions			
2. Definitions and Abbreviations	2.1 Definitions			
	2.2 Abbreviations			
3. Precedence of Documents				
4. Technical Qualification Criteria				
5. Interface Responsibilities	5.1. Design Interface			
	5.2. Space Envelope			
	5.3. Interfaces with other systems			

6. Technical Requirements	6.1. General			
	6.2. Standards and Codes			
	6.3. Proven Design			
	6.4. Technical Information of Passenger Door System			
	Passengers alarm			
	6.5. Weight			
	6.6. Noise & Vibration			
	6.7. Software			
	6.8. EMC Requirement			
	6.9. RAMS requirements			
	6.10. Fire Safety			
	6.11. Quality Assurance Program			
7. Scope of Supply	7.1. General			
	7.2. Hardware.			
	7.3. Software			
	7.4. Engineering Support			
	7.3. Design Submission and Approval Responsibilities			
	7.4. Design Deliverables			
	7.5. Test Program			
	7.6. Submissions for Statutory Approvals			
	7.7. Operating Rule Book			
	7.8. Operating Procedure Manuals			
	7.9. Operation and Maintenance Manuals (O&M Manual)			
	7.10. Training			

8. DNP / DLP / Warranty				
9. Comprehensive Maintenance Contract				
10. List of Annexures and Enclosures	10.1. Annexures			
	10.2. Enclosures			
11.PTS & ERTS Compliance				
12.Project Management				
13. Submittals with Technical Offer				

Authorized signatory with company seal / stamp

APPENDIX – C

COMPLIANCE REPORT OF GENERAL TERMS & CONDITIONS

(To be submitted along with Technical Bid)

Bid Invitation No :

Firm :

Item details :

Sl. No.	Terms / Clause	Complied	Not Complied	Remarks
1.	GLOSSARY, DEFINITIONS & INTERPRETATIONS			
2.	SUBMISSION OF THE TENDER			
3.	SUPPLIERS SHARING LAND BORDER WITH INDIA			
4.	PREFERENCE TO MAKE IN INDIA			
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

APPENDIX – C

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.	RERENTION MONEY			

Authorized signatory with company seal / stamp

APPENDIX – D

COMMITTEMENT TO SUPPLIES

(To be submitted along with Technical Bid)

This is to certify that we M/s ……. against GeM tender No./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

APPENDIX- E

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.

APPENDIX -F

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 :

APPENDIX – I

DELIVERY SCHEDULE

Required Delivery Schedule: For **Passenger Door System**

Sl No	Part No / Description	Total Qty (Trainsets)	Schedule	No of Train Sets (3 Cars/TS)
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		
5	Deliverables	Apr.26		
	SIL Certifications and certificate submission as per ERTS Clause 12.19	Mar-26		
	Printed Circuit Boards (PCB) details asper ERTS 19.55	Mar-26		
	Microprocessor Details as per ERTS19.57	Mar-26		
6	Spares	To be supplied as per BEML requirement		
7	Tools and test benches 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 l/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 the .....Bank.

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 named .....in the presence of:

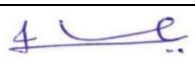
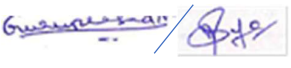
Witness 1.

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

Witness 2.

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

Chennai Metro ARE02A Project
Procurement Technical Specification of Passenger Door System

	Name	Date	Signature
Approved By	Shivakumar S B	03.05.2025	
Reviewed By	Manjunath S	03.05.2025	
Checked By	Guruprasad N.C. / Saranya V	03.05.2025	
Prepared By	Shashank A.	03.05.2025	

REVISION HISTORY:

Rev. No.	Clause No.	Page No.	Changes	Revision Date
Nil	-	-	First Issue	15.04.2025
1	1.1 6.1 9	5 16 73	Point (4) updated Point 1 updated Section 9 updated	03.05.2025

Table of Contents

1. Introduction

1.1. General

1) This Procurement Technical specification (PTS) specifies the technical requirements of Passenger Door system to be supplied for cars under Chennai Metro Phase 2 ARE02A Project to Chennai Metro Rail Limited (herein after CMRL).
2) The Passenger Door system shall comply in all respects with CMRL Employer's Requirements Technical Specification (ERTS-RS).
3) BEML will carry out all required works and activities as Contractor to the Employer for Chennai Metro ARE02A project, while the subcontractor shall be responsible for all works required in this PTS with regard to Passenger Door system and shall be responsible for supporting the BEML activities as contractor for Chennai Metro ARE02A project.
4) The scope of work covers design, development, testing, manufacture, supply, commissioning and integrated testing of the Passenger Door system suitable for UTO confirming to GoA4 as specified in IEC 62290-(1,2&3) & IEC 62267 and the training of Operation and Maintenance personnel of the CMRL on the Passenger Door system as per ERTS-RS. The OEM is required to support for CMC as per the scope mentioned in the document.
5) The scope of work includes all items of work which may be required to meet the performance requirements, trouble free, reliable and efficient operation of trains and meeting the best international practices even if not specifically mentioned in this PTS. The trains have to be operated on three lines/corridors (Corridor 3, Corridor 4, Corridor 5) as per ERTS-RS 1.3.1. 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 as per ERTS-RS 1.4.3.

1.2. Train Configuration & Passenger Door System Arrangement

1.2.1. Train Composition

a) The rake configuration is as follows.

3 Car Trainset:

DMC + TC + DMC

b) 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)

Where,

* Fully Automatic Coupler (with electrical head)

\+ Semi permanent coupler

DMC : Driving Motor Car

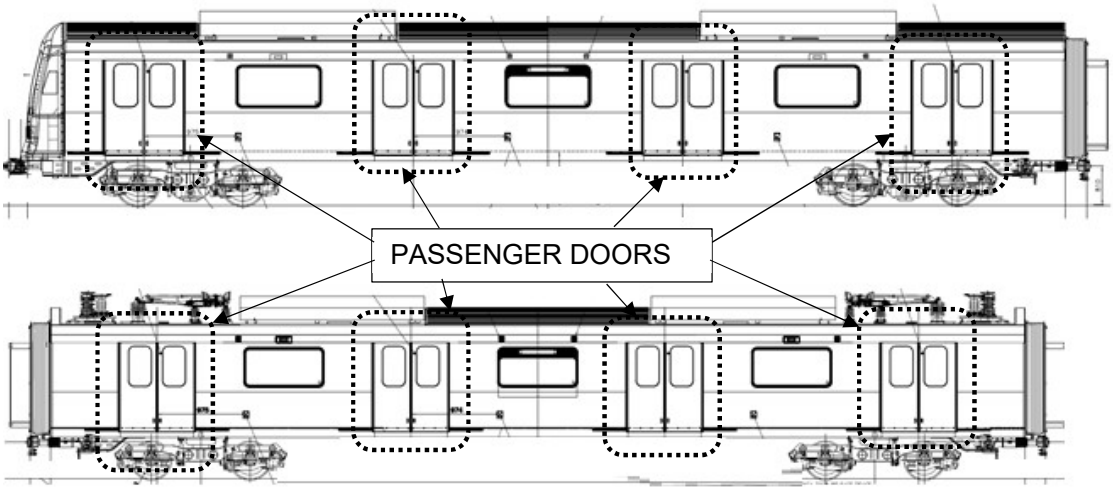
MC : Motor Car

TC : Trailer Car with Pantograph

c) All DMC and TC supplied under this contract shall be totally interchangeable with all other DMC and TC respectively, supplied under this contract, without modification.

d) As per ERTS 2.2.31, Hardware & Software of passenger door system shall be automatically reconfigure as required whenever a coupling or decoupling command is initiated by OCC or the Train Operator.

1.2.2. Passenger Door System Arrangement



1.3. Car Weights

Approximate car weights are given in the below table:

	DMC	TC
AW0	39654.9 kg	39985 kg
AW1	39720 kg	40050 kg
AW2	51679.9 kg	52595 kg
AW3	56229.9 kg	57275 kg
AW4	60779.9 kg	62020 kg

Axle Load	16,000 kg	16,000 kg
Car Configuration	DMC-TC- DMC	

AW4: (8 passengers/m^2 plus AW1) with Average weight of each passenger estimated as 65 kg as per ERTS-RS clause 2.12.

Tare weights indicated above table are subjected to change by ± 2%, subcontractor shall accommodate the weight changes accordingly in the design and development of Passenger Door system.

1.4. Environmental Conditions

The proposed system shall meet the climatic and environmental conditions as set out in ERTS-RS clause 2.11.

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 below. Following points are listed for reference as a minimum.

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	
SO2 level in atmosphere	5 ~ 40 micro g/m^3	
NOx 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.

Note:

1. 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.
2. 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.
3. The Rolling Stock must be able to operate regardless of the external conditions. They must also be so designed as to avoid abnormal wear due to adverse weather. They can be parked outdoors regardless of the atmospheric conditions.
4. The rakes shall be continuously exposed to highly corrosive, salty atmosphere along with industrial pollutants.
5. The equipment mounted on the under-frame shall be designed to permit propulsion of the train at 10 km/h through water up to a depth of 75 mm above rail level (with maximum allowable wheel and rail wear). Equipment shall be made splash proof in accordance with International Standards.
6. With maximum allowable wheel and rail wear, the rake must be able to operate successfully under the above conditions with no entry of moisture or other contaminants into any compartment, component, or device that could cause equipment on the rake to malfunction or be damaged; that could increase maintenance requirements; or that could cause premature wear or failure.
7. The Water used in Chennai for washing is likely to have a high level of dissolved matter which may aid corrosion.
8. Tunnel walls may be wet and seepage water will normally be present in the invert. Passenger Door system supplied must therefore be capable of withstanding the effects of seepage (if any) and continue to operate in such wet, humid & flood conditions.

1.5. Vehicle Performance Requirements

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

Item	Values
Maximum permissive design speed of the train	90 kmph

Maximum permissive speed in operation on tangent and level track	80 kmph
Declared Schedule Speed (DSSP), with fully loaded(AW3 condition)	32 kmph
Minimum Design Average Acceleration rate for fully loaded (seating plus standees @ 8 passengers /sq. m) train on level tangent track shall be as under: 0 kmph to 40 kmph 0 kmph to 60 kmph 0 kmph to 80 kmph	 1.0 m/s^2 0.6 m/s^2 0.3 m/s^2
Minimum Operational Average Acceleration rate for (seating plus standees @ 6 passengers/sq. m) loaded train on level tangent track shall be as under: 0 kmph to 35 kmph 0 kmph to 60 kmph 0 kmph to 80 kmph	 1.20 m/s^2 0.65 m/s^2 0.35 m/s^2
Minimum Average Service braking rate from 80 kmph to standstill for fully loaded (seating plus standees @ 8 passengers / m2) train on level tangent track	1.0 m/s^2
Minimum Average Service braking rate from 80 kmph to standstill for - (seating plus standees @ 6 passengers / m2) train on level tangent track	1.1 m/s^2
Minimum Average Emergency braking rate from 80 kmph to 0 kmph for fully loaded train on level tangent track	1.3 m/s^2
Jerk rate (Maximum)	0.75 m/s^3

1.6. Track structure Parameters

The Track Parameters for At-grade, Elevated and Underground sections are set out in ERTS-RS Table 2-2. Following details are listed for reference only.

Description	Elevated and at-grade Corridor	Underground Sections
Track Laying Gauge	1435 mm	
Rail Type		
Main Line	60E 1 Head hardened as per IRS T 12 – 2009 With All Amendments / Correction Slips	
Depot	60E 1 (880 Grade) as per IRS T 12 – 2009 With All latest Amendments / Correction Slips.	
Rail Profile	60 E1 Profile	
Inclination Of Rail	1 / 20	
Rail Seat Spacing,	Nominal 650 mm ± 5 mm	

Main line		
Sleeper Spacing, Depot	650mm ± 20mm; Inspection Lines 1000 mm	
Ballast Cushion		
Depot	Ballast less Track in Madhavaram Depot Ballasted Track in Poonamalle Depot	
Rail Panel Lengths	Continuous welded rails	
Minimum Radius of Curvature	Depot – 100 m Main line (At grade and elevated) – 120 m	200 m
Minimum Turn Out Depot	1 in 7, R-140	
Minimum Turn Out Main line	1 in 7, R-140	
Maximum Cant Permissible in curves	125 mm	
Maximum Cant Deficiency Permissible	100mm	
Maximum Permissible Cant Gradient	1 in 440	
Turn-out Speed (Main line) 1 in 9, R300	45 km/h	
Turn-out Speed (Main line) 1 in 9, R190	35 km/h	
Turn-out Speed (Main line) 1 in 7, R190	35 km/h	
Turn-out Speed (Main line) 1 in 7, R140	25 km/h	
Maximum Gradient	4 % Including Grade Compensation	
Minimum vertical curve radius crest	1500m	
Maximum track axle load (AW4)	16.0 tonnes	
Widening of track Gauge on curves	Up to 9 mm	

1.7. Current Collection System

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

System Particulars	For all sections and depot
Nominal Voltage	25 KV
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

1.8. Platform Interface

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

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

1.9. Signalling System

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

1.10. Car Dimensions

Dimension	Values
Length of DMC / TC / MC over coupler faces	22,600 mm
Width of car, overall	2900 mm
Wheel dimensions: New wheel diameter Wheel wear limit	 860 mm 80 mm (on diameter)
Height of car floor above top of rail at door threshold	1,130 mm (maximum) 1,100 mm (minimum)
Spacing between bogie centrelines	15,000 mm

2. Definitions and Abbreviations

The following definitions and abbreviations are applicable to the PTS.

2.1. Definitions

- "**Employer"** means Chennai Metro Rail Limited (CMRL), its legal successors and assignees.
- "**Subcontractor**" means the Supplier who supplies the required Passenger Door System to BEML for CMRL ARE02A project. Subcontractor shall carry out the works in

accordance with ERTS (RS & CMC) with regard to Passenger Door System.

- **"Contractor"** means the persons or person appointed by the Employer to undertake the execution of the works for CMRL ARE02A project. In order to avoid misunderstanding of the roles of the Contractor in ERTS (RS & CMC), the term "Contractor" shall be read as "Subcontractor" in ERTS (RS & CMC) for those ERTS (RS & CMC) clauses referred to in this PTS.
- **"Contract"** means the contract between Subcontractor and BEML in relation to the supply of Passenger Door for CMRL ARE02A project.
- "**Engineer**" means any person nominated or appointed from time to time by the Employer to act as the Engineer for the purposes of the Contract and notified as such in writing to the Contractor.
- **Project Manager or Employer's Representative**" means any person nominated or appointed from time to time by the Employer to act as the Project Manager/ Employer's Representative for the purposes of the Contract and notified as such in writing to the Contractor.
- "**NIT**" means Notice Inviting Tender for Supply of Passenger Door System for CMRL ARE02A Project issued by BEML.
- "**GTC**" means General Terms and Conditions for Passenger Door System for CMRL ARE02A Project issued by BEML.
- "**SCC**" means Special Contract Conditions for Supply of Passenger Door System for CMRL ARE02A Project issued by BEML.
- "**BEML**" means the Contractor to procure the Passenger Door System for CMRL ARE02A project.
- "**ERTS-RS**" means Employer's Requirements Technical Specification – Rolling Stock for CMRL ARE02A project.
- "**ERTS-CMC**" means Employer's Requirements Technical Specification - Comprehensive Maintenance Contract for CMRL ARE02A project.
- "**PTS**" means BEML's Procurement Technical Specification.

2.2. Abbreviations

GOA	:	Grade of Automation
UTO	:	Unattended Train Operation
EMC	:	Electro-Magnetic Compatibility
ERTS	:	Employer's Requirements Technical Specifications
FMEA	:	Failure Mode Effects Analysis
FMECA	:	Failure Mode Effects and Criticality Analysis
FRACAS:		Failure Reporting and Corrective Action system

FAI	:	First Article Inspection
ISO	:	International Standards Organization
ITP	:	Inspection Test Plan
LRU	:	Least Replaceable Unit
MRTS	:	Mass Rapid Transit system
MDBF	:	Mean Distance Between Failures
MDBCF	:	Mean Distance Between Component Failures
MDBSF	:	Mean Distance Between Service Failures
MTTR	:	Mean Time To Repair
NCR	:	Non-Conformance Report
PHA	:	Preliminary Hazard Analysis
RDSO	:	Research Design and Standards Organisation (Ministry of Railways)
SOD	:	Schedule of Dimension
TCMS	:	Train Control Management System

For further abbreviations, please refer to APPENDIX-A of ERTS.

3. Precedence of Documents

1) The PTS shall be read in conjunction with the Notice Inviting Tender (NIT) General Terms and Conditions (GTC) & Special Contract Conditions (SCC) of the tender & ERTS (RS & CMC). To the extent that any provision of the PTS is inconsistent with any provision of the Commercial Specification, the provisions of the NIT shall prevail.
2) To the extent that any provision of NIT is inconsistent with any provisions of the ERTS (RS & CMC), the provisions of ERTS (RS & CMC) shall prevail.
3) This PTS in no way relieves the 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	ERTS (RS & CMC)
2	PTS
3	NIT/GTC/SCC

4) 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.

5) Also, in the event of any conflict among the requirements of particular parts of the PTS, ERTS and NIT, 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. Technical Qualification Criteria

1) Subcontractor shall be an Original Equipment Manufacturer (OEM) of Passenger Door system for Railway Metro Rolling stock having experience in design, manufacturing, testing, commissioning, integrated testing and comprehensive maintenance. Company profile and the infrastructure details shall be submitted by the bidder.
2) Passenger Door system designs shall be service proven. In general, "service proven" shall mean the system, subsystem, equipment or components, etc. which shall comply with requirement's specified ERTS-RS.
3) The proposed Passenger Door system shall be in satisfactory revenue operation for minimum three (3) years, in a country other than the country of origin of manufacturer or in India, at the time of bid submission. The details shall be provided as per requirements of Form Sys-3 by the bidder. Also, duly filled & Signed Format for Submission of Vendor/Subcontractor/Suppliers Credentials: Rolling Stock (Enclosure 3) shall be submitted
4) Letter of authorization (Form MAN) to be filled and submitted by the bidder in accordance with the instructions indicated in the form and signed by a person with the proper authority to sign documents.
5) The credentials of the manufacturing plant shall also be submitted along with the technical offer.
6) The sub-contractor shall provide all the required documents for obtaining the vendor approval for the Passenger Door system as per the tender. Selection of Vendor is subject to CMRL approval.
7) The firm should have designed, and supplied Passenger Door system for project having GoA4 (UTO) level of automation. Such supplies should have been in revenue service with satisfactory performance. Satisfactory performance certificate from the Metro operators needs to be furnished.
8) The subcontractor shall provide ISO 9001:2015/ IRIS certification or equivalent international certification along with the technical offer and shall manufacture the products accordingly.
9) The subcontractor shall submit Quality Assurance Plan (QAP), Inspection test Plan (ITP), company profile with infrastructure facilities, product range etc., along with technical offer.

5. Interface Responsibilities

5.1. Design Interface

1) At design stage, BEML shall be responsible for defining the technical requirements and the design constraints. The location of mounting points and the design of

equipment installation comprising of Passenger Door system shall be defined by the subcontractor and approved by BEML in order to avoid any mechanical interference with other equipment for the vehicle. The subcontractor shall be responsible for mounting methods and providing all requisite materials for mounting of the Passenger Door System on the carbody.

2) Any changes of the components comprising of Passenger Door System shall be defined by the subcontractor and approved by BEML in order to avoid the mechanical interference with other equipment for the vehicle.

3) In order to implement interface requirements, the subcontractor shall provide the information required by BEML or CMRL and shall provide the interface data voluntarily for ensuring the performance of the Passenger Door System which need to be used for the mechanical and functional interface. The subcontractor shall have whole responsibility for problems which will happen without any information and notification used for engineering interface with other equipment or car body structure.

4) Even if technical information or drawings are approved by BEML or CMRL, the subcontractor shall have responsibility to change/ solve/ modify design failure of production, quality problems and safety issues on its own cost.

5) The subcontractor shall keep in mind that any Door system initially proposed by them should be customized to meet a situation of this project or the need of CMRL. So, the subcontractor shall implement it to Passenger Door System without additional cost. Subcontractor shall solve all issues for proper operation of Passenger Door System at subcontractor's own cost.

5.2. Space Envelope

The Passenger Door assembly shall be designed for mounting within the car body space envelope without any interference.

In order to avoid the mechanical interference with other equipment of the vehicle following sub-assembly mountings shall be taken care during preliminary and pre-final design stage.

- Integration of the Door Drive unit on to the car body
- Top guide rail mounting
- Bottom guide rail mounting
- Sealing Arrangement shall be provided to arrest the leakage of the conditioned air from the saloon area to outside. Suitable noise attenuation measures shall be incorporated between car body and the door interface under door closed condition.
- Suitable brush design for Door drive cover to ensure free Pull arm movement without interference with the cover.
- Suitable threshold plate to maintain the maintain horizontal gap as per ERTS RS 3.4.8.

The design of the door system components shall consider the tentative carbody details provided in the enclosed sketch GR-5678 for the door leaf profile and the available space envelope. The specific details will be finalized during the preliminary design stage.

The Subcontractor shall provide the detailed longitudinal section drawing and the detailed drawing related to Passenger Door system during preliminary design stage.

5.3. Interfaces with other systems

5.3.1. Electrical/Communication Interface

1) The subcontractor shall provide the interface specification between TCMS, Propulsion system, Track work, PSD/PSG, depot maintenance equipment and vehicle equipment including signaling, such as ATP, ATO, UTO control and any other equipment.
2) 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 (RS & CMC) requirements.
3) 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
    - DCU wiring diagram.
    - Both equipment side and car side mating connectors, pins & required tools etc. will be under subcontractor’s scope.

4) BEML and the subcontractor will comply with and be responsible for the interface requirement and develop the interface specification on his scope of supply.
5) Subcontractor shall provide the necessary interface and participate in finalizing the TCMS Interface and carry out necessary testing on-site for successful integration and completion of the project.
6) Necessary Electrical & Software interface shall be supported and implemented by subcontractor during execution phase for successful completion of project even if it is explicitly not mentioned in ERTS RS, PTS.

5.3.2. TCMS Interface

1) Subcontractor shall provide the necessary interface and participate in finalizing the TCMS Interface and carry out necessary testing on-site for successful integration and completion of the project.
2) The subcontractor shall meet the communication protocol requirements of the lead subcontractor (TCMS) in accordance with the interface document requirements for Passenger Door system.
3) Interface with TCMS shall be based on service proven communication system and shall be compliant as per ERTS RS 14.3.3 and same shall be decided during design stage.
4) The sub-contractor shall meet the requirements but not be limited to ERTS Chapter 2.6.14, ERTS-RS Appendix-C with regard to TCMS interface, PSD Interface, Signaling Interface.
5) Before the Type Test, commissioning of complete car at the vehicle level, the subcontractor shall meet the TCMS combination test between TCMS and their equipment as per ERTS-RS. One or several equipment including connectors, power, cables etc., should be delivered to TCMS supplier's test placement before the testing period by subcontractor. Subcontractor's engineer should attend the combination test for technical support, for example software changes or equipment installation, in accordance with TCMS supplier's requirement.
6) The subcontractor shall meet the requirement for single point uploading of software and downloading of fault logs and trace data shall be provided as required by ERTS RS 14.9.5
7) Doors numbering shall be in line with TCMS.

5.3.3. Interface with PSD Contractors:

1) The design of the passenger door control system shall ensure that the passenger doors open before the PSDs open. The operation of the “Door Close” pushbutton shall broadcast an audible warning in each saloon, signifying that both the passenger doors and PSD shall subsequently close.

2) After the pre-set time, adjustable between 0 to 5 seconds, following the finish of the audible warning, the control system shall synchronously “Close and Lock/Latch” all the passenger doors and PSD on the corresponding side. The design of the passenger door control system shall ensure that the passenger doors close before the PSD close.

3) The door control shall be suitably interfaced with Platform Screen Doors (PSD) as per ERTS-RS 6.2.4 and shall be discussed during preliminary design stage.
4) As per ERTS-RS Appendix C and Chapter 2, Subcontractor shall provide the following details & Interface

- Shall interface with Signalling & Train Control Contractor for synchronization of train door / PSD/PSG opening and closing
- Shall exchange the defective / isolated train door information with Signalling & Train Control Contractor for disabling opening/closing

- Shall prevent a train door from opening in case its corresponding platform screen door is under failure/isolated.
- Shall display message at relevant train door prior to train arrival to notify passengers that the particular train door will not open in case of defective PSD/PSG on upcoming station, based on the location of the defective PSD/PSG shared by the Signalling & Train Control system.
- Shall interface with Signalling & Train Control Contractor for the provision of reclosing the door(s) without opening all doors in case of obstruction detection.

5.3.4. Interface with On-Train Public Address System

The door control shall be suitably interfaced with On Train Public Address System as per ERTS RS 13 and shall be discussed during preliminary design stage.

5.3.5. Signalling Interface

Refer ERTS-RS Appendix C Chapter 2 for full details of the division of responsibility between the subcontractor and Signaling, PSD contractors. The subcontractor shall comply with the requirements.

Subcontractor shall support and implement necessary interface for GoA2/GoA3/GoA4 during execution phase and carryout necessary fine tuning of his equipment & software during testing & commissioning and test trials on-site for successful completion and handing over of the trainsets for Statutory approvals and Revenue Service operations.

As per ERTS-RS Appendix C Chapter 2.13.1 (Sl. No. 17), Subcontractor shall provide necessary support to Signalling & Train Control contractor for Standalone door operation command to allow driver / cleaning staff to enter / exit the train from designated door in designated Depot area / Mainline siding. Necessary support to the Signalling & Train Control Contractor to be provided.

6. Technical Requirements

6.1. General

1) The subcontractor shall meet the Passenger Door System requirements of ERTS RS for the design, development, manufacture, supply, testing, delivery, commissioning and integrated testing, suitable for UTO operation, including the training of operating and maintenance staff of the CMRL including support for comprehensive maintenance contract (CMC) of Chennai Metro Rail Project ARE02A.
2) Passenger Door system shall fully meet the requirement of ERTS RS of CMRL ARE02A project and shall be compatible for operating 3-car, 6-car & multi-consist train formations.

3) The subcontractor shall support in all aspects in obtaining clearance for dispatch of the prototype trains after successful completion of tests. The subcontractor shall carry-out any modification/ alteration based on results of the tests on the prototype be required. The subcontractor shall carry out necessary modifications at no additional charge on all trains and shall support in delivering the prototype train
4) The subcontractor shall 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 RS 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.
5) The subcontractor shall meet the system requirements of Passenger Door system mainly in accordance with ERTS chapter 6.

6) Subcontractor shall consider all energy saving methodology and submit the measures taken for energy saving as part of tender bid submission. This is required since SEC (Specific Energy Consumption) at Train level has been specified in the contract and the same needs to be achieved to avoid imposition of penalty by employer. In this regard, subcontractor shall submit the details of energy consumption of Passenger Door system.
7) Subcontractor shall provide the detail of projects interfaced with TCMS along with grade of automation GoA4.
8) The subcontractor shall comply the Train withdrawal scenarios for 3-car train specified at Appendix- I of ERTS-RS.
9) As per ERTS RS 14.7.1.3 & 14.7.2.2, Real-time fault data shall be available for Door system. Each car system shall perform its own diagnostics and shall log fault and status data. This information shall be provided to the DMS in real-time.
10) The various important parameters / signals of the equipment / subsystems (i.e. associated trace / environment data) shall also be recorded for pre-determined period before and after of occurrence of associated events/ faults with a view to enable proper fault analysis.

6.2. Standards and Codes

1) All equipment and software supplied shall be in accordance with the requirements of the standards and codes specified in the ERTS-RS and it's Appendix-B. The subcontractor may propose an alternative equivalent international standard during the design stage. The acceptance of alternative standard will however be subject to review by BEML/CMRL. When a Standard or Code is referred to, it shall be assumed that the revision that is current during the design finalisation shall be applicable, unless otherwise stated.

   Where no standard is identifiable, the subcontractor shall make a proposal, based on the best international practice, which shall be subject to review by BEML/CMRL.

2) During the preliminary design phase, the subcontractor shall submit a consolidated list of all the standards that he intends to use for the design, manufacturing and testing and other phases of the contract, for review of BEML/CMRL.
3) All drawings and design calculations submitted with the tender, or in accordance with the requirements of the contract, shall use SI units
4) The sub-contractor shall comply to latest version of standards in ERTS-RS and its Appendix-B.

6.3. Proven Design

The proposed Passenger Door systems by the sub-contractor against this PTS shall satisfy the “Proven Design” clause 2.4 of ERTS-RS.

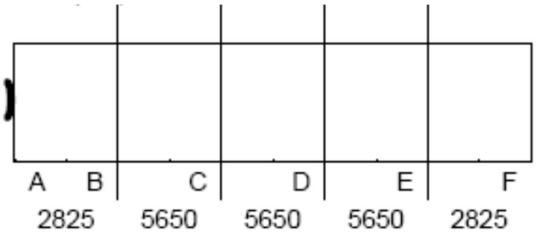
6.4. Technical Information of Passenger Door System

6.4.1. Number of doors and size (ERTS RS Clause 6.2)

1) Each Coach shall have Eight (8) electrically powered, exterior sliding type conforming to EN 14752 Latest version. The free passing through height of open doors shall be 1900 mm minimum. The minimum door passage width shall be 1400 mm. The doors shall enable short stopping dwell times.
2) The two door panels at each passenger doorway shall be synchronously controlled with Antidrag Feature and shall provide a door clear opening width of equal spacing of not less than 1400 mm Since platform screen doors (PSD) will be used at all stations with full height PSDs in underground stations and half height PSDs in elevated stations, the location, inter-door distance & size of the door panels are important for the PSD equipment supplier. The Contractor shall coordinate with PSD Contractor as part of interface.
3) The passenger doors shall be equally spaced over the complete length of the rake from Frontend Coupler head to rear end Coupler head of the train. The Door pitch shall have equal segments from the end coupler head of DMC1 coach to the end Coupler head of DMC2 coach such that train doors of three (3) types of Rolling stock in CMRL Phase 2 shall match with the station PSD’s door pitch. All Car types (DM car / T car / M car) shall be of an equal car length of 22,600 mm and the requirements of clause 2.7.4 Table 2-1 of ERTS RS shall be followed.

   A tentative layout for DM car, T car & M car is shown below for easy reference (all dimensions are in mm). The Contractor shall submit the door layout design for approval of CMRL.

   DM / T / M car (22,600mm Distance over Coupler)



A~B is distance between the Coupler Head to the Centre Line of the Door.
B~C, C~D & D~E is Door Pitch
E~F is distance between the Coupler Head to the Centre Line of the Door.

4) The Contractor is advised that platform screen doors (PSD) will be installed on all stations under a separate contract. The Contractor shall coordinate with the CMRL to provide the necessary interface information data for the separate PSD contracts including, ATP / ATO signals to coordinate for the opening and closing of PSDs & train doors, station dwell times, door opening and closing announcements, signals for “Train Arriving” and Train Leaving” announcements, and all signals necessary for the proper design, interface, interface and operation of the PSDs with Rolling stock operation.

5) The reliability and intrinsic safety of the doors of metro rakes are of paramount importance. One door failure often has the effect of disrupting the service, and usually by more than a two-minute delay. It is of the utmost importance therefore that the door scheme should be designed with necessary safeguards against potential failure. The door operation shall remain reliable under all operating conditions from tare to crush AW0 to AW4 loadings

6) Provision shall be available for the operator to board the train from the track level (in elevated, tunnels and in at-grade sections of CMRL Phase 2) and able to lock & unlock at-least two opposite saloon doors on each end car of the rake using operator’s key. Necessary handrail and ladder arrangement shall be included at these positions in the design of the train. The location of the ladder and handrail shall be proposed to CMRL for approval.

7) No door system operation or single defect or failure of any part of any door system shall produce a situation capable of causing injury to any passenger / maintenance staff.

8) Door guides and supports shall be mounted within the section of doorway protected by the door seals and other suitable means from inside and outside ensuring that no ingress of dust, debris, water or any other foreign matter likely to result in excessive wear or incorrect operation of the door

equipment. The cleaning of the door guides shall be able to be done with the general tools and shall not require any special tools for cleaning. The proposed design for sealing of the guides shall be got approved from CMRL during design stage.

9) Limit switches used shall be of high reliability and with IP 65 protection. Life of the limit switches shall be at least 15 years. The Contactor shall furnish details during Pre-Final Design Stage.

10) Passenger Doors System's functions has to meet the all the criteria defined in Chapter 14 of ERTS RS.

11) All electrical and electronic components shall comply with the EMC and EMI requirements of EN 50121 (all parts), IEEE 16, EN 55011 and IEC 61000-4 standards or other equivalent international standards. The requirements of EMC EMI requirements referred in ERTS RS clause 10.19 & 2.18 of the rolling stock shall be met.

12) 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.

13) Material requirements of all sub systems of train shall be compliant with the requirements of Chapter 19 of ERTS RS.

6.4.2. DESIGN CRITERIA (ERTS RS Clause 6.3)

1) The construction and mounting arrangement of the door system shall be sufficient to prevent deformation or damage when subjected to a load equivalent to load that could occur on a Crush AW4 Loading condition of Rake.

2) The construction shall ensure that the complete door system is sealed against the ingress of draughts, water, dust and noise from all sides of the door system.

3) The door leaf edges shall be designed to ensure that when the doors are closed, they shall form a weather tight seal extending the full height of the passenger door.

4) Seals shall be effective under all operating conditions from Tare Loading to Crush AW0 to AW4 Loading condition and shall be particularly resistant to atmospheric and chemical deterioration and to vandalism. Life of the seals shall not be less than 10 years.

5) The closing force of the passenger doors shall be in accordance with EN14752.

6) To open an unlatched passenger door when no power supply is available, the force exerted by a person within the car or standing at track level shall be in accordance with EN 14752 Latest version.
7) During all door operations and under all power supply conditions, door movements shall be smooth, controlled, and devoid of jerks or any violent motion. The Contractor shall supply Service proven motor drive for Door operation.

8) Doors shall not slam after removal of an obstruction or when the power supply is lost, removed, or interrupted.

9) All passenger door components and systems, including all rollers, racks gears and pinions which are not intended for passenger use or access, shall be adequately protected against passenger intrusion and be vandal resistant at all times, particularly during the passenger door operating cycle.

10) In the closed position the sealing shall ensure that the doors do not permit draughts, dirt, or water to enter the car either in service or when undergoing washing operations or during any monsoon rainfall conditions of Chennai.

11) The operation of the doors and all associated equipment shall not be impaired during the lifetime of the doors by normal or abnormal operating conditions.

12) The door controller unit shall be of a proven design, shall be equipped with self-diagnostic functions and shall communicate with TCMS as per requirements of Chapter 14 of ERTS RS

13) It shall be possible for CMRL to modify or change the door system parameters, modify or change open-close logic of the door circuits and implement the same as required by CMRL based on their operational and maintenance requirements. Full access to the software for the purpose above shall be provided. Any hardware software tool required for this purpose shall also be provided. The documentation including but not restricted to flow charts (for complete software), signal flows, and interpretation of signal etc. shall be provided. CMRL personnel shall be fully trained and made fully conversant by the Contractor for this purpose.

14) Passenger Door Opening and Closing Times
    a) Opening and closing time of the passenger doors shall be adjustable in the range of 1.5 to 4.5 seconds.
    b) The end of the closing stroke (say 100 mm per doorway) shall be damped or cushioned to reduce impact and minimize possible injury to passengers.
    c) All doors on the rake shall fully open within 2.0 to 2.5 seconds from initiation of the open-door command.
    d) All doors on the rake shall fully close within 2.5 to 3.5 seconds from the initiation of the “Close Door” command.

e) Once any specific door(s) is/are completely opened after persistent obstacle detection, the system shall have provision of re-closing only the obstruction detected door(s) alone without opening other closed doors

15) Similar finish material as adopted for Coach Sidewall shall be used for Door leaf construction. Joints and edges of door window and complete door leaf shall be thoroughly sealed against ingress of moisture. The composition of door leaf shall be of any latest technology which meet the below requirements:
   a) Minimum replacement Lifetime of 35 years
   b) Better Noise attenuation while operating in tunnels and in elevated sections to meet the criteria of ERTS RS clause 2.17.
   c) Fire compatibility requirements as per EN 45545 - HL 3 category and meet the requirements of ERTS RS clause 2.26.

16) There shall not be any drain holes on the floor sides that allow any exterior noise, vermin, water, and dust from exterior of the saloon under frame to saloon during door close condition.

17) Each door leaf shall have a glass window meeting the requirements of clause 3.4.9 of ERTS RS. Replacement of door glass window shall be possible without removal/detachment of door leaf from the train.

18) No single point failures in door system shall immobilize the train under any circumstances. Sufficient redundancies shall be provided by the Contractor in the design.

19) Single point uploading of software and single point downloading of fault data per train shall be ensured for all the Door control units in the rake. The requirements of ERTS RS clause 14.11 shall be met.

20) Real time remote downloading of logs for door system shall be available as per ERTS RS clause 14.11 and 14.13.

21) A microprocessor-based saloon Door Controller Unit (DCU) shall control each pair of saloon door leaves and shall be an integral part of door control assembly. The door controller unit of a proven design shall be equipped with self-diagnostic functions and shall communicate with TCMS on all the events, faults, and variables of the door system. Power supply to DCUs shall be in such a loop that redundancy can be ensured in case of breakage / disconnection of any one power / network wire. The Contractor shall ensure that the system shall not be affected in single point failure. Details shall be submitted for review of CMRL.

22) The door position measurement and detection shall be accurate and real time measurement of the distance moved by each leaf. Details shall be discussed and

finalized during design stage. All door close and all door latching shall be independently monitored through two separate independent circuits. All door closing function and all door latching functions shall be separately monitored at the train level.

23) Door System shall be SIL 2 compliant at train level for all the safety related functions including the following:
a) Complete system (both Hardware & Software)
b) Door unlocking when train not at standstill,
c) Door opening at standstill on platform side,
d) Train departure with an open door,
The Contractor shall submit relevant details for SIL levels for above. The SIL levels as above shall be validated and shall ensure that the train shall not move from a station unless Train doors & PSD are closed and latched unless intentionally permitted by the concerned operator or OCC controller or DCC controller. Details shall be worked out during design stage. The details certified for SIL 2 rating shall also be verified for CMRL satisfaction during the type testing.

24) Door Operation Noise produced by simultaneous operation of all saloon doors on one side of the car shall not exceed 75dBA during the sliding operation and 78 dBA for the locking & unlocking conditions, measured on the fast meter scale. This should be measured at all points in the car 300mm from the doors and 1000mm above the floor.

6.4.3. Door windows (ERTS RS 3.4.9.2)

1) All door windows shall be sealed to prevent the ingress of draughts, water and foreign matter. Structural requirements for rail vehicle structures shall be design and tested conforming with GM/RT2100, UIC 566, EN 12663-1.

2) Door windows shall be designed to minimize solar gain and provide a level of thermal insulation consistent with the requirements of the air conditioning system.

3) Door windows shall comprise two panes of toughened non-shattering glass separated by an air gap hermetically sealed against ingress of moisture and internal misting.

4) Replacement of door window glass shall be possible without removal of door leaf.

6.4.4. DOOR OPERATION (ERTS RS 6.4)

1) Each passenger door shall have two stable states:
a) door open
b) door closed and latched.

2) In the door open state, the passenger door shall fully open to allow free passenger movement in & out of the car but shall be capable of being closed and latched by the operator in non-UTO operations and by the signaling system in UTO operations.

3) In the door closed and latched state, the passenger door shall be proved closed (detection of the physical position of the passenger door) and proved latched (detection of the mechanical latching device), to the rake operator as well as the rake control system, to the RSC consoles of OCC, BCC & DCCs.

4) The Contractor shall ensure that the passenger doors are not affected by lateral or longitudinal displacement by normal wear of any part of the passenger door in service. Wear and/or damage as a result of the lateral or longitudinal movement of the doors shall be repaired and/or replaced by the Contractor at its own expense.

5) The device to detect and prove that passenger doors are fully closed and latched shall be capable of detecting any obstruction causing a minimum gap of 10 mm per doorway and prevent the door proving indication from being achieved, in accordance with EN-14752 Latest version. This detection obstacle function shall be achievable for a minimum gap of 10 mm per doorway all along the height of the door.

6) Crew Switches:
    d) Crew Switch to open and close coach side doors electrically shall be provided as per below requirement: One door location per each interior side of the car (total two numbers in each car interior) One door location per each exterior side of the car (total two numbers in each car exterior). The exterior crew switches shall be accessible from both track level and from platform level.

    e) The Operator's keys and maintenance keys shall activate these crew switches.
    f) Crew switches shall be provided at doorways. Exterior crew switches shall be waterproof. The identification details on the crew switches shall be properly engraved on its surface to withstand regular train cleaning.
    g) Both interior and exterior switches shall be enclosed to blend with both interior and exterior finishes
    h) The Contractor shall submit for approval a proposal that details the recommended locations of crew switches
    i) The crew switch functions shall always operate, unless the car battery is discharged or disconnected.
    j) The location of exterior crew switches (2 numbers in each car) shall be decided during interface with PSD Contractor and same shall be submitted for CMRL approval.

5) Door System Indicators

a) Door Closed and Opened Indicators shall be provided on the emergency operator's desk.
b) The door closed interlock described in this Chapter shall provide signals for door open/closed indicators in the emergency operator's desk and to the TCMS DDU, OCC, BCC & DCCs.
c) Each doorway shall be provided with exterior & interior door open LED indicators. Each car shall be provided with external Car indication lamp on each car lateral side. The functionality of individual door's exterior & interior door open LED indicators & external Car indication lamps shall be complied as per the requirements of ERTS RS clause 8.4.3 and 8.4.4. The Contractor shall present the design for CMRL approval during design review.
d) Door open / closed status shall be communicated to the train Operator through indicator buttons & TCMS DDU. It shall also be displayed remotely in RSC consoles of OCC, BCC & DCCs. It shall be able to identify malfunctioning doors individually on the train's DDU and in RSC consoles of OCC, BCC & DCCs as defined in ERTS RS clause 14.11 & 14.13.
e) Doors Out of Service Indicators shall be provided on the car interior and exterior that denote that the door panel(s) of a cut-out door operator is (are) out of service (as defined in ERTS RS clause 8.4.4). These shall be integrated with the car's aesthetic styling. The type, style, and location of these indicators shall be submitted for approval.

6.4.5. DOOR CONTROL (ERTS RS 6.5)

1) Doors shall be electrically operated from 110V DC supply through train line wire. The door system shall continue to operate correctly with the car battery voltage supply range between 77~132VDC as specified in EN 50155. The passenger door control system shall ensure the safe operation of the passenger doors on the rake and shall be classified as a Safety Critical system and shall meet the requirements mentioned below.

2) The operator shall have full use of all passenger door controls in the Driver desk. These controls shall be activated when the master control switch is not in the "OFF" position and when the auxiliary supplies are available.

3) The train operator shall be provided with the following passenger door controls at each emergency operator's desk and shall be ergonomically located to facilitate door open operation:
   a) One "Right Door Open" illuminating-cum-control pushbutton.
   b) One "Left Door Open" illuminating-cum-control pushbutton.
   Illumination of the "Door Open" pushbuttons shall indicate that the specific train side door opening enable signal from the Signaling system is available.

4) The train operator shall be provided with the following passenger door controls per each emergency operator's desk and shall be ergonomically located to facilitate door close operation.
    a) One "Right Door Close" illuminating-cum-control pushbutton,
    b) One "Left Door Close" illuminating-cum-control pushbutton.

5) The illumination of the "Door Close" pushbuttons shall indicate that all the passenger doors per train side are proved closed and mechanically latched.

6) Passenger door control circuits shall have two circuits specific to each side of the car. One circuit shall monitor closing & opening of all doors per each side of the car. Another circuit shall monitor Locking & Un-locking of all doors per each side of car. Both Door control circuits of each train side shall be designed to be totally independent from each other and shall be independent from both door control circuits of opposite side of train, ensuring that failure of any door control circuit on one train side shall not affect the door operation on other train side.

7) All pushbuttons shall be connected in the circuit to ensure that no single false feed or earth fault can activate the passenger doors without the action of the operator or without signaling system authorization, even though all the prerequisite parameters are available.

8) Passenger door control circuit shall employ Hard Wired feed and return rake control wires. The feed and return rake door open control wires, on every car, shall be electrically bonded together at all times unless a legitimate door open signal is activated.

9) To change the state of the passenger doors on the rake from "Closed and Latched" to "Open", the following actions shall be required:
    a) the rake shall be proved stationary, by the signaling system or the traction equipment in the event of an signaling system failure, and with the brakes applied.
    b) the correct commands are received from the signaling system or rolling stock system, including the correct side for the passenger doors to be opened.
    c) Door opening commands are received from the signaling system or rolling stock system for opening only on the platform side of the rake.

10) In "Automatic" mode, the door open command shall be activated automatically, provided the above ERTSRS clause 6.5.9 requirements have been achieved. A switch shall be provided, preferably at the side of the driving console. In ATO mode, the automatic door open command may be overridden by operating this switch. Operation of this switch shall be monitored by TCMS.

11) In a manual driving mode, the operator shall be required to depress the “Door Open” illuminated pushbuttons, which correspond to the correct station platform side. The lamps shall only be illuminated when the signaling system permits the door open controls to function.

12) The door control commands shall be as follows.
    a) Doors open - provided that the prerequisite parameters of ERTS RS clause 6.5.9 are available, the operation of door opening shall be performed automatically. All the passenger doors on the corresponding train side shall synchronously open. All passenger doors on the opposite side at the rake shall remain “Closed and Latched”.
    b) Doors closed - the passenger doors shall be capable of being closed without the prerequisite parameters of ERTS RS clause 6.5.9 being available. The operation of the “Door Close” pushbutton shall broadcast an audible warning in each car’s saloon, signifying that the passenger doors shall subsequently close. After a pre-set time, adjustable between 0 and 5 seconds, following the finish of the audible warning, the control system shall synchronously “Close and Latch” all the passenger doors on the corresponding side. The location of the audible warning devices within and outside the saloons and the output sound pressure levels shall be such that they are clearly audible by passengers in the rake and passengers standing on the platforms. It shall be possible for CMRL to adjust the type of door warning alarm tone based on passenger feedback.

13) A visual indication of the door’s status, by means of the “Door Close” illuminated pushbuttons, shall be provided to the rake operator. The indicators shall be available at all times and shall be controlled by means of a monitoring circuit that illuminates the lamps when all the following conditions are detected:

    a) all the passenger doors are closed and mechanically latched.
    b) both the Detrainment doors are closed and latched.
    c) None of the passenger door emergency release devices are activated.

14) The monitoring circuit shall be designed to incorporate a Hard-Wired rake control feed and return loop, supplied from the controlling emergency operator’s desk only and check the continuity of all door detection devices. The circuit shall provide a “circuit validity” indication on the emergency operator’s desk and an associated exterior indication on each side of each car as per ERTS RS clause 8.4.3.

15) The monitoring circuit shall also be interlocked with the driving controls, to ensure that the loss of continuity of door monitoring circuit shall inhibit motoring and apply a full-service brake once the rake has proved to be stationary.

16) The door operating mechanism shall be housed within the saloon above the doorway lintels. The design shall provide ease of access for maintenance. The complete mechanism shall be modular and mounted on a rigid frame so that it can be adjusted in situ for alignment and be removed as an integral unit from the car. The entire door mounting hardware and door actuation hardware must be readily accessible for adjustment and removal. The Contractor shall submit a detailed door operating function matrix for CMRL's review and approval.

17) The opening and closing of doors shall be possible from an operative driving console in train, from RSC consoles of OCC, BCC & DCCs. However, during UTO GoA4 operating conditions, all the door controls shall be controlled automatically by Signaling system. The door controls shall be located on emergency operator's desk, suitably located on side end position between the end door & front end. This control Push Buttons shall be suitably encapsulated during GoA4. The location shall be proposed by the Contractor and subject to approval from CMRL.

6.4.6. PASSENGERS ACCESS PROTECTION

1) An obstacle detection system shall be capable of detecting an obstruction as specified in ERTS RS Chapter 6.4.5.

2) If a passenger door whilst closing should be obstructed by an object, then the door movement shall pause to enable removal of the obstacle, then another attempt to re-close will follow. The passenger door shall attempt to re-close 3 times, which shall be adjustable. After each attempt a partial 50 to 200 mm reopening of each door leaf shall be carried out before next attempt.

3) In the event that the passenger door fails to close following the three attempts, further door movement shall cease on the offending passenger door and door will remain in full open position. Once such a passenger door has stopped movement, following this condition, further door closure shall require another activation of the corresponding "Door Close" command without the necessity to re-open & close all other doors of train.

4) Door closed, latched and obstruction sensing information shall be sent from each car in the rake to TCMS DDU, RSC consoles of OCC, BCC & DCCs.

5) The type and frequency of obstruction sensing information and failure reports to be sent to the TCMS, OCC & DCC will be determined during design review.

6.4.7. PASSENGERS ALARM AND EMERGENCY SYSTEMS

Passengers alarm

1) Two locations on each side of the coach, total four numbers per car, (locations to be determined during design review) shall be fitted with an internal manual passenger alarm. Refer to ERTS RS clause 13.10.

2) Activation of any push button within a car shall cause a visual indication and an audio alarm on the emergency operator's desk. In UTO mode of operation, Visual indication and audio alarms shall be provided at RSC consoles of OCC, BCC & DCCs.

3) An indication shall also be provided on the exterior of each side of each car to indicate that a passenger alarm has been activated in that car.

4) Any event of a passenger alarm activation when the rake is within the station zone or out of the station zone shall not prevent the rake movement.

5) Once the train operator or OCC or DCC has acknowledged the call, he/she shall be capable of initiating a communication link with the activated alarm unit in a full duplex communication.

6) A Hard-Wired passenger alarm loop circuit shall be provided to monitor the status of each passenger alarm unit.

7) The circuit shall ensure continuity throughout all non-operated alarms, and the loss of continuity, due to an operated alarm, or failure of the circuit shall provide an audio-visual alarm in TCMS and in RSC consoles of OCC, BCC & DCCs.

8) Further rake movement shall be inhibited until the activated alarm(s) has been reset.

9) In the event of a failure that prevents either the passenger alarm unit from being reset or a fault of the monitoring circuit, then a sealed isolating switch (located in the emergency operator's desk) shall be provided to enable the operator to isolate the passenger emergency alarm circuit and move the rake.

10) The isolating switch shall override the passenger alarm monitoring circuit, as far as the controlling emergency operator's desk is concerned.

11) Activation of the passenger alarm isolating switch shall enable the service brakes to be released and traction power to be available, although controlled under abnormal operating conditions.

Internal Emergency Egress Device

1) All passenger doorways (locations to be determined during design review) on each interior side of each car, shall be fitted with an internally mounted, manual emergency egress device, which shall have two positions 'normal' and 'emergency release'.

2) The Emergency Egress Devices shall be concealed inside the door panels, so that access to Passengers shall be avoided.
3) Provision shall be provided for the operations & maintenance staff to activate the emergency egress device by using the door access key.

4) When the device is in the 'normal' position the passenger door shall respond normally to all control commands specified.

5) After moving the internal emergency egress device to the 'emergency release' position, it shall be possible to mechanically un-latch the associated passenger doorway and enable the door leaf's to be manually opened from both inside and outside.

6) In emergency release position, the opening of the passenger doors shall be possible by the effort of one person manually. Opening the passenger doors should only be possible once the rake is proved to be stationary, and the brakes applied.

7) Once the device has been activated to the 'emergency release' position, the device shall be mechanically latched in that position, and shall require the use of the reset key to reset back to the 'normal' position. The reset function shall also be available from TCMS / OCC.

8) In the event that the passenger doorway has been opened by activating the emergency egress device, the door leaf shall be capable of being manually set to 'close and latch' condition.

9) The operation of internal emergency egress device shall be possible during train switched off condition also.

External Emergency Passenger Door Release Device

1) Two passenger doorways on each exterior side of the car, total 4 doors in a car, shall be capable of being opened manually, without the assistance of power, using an externally mounted bi-stable manual emergency door release device to release the mechanical door latch.

2) The emergency passenger door release device shall operate in two positions, 'normal' and 'emergency release'.

3) The emergency passenger door release device shall be capable of operation from both the track level and station platform levels.

4) When the emergency passenger door release device is in the normal position the passenger door shall respond normally to all control commands.
5) Moving the external emergency passenger door release device to the emergency release position shall mechanically un-latch the associated passenger doorway and enable the door leaf's to be manually opened from both inside and outside.

6) The opening of the door leaf's shall be possible manually by the effort of one person.

7) Once the emergency passenger door release device has been activated and the door leaf's are open, the emergency passenger door release device must be reset manually to restore its normal position.

8) The location of external emergency passenger door Release Device (2 numbers on each side of each car) shall be decided during interface with PSD Contractor and same shall be submitted for CMRL approval.

9) The operation of external emergency egress device shall be possible during train switched off condition also.

Long Stop Request:

1) Long stop request Push button provision shall be made available near the Wheelchair area inside the coach. This provision shall be available on both sides of the train (1 no per DMC car).

2) Once this button is pressed in any UTO & non-UTO modes, the corresponding doors shall be kept open for longer time increasing dwell time of the train.

3) RS Contractor shall suitably interface with STC Contractor to achieve this function.

Inter-operability of Keys:

1) The Rolling Stock Contractor shall share the details of the Operator key/keys of the rolling stock for door opening, from outside and inside and for manual door isolation. The details shall include the profile of the key, available manufacturers, License/ approval for the manufacturing or procurement of the particular keys etc. The details shall be adequate and shall authorize the Platform Screen Door Contractor to manufacture or procure the key in a rightful legal manner for usage in CMRL PSD system. PSD Contractor shall procure/manufacture the key and use in PSD system,

so that Operators can use the same set of keys for similar functionalities in RS door and PSD door. Necessary approval shall be taken from CMRL before the procuring/ manufacturing.

6.4.8. Thresholds (ERTS RS 3.4.8)

1) Door thresholds shall be provided at all side and end doors. Door thresholds shall be designed and constructed to prevent the entry of water between the threshold and door, including entry of water when the car is subject to the horizontal spray jets of the car washing facility.
2) The height of the side door threshold shall be 3.2 mm maximum above the top surface of the finished floor, with a maximum slope toward the outside of the car of 25 mm in 305 mm.
3) The door threshold may extend beyond the nominal car width at floor height by not more than 38 mm. Beyond the doorway, on both sides of the doorway, the extension strip shall gradually slope towards the sidewall to form a horizontal ramp. The threshold extension shall be designed, constructed and installed to shear off if impacting any wayside structures without causing additional damage to the car structure.

4) CMRL may request the Contractor to provide a segmented rubber gap filler at the outer edge of the threshold to reduce the horizontal train to platform gap. The depth of the gap filler (if required) shall be finalised during preliminary design stage. If it is requested, it shall be provided by the Contractor at no additional cost to CMRL.

6.4.9. DOOR SYSTEM INTERLOCKS AND BYPASS SWITCHES (ERTS RS 6.8)

1) All passenger doors shall incorporate a mechanical latch, which automatically engages after both the passenger door leaves are fully closed, preventing the passenger doors being opened by the passengers by normal means.
    a) No spurious electrical signals shall cause any door to be un-latched or opened. The Contractor will be required to provide a comprehensive Safety Audit to prove this point to the satisfaction of CMRL.
    b) There shall be no single point failure of equipment or wiring, or two-point failure with one failure undetected, which would cause a door to open without being commanded.
    c) The door controls shall be interlocked with the train's zero speed circuitry so that the doors cannot be opened until the train is stopped. However, loss of ATC power at zero speed shall not inhibit door operation. Zero speed signal shall be hard wired.

2) The bypass controls shall be provided to by-pass operation of any defective doors by the train operator through TCMS DDU. Provision shall also be provided in from RSC consoles of OCC, BCC & DCCs for by-passing a faulty door, remotely.

3) The mechanical latch shall be released automatically when the passenger door open

controls are legitimately operated or when the local emergency release is operated.

4) Each passenger doorway shall be provided with a manual door lock-out device both inside and outside of each doorway, which mechanically locks-out the specific doorway preventing further operation and isolates the power supply & door monitoring interface to the pair of defective door panels, thus preventing the passenger doors from being opened by normal means. In the event of a failure or during any delayed operation of any specific doorway, then this manual door lockout device shall be operated by train operator / station controller to enable further rake movement. These internal & external manual doors' lock-out devices per doorway shall be accessible to the operation & maintenance staff through operator key mechanism. It shall be possible to operate these manual doors' lock-out devices without opening any door panels.

5) These manual door lock-out devices shall be inaccessible to passengers and access to be gained only by means of the operator key. The position of exterior manual door lock-out device shall be planned during interface with PSD supplier and same shall be submitted for CMRL approval.

6) In the event of a failure of the door monitoring circuit that causes loss of continuity in the train in non-UTO modes of operation, then a sealed isolating switch shall be provided to operate in emergency operator's desk to enable further rake movement. The isolating switch when activated shall isolate the door-monitoring circuit interface from the driving controls, enabling the brakes to be released and traction power to be available when operating in a manual-driving mode only. Operation of this isolation switch shall be communicated to RSC consoles of OCC, BCC and DCCs.

7) Activation of the isolation switch shall illuminate the cab indicators to signify that a door is isolated. Indication of the exterior door indicator lamp shall continue to show the correct status of the doors on that car as per clause 8.4.4; consequently, the exterior lamp of the respective offending car where the fault occurs shall remain illuminated as per ERTS RS clause 8.4.3.

8) Operation of a sealed isolating switch shall be reported in the TCMS logs.

9) In the event of a failure of the door monitoring circuit that causes loss of continuity in the train in UTO operation, then it shall be possible to remotely isolate the door monitoring circuit from RSC consoles of OCC, BCC & DCCs to enable further rake movement in UTO operation. Train movement in this condition shall be authorized from OCC/BCC after due verification of CCTV footages that all doorways are closed in the particular train. Indication of the exterior door indicator lamp shall continue to show the correct status of the doors on that car as per ERTS RS clause 8.4.4; consequently, the exterior lamp of the respective offending car where the fault occurs shall remain illuminated as per ERTS RS clause 8.4.3.

6.4.10. UTO OPERATION (ERTS RS 6.10):

The design of Passenger Doors System and its relevant components in train shall support for the UTO / GoA4 in the CMRL Phase 2 corridors defined in Chapter 1. Trains shall be operated in GoA4 / UTO mode from the initial stage of commissioning and revenue operations. Hence all the feedbacks, 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. The Contractor shall submit the details of controls to be provided in OCC & DCC for review and approval of CMRL.

6.4.11. Platform gaps (ERTS RS2.2.8)

The rake shall be a high-floor design, with level boarding from platforms. Wheelchair and mobility impaired boarding shall not require the use of bridging or lifting devices. The horizontal gap between the passenger door thresholds and platform edge and vertical gap between the passenger door thresholds and platform edge details are mentioned in SOD (Clause 2.7.1). In no cases (including the worst operating conditions) shall the top surface of the horizontal threshold of the car be lower than the top edge of the platform.

ADDITIONAL CLEARANCE FOR PLATFORMS ON CURVES
The additional clearance for platforms on curves is to be provided as shown at appendix-5.
Note:
i) As the minimum radius of horizontal curve for station platform line is 1000 metres, there will be no super elevation and gauge widening at stations on passenger platform lines.
ii) Platforms located in curve shall be fitted with gap filler/ or suitable arrangement wherever necessary to maintain the Maximum stepping distance (between platform and car body floor) at platform as 75 mm in Horizontal direction and 45 mm in Vertical direction. The gap filler shall be of elastic nature and flexible to allow train contact without any adverse effect on passenger safety and stability of train.

Horizontal distance from Centre of track to face of passenger platform coping/PSD threshold shall be

Condition	Value
For Elevated, At Grade section,	Minimum value: 1515 mm Maximum value: 1520 mm
For Underground section	Minimum value: 1510 mm Maximum value: 1515mm

6.4.12. Interfaces

6.4.11.1 With TCMS

1. The door controller unit shall have communication link with TCMS. TCMS shall also be interfaced with the related circuits and interlocks so that all the door related status and commands are logged. See Appendix C for full details of the division of responsibility between the Contractor and Signalling & Train Controls.
2. TCMS Architecture (ERTS RS 14.2)
3. Ethernet based: The network communication technology to be adopted for all TCMS data communication links and subsystem communication interfaces shall be based on Ethernet (100 Base TX or better).
4. EMI Immune: Train networks shall be proven train data communication links that are immune to EMI / EMC and harmonics generated by traction equipment or generated from external environment of train. Suitable physical bus interfaces, to ensure error-free and high-speed data transmission shall be provided.
5. Dual Homing at End devices shall be achieved as per ERTS RS 14.2.4.
6. Regarding Door-TCMS interface refer Ethernet consist network Specific Requirement (Annexure-2), General ICD(Annexure-3), DCU-TCMS ICD (Annexure-4) and Safety Data Transmission Protocol (Annexure-5) of section 10 of this document and compliance of the same to be provided.

6.4.11.2 With On-Train Public Address System:

The door control shall be suitably interfaced with on train Public Address System to achieve the following:

1) As per ERTS RS 2.3.4, Automatic opening of doors on the appropriate platform side(s) when the train is berthed. When the dwell time has elapsed, the Trains doors shall be closed automatically with PA and chimes prior to the door close operation. Necessary information of doors shall be communicated to Rolling stock for operation of doors and Passenger announcement.
2) As per ERTS RS 13.8.8, A pre-recorded announcement or tone, advising passengers while the doors are opening and when doors are closing shall be broadcasted. These announcements shall be broadcasted by the communications system, triggered by signals from the door control system and signalling door information.

6.4.13. Interface with Platform Screen Doors (PSD)

The Contractor shall ensure compliance to the following interface requirements between Passenger Saloon Doors and Platform Screen Doors:

1) The two door leaves at each passenger doorway shall be synchronously controlled and shall provide a door clear opening width of equal spacing of not less than 1.4 m. The location and size of the door panels are important for the PSD equipment supplier.
2) The passenger door pitch shall be equally spaced over the length of the rake. The co ntractor shall submit the door layout design for approval by the project manager.
3) The Contractor is advised that platform screen doors (PSD) will be installed under a s

eparate contract. The Rolling Stock Contractor shall coordinate with the designated c ontractors for PSD, Signalling & Train Control and Telecommunications to provide the necessary interface information data including but not limited to the following:

a. ATP/ATO/UTO signals to synchronise the opening and closing of PSDs with opening and closing of train doors. The Rolling Stock door / PSD open/close synchronisation shall not exceed 0.5 sec. The Contractor shall provide all support necessary to Signalling & Train Control to achieve this target.
b. Station dwell times
c. Door opening and closing announcements
d. Signals for "Train Arriving" and Train Leaving" announcement
e. Any other information necessary for the proper design, interface, interface and operation of the PSDs.

Different failure scenarios of PSD as well train doors including information to passengers shall be considered. The details shall be submitted and finalised during design phase.

6.4.14. Bill of Material (BOM)

1. All components and sub-components used in Passenger Door system shall be highly reliable and should have been used and established their satisfactory performance and reliability on at least three mass rapid transit systems in revenue service over a period of three years or more (in each MRTS)
2. The subcontractor shall submit the complete Bill of Material (BOM) for Passenger Door system including door panels, door electronics & controls, switches, mechanical drives, along with the list of Models /make and list of projects in which these items are used, along with the technical offer.

6.5. Weight

1. To minimize energy costs, great importance will be placed on achieving practical designs of minimum car weight whilst meeting specified structural and performance requirements. Accordingly, the weight of the Complete Passenger Door System shall be kept to a minimum and shall not exceed 165kg including all accessories.
2. The subcontractor shall submit details of estimated weights and center of gravity for Passenger Saloon Door System along with the technical offer.

6.6. Noise & Vibration

Subcontractor should devote particular attention to the design of passenger doors to get quiet operation condition and should ensure that the transmission loss is above the specified levels. All equipment should be designed to eliminate the rattling and resonance at all speeds up to maximum running speed and aerodynamic forces caused by ambient wind,

train motion, or the passage of other trains.

The equipment, sub-assemblies and components shall also comply with the requirements laid down in 'Guidelines for Noise and Vibrations for Metro Rail Transit Systems' issued by the Ministry of Railways, Govt. of India (ERTS-RS Appendix D4).

Sound reduction index Rw of the door panel assembly measured as per ISO 10140-2 should be equal to or larger than 28 dBA. The estimated Rw value shall be indicated in the technical offer.

Door Operation Noise produced by simultaneous operation of all saloon doors on one side of the car shall not exceed 75dBA during the sliding operation and 78 dBA for the locking/unlocking, measured on the fast meter scale. This should be measured at all points in the car 300 mm from the doors and 1000 mm above floor level. (ERTS-RS 6.3.26)

The complete Passenger Door system 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 equipments, sub-assemblies and components shall be subjected to shock and vibration test as per IEC61373.

6.7. Software

6.7.1. General Software Management

The sub-contractor shall provide, but not restricted to the following requirements, for general software management:

1. Diagnostics & Maintenance Software (10 copies if license is limited)
2. User Manual for Diagnostics & Maintenance Software
3. Two back-up copies of application (executable) software whenever software change is implemented
4. API (Application Programming Interface) / SDK (Software development Kit) documentation for necessary interface if any
5. Test Software specified in ERTS-RS Chapter 20
6. Uploading tools of executable software and it's manual
7. Software Training satisfy CMRL's needs and expectation.
8. Provision to download the desired data for the entire train including data logged in sub-system (Passenger Door System) through TCMS port/remote wireless by Maintenance terminal PC.
9. Single point uploading and data downloading through TCMS port/remote wireless should be provided by the subcontractor.

10. Provision for other diagnostic access by maintenance staff via the notebook computer.
11. Provide all necessary software & tools for downloading the data, modifying parameters settings/uploading parameters, uploading software etc. through its port and also through TCMS port/Wireless by Maintenance Terminal PC.
12. Provide the necessary software tool to read the downloaded trace data through its port and also through TCMS port & remote wireless access by Maintenance Terminal PC.
13. Necessary software for all diagnostic functions (3 sets minimum).

6.7.2. Software management and control

1) The sub-contractor shall implement the principles states in ERTS-RS Section 20 to manage the production of software systems and products throughout the Project.
2) These principles shall apply to sub-contractor involved in software development, modification, configuration, re-use and adoption of COTS software.
3) The goals of software management activity are to obtain software which is Fit for purpose & Safe.
4) The sub-contractor shall cover all the technical, safety & quality and managerial aspects of the software systems as per ERTS-RS Section 20 and submit the compliance.

6.8. EMC Requirement

1. To help avoid undesirable effects upon external equipment, or upon other installations along the right-of-way, caused by onboard car systems, the electromagnetic emission limits specified in ERTS-RS shall not be exceeded. The requirements of EMC EMI requirements referred in clause 2.18, 10.19, 17.5.4.9, 17.11.17 & ERTS-RS Appendix C shall be met.

2. 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 procedures for functional safety and engineering verification.

3. The sub-contractor shall submit EMC control plan which contain sufficient information to demonstrate clearly the sub-contractor’s proposals for achieving EMI/EMC in the design, manufacture, testing of the system and evaluate and ensure that the requirements of the electromagnetic compatibility and interference as specified in the ERTS-RS for BEML approval.

4. The sub-contractor shall submit an EMC Control Plan for the BEML’s review and acceptance and it shall include an EMC analysis report including various measures to reduce conducted, induced and radiated emissions to acceptable levels as specified by the relevant international standards and also meet the ERTS-RS requirements.

5. The plan shall specify measures to increase immunity of the subsystems in scope of supply. All train borne equipment on the vehicle shall be designed and constructed to fulfill the requirements of EN 50121-3-2 (Equipment level), EN 50121-3-1 (Train Level) and any standards where applicable.

6. Emission (radiated and conducted) and immunity tests for all individual equipments provided by sub-contractor shall be performed under normal operating condition & degraded operating condition according to EN 5012-3-2 by sub-contractor. The test specification and test report shall be approved by BEML.

7. Sub-contractor may need to carry out any further test if required by CMRL/BEML.

8. Train Level EMC test as per EN 50121-3-1 and ERTS-RS will be performed by car-builder or nominated testing agency. In case of any EMI/EMC issue on the sub-contractor's (Passenger Door system) aggregates, the mitigation measures shall be designed and implemented by sub-contractor at no additional cost & no schedule impact to BEML.

6.9. RAMS requirements

The sub-contractor shall comply every aspect with the requirements of RAMS (Reliability, Availability, Maintainability and Safety) as per ERTS-RS , ERTS-CMC & EN50126. During warranty period (standard purchase warranty), the values of the RAMS target shall be calculated from the records of all faults and service failures. In the event that the target is not achieved, the supplier shall, at his own expense, take whatever action necessary to meet the target specified. Also, the sub-contractor shall provide all information related to the RAMS requirements. The sub-contractor shall comply with, but not limited to, the following requirements

6.9.1. RAMS Deliverables

The sub-contractor shall submit the following RAMS Deliverables as a minimum as per the enclosed format during PFDR and FDR.

1) FMECA (Failure Mode, Effects and Criticality Analysis)
2) List of LRU
3) RAM Analysis (MDBCF, MDBCSF & MTTR)
4) Maintenance Schedule (Corrective Maintenance, Preventive Maintenance, Overhauling Maintenance)
5) Reliability Block Diagram (RBD)
6) Hazard Analysis
   a) Subsystem Hazard Analysis (SSHA)
   b) Interface Hazard Analysis (IHA)
   c) Operating Hazard Analysis (OHA)
7) Fault Tree Analysis
8) Safety Analysis
9) Life Cycle Cost (Corrective Maintenance, Preventive Maintenance,

Overhauling Maintenance)

Sub-contractor shall submit the above RAMS deliverables in the format shared by BEML as a minimum requirement.

6.9.2. Reliability, Availability and Maintainability: General

1. Reliability, Availability and Maintainability (RAM) requirements and goals shall be developed in terms of Mean Distance Between Failures (MDBF), percentage Availability and Mean Time to Repair (MTTR). The Contractor shall perform RAM analysis up to the point of interface with other Contractor's systems.
2. The Subcontractor shall comply with the guidelines of EN 50126 (all parts), IEC 60300-1, IEC 60300-2 and IEC60571 for electronic equipment, and IEC 60300-3-5 or similar international standards in meeting the reliability, availability and maintainability requirements of equipment.
3. The Subcontractor shall submit Reliability, Availability and Maintainability Plan. The Contractor shall verify, after system design have been completed, that the reliability, availability and maintainability requirement will be met.
4. The Subcontractor shall demonstrate by quantitative methods achievement of the specified levels of reliability for the train and specific individual items of equipment.
5. An evolving reliability model consisting of reliability block diagrams and probability of success equations shall be developed and submitted to the BEML/GC-CMRL for acceptance. This model shall show the relationships required for system and equipment to operate successfully. The reliability block diagrams shall include all elements essential to the successful performance of the system and the interrelationships and interface of these elements.
6. Reliability apportionment and prediction analysis shall be in accordance with established techniques or standards, which will be submitted for acceptance by the BEML/GC-CMRL. The analysis shall provide predictions for each major equipment and sub-system. Predictions shall be based on actual commercial/revenue service results for identical equipment operating under service conditions and duty cycles equivalent to Chennai Metro Rail system, or more severe. The analysis shall be carried out in parallel with the design of the train. The relevant apportionment and prediction figures shall be part of the design submission documents for the individual equipment, sub-system and system.
7. Reliability Apportionment and Prediction Report shall be completed prior to build commencing and reports shall be submitted at this stage for acceptance by the Project Manager, who reserves right to require the Contractor to carry out field data collectionto verify the reliability model.
8. The design shall ensure that passenger deboarding cases in operational trains are bare minimum and avoided to the extent possible

6.9.3. Reliability Analysis

1. The reliability data shall be based on actual operating information for the equipment. In addition, the subcontractor shall submit a list of typical train withdrawal scenarios for

review and acceptance by the BEML. The list shall include all anticipated failure scenarios, which can affect safety, punctuality and passenger comfort. Also, a list of typical train withdrawal scenarios should be based on the reliability analysis.

2. The Reliability Block Diagrams (**RBDs**) and prediction of reliability performance shall be submitted to BEML for acceptance. The reliability block diagrams shall include all elements essential to the successful performance of the system and the interrelationships and interface of these elements.
3. The subcontractor shall submit reliability prediction to demonstrate by quantitative methods above the achievement of the specified levels of reliability for the scope of supply.

6.9.4. Reliability Target

The MDBCF and MDBSF per 3 car train-set of the Passenger Door system shall meet the following table, considering 150,000 train-km of annual running mileage.

The following are the target values of MDBCF for Door system.

Sl No	System / Equipment	MDBCF target (Equip-km)	Failure Rate (1/MDBCF)
1	EDCU	50,00,000	2.00E-07
2	Motor assembly	7,00,00,000	1.43E-08
3	Coupling assembly	7,00,00,000	1.43E-08
4	DLS	8,00,00,000	1.25E-08
5	DCS	8,00,00,000	1.25E-08
6	EDS	4,00,00,000	2.50E-08
7	LOS	4,00,00,000	2.50E-08

Equipment	**Reliability Demonstration Period**			
	After 6months to 12months from start of revenue Service		**After 12 months from start of revenue Service**	
	MDBCF (train-km)	**MDBSF (train-km)**	**MDBCF (train-km)**	**MDBSF (train-km)**
Passenger Door System	3,87,500	11,62,500	4,68,750	18,75,000

The Reliability performance shall be assessed by the following measure:

$$\text{MDBCF} = \frac{\sum \text{Traveled kilometer per train-set}}{\sum \text{Number of } \textbf{relevant Failures}}$$

Where,

Mean Distance Between Component Failure (MDBCF): The MDBCF 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 system to the total number of relevant failures occurring within the population identical items.

Please note the above mentioned MDBCF targets shall be followed as a minimum. It is the responsibility of sub-contractor to submit the MDBCF of their equipments for review of BEML/CMRL.

$$\text{MDBSF of Door systems including draft gear} = \frac{\sum \text{Traveled kilometer per train-set}}{\sum \text{Number of } \textbf{Service Failures}}$$

Where,

Mean Distance Between Service Failure (MDBSF): The MDBSF 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 system to the total number of service failures occurring within the population identical items

6.9.5. Availability Requirements

Availability Targets: The trains supplied shall achieve minimum average availability of 95% for fleet of trains. Penalties for not meeting Availability targets shall be imposed on the sub-contractor as per ERTS-RS & ERTS-CMC.

6.9.6. Maintainability Requirements

1. **Design requirements**
   a. The design of all components will be such that maintenance is reduced to a minimum, substantially improving service intervals and components will be so arranged that those requiring attention are easily accessible, and readily removable. All equipment should be designed using the Least Replacement Unit (LRU) principle whereby the repair of a fault merely involves the replacement of a faulty module.
   b. The design shall also minimize Mean Time To Repair (MTTR) and costs throughout design life. MTTR is the ratio of cumulative time, including the access time expended during a time interval to the total number of relevant failures.
   c. The LRU replacement should be less than 30 minutes.

d. The subcontractor shall also comply with the maintenance requirement of Clause – 18.7.3 of ERTS-RS.

6.9.7. Maintenance Interval

Session	Interval (Minimum)	Manpower and downtime requirements (Maximum)	
		Downtime	Expected staff
A Service Check	15 days or 6,250km	2.5 hours	8 persons per train
B1 Service Check	45 days or 18,750km	10 hours	8 persons per train
B4 Service Check	180 days or 75,000km	20.5 hours	8 persons per train
B8 Service Check	360 days or 150,000 km	47.5 hours	8 persons per train
C1 Intermediate Overhaul1	Minimum 4 years+ or 600,000km+	5.5 days	4 persons per car
C2 Periodic Overhaul1	Minimum 8 years+ or 1200,000 km+	11.5 days	4 persons per car
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+		
Corrective Maintenance operations that do not require car lifting	-	4 hours	-
Corrective Maintenance operations that require car lifting, excluding time required for shunting	-	6 hours	-

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

6.9.8. Component Change-Out Requirements

The Sub Contractor will design the Door such that the component changes out requirements listed in the below Table can be met. The person-hours are based on fully trained maintenance personnel using standard tools and test equipment.

Item	Maximum Person-Hours for interchangeability

Saloon Door (each)	0.75

In addition, the Sub Contractor will demonstrate that Door Mean Time to Restore (MTTR) that does not exceed 1.5 hours, with a maximum maintenance repair time of 3 hours, is achievable for at least 95% of all failures using the diagnostic tools and procedures provided by the Sub Contractor.

6.9.9. Master Maintenance schedule

1. The maintenance schedules shall be provided stating the parts needing attention at the basic service period and for major overhauls.
2. The subcontractor shall submit work instructions/manuals for all scheduled maintenance activities, fault finding, and corrective maintenance of all faults likely to be found during maintenance and servicing.
3. The master maintenance schedule should be incorporated in maintenance manual and sub-contractor shall provide the relevant chapter reference no in maintenance manual against each maintenance task in master maintenance schedule

6.9.10. Life Cycle Costs

The subcontractor shall comply with ERTS-RS clause 2.27 for the life cycle cost. The Subcontractor 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 and reliability requirement of this particular specification. This plan shall be submitted during the PDR stage for approval by BEML/GC-CMRL.

6.10. Fire Safety

6.10.1. General

The sub-contractor shall comply with ERTS-RS 2.26 requirements for fire performance and fire safety flammability and smoke emission as per ERTS-RS 19.61. The subcontractor shall submit a Fire-safety Plan providing the list of Non-metallic material items, wires & cables that are proposed to be used in the Passenger Door systems with details of material, applied mass, fire safety compliance (Flammability, smoke, toxicity) and fire load calculations, during the preliminary design phase.

6.10.2. Material Properties

a) All non-metallic Materials used in the construction of Passenger Door System 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

b) All non-metallic materials used in the Passenger Door System shall comply with fire safety requirements of EN45545 Part 1 to 7 (Category 4-A, Hazard level **HL3**) latest editions.

c) The subcontractor shall submit a Fire-safety Plan providing the list of Non-metallic material items, wires & cables that are proposed to be used in the Passenger Door System with details of material, applied mass, fire safety compliance (Flammability, smoke, toxicity) and fire load calculations, during the preliminary design phase.

d) The sub-contractor shall also submit a Fire Safety analysis report for review and acceptance by the CMRL as required in ERTS-RS. Fire Performance Verification Type tests shall be according to the relevant standards shall be undertaken to establish fire ratings for all materials proposed. However, test certificates from any Testing Agency of international repute may be accepted in lieu by the CMRL at their sole discretion.

e) All the Fire reports / documents will be Verified and approved by an independent Fire Safety consultant appointed by BEML.

6.10.3. Wiring and Cables

a) Fire resistant cables shall be proposed for circuits, which should survive for long periods during fire, as per applicable international standards.
b) All wires & cables shall comply to ERTS-RS Clause 19.35, 19.36 19.37, 19.38, 19.39, 19.40, 19.43 & 19.44. The insulation of all wires and cables including those used within equipment / subsystem shall meet the flame and smoke test requirements of ERTS-RS clause 19.61 and shall be zero halogen.
c) Wires, cables, cable joints, connections, terminations, earthing system etc. shall comply to ERTS-RS 19.41 & 19.42 requirements.
d) The Cable markers provided shall be fire retardant heat shrinkable type. The cable markers shall be protected against fading by providing Fire retardant heat shrinkable clear sleeve.
e) Fire resistant cables shall be proposed for circuits, which should survive for long periods during fire, as per applicable international standards. As a minimum, the cables and wires for door opening shall be fire resistant in compliant to EN 50200. i.e., power and signal cables related to door opening circuit shall be considered. (ERTS-RS 19.36.13)
f) For general-purpose wire and cable, the insulation shall be of heat and moisture proof material suitable for use at conductor temperatures of 90ºC minimum in dry and wet locations. For high temperature applications, such as connecting to heaters and resistors, the insulation shall be suitable for a maximum conductor temperature of 110ºC and short circuit temperature upto 250ºC.
g) The proposed cables shall be proven on metro Rolling Stock. The Contractor shall submit the voltage grade, size and type of cable for different applications along with the proposed specification for the cables for review by the Project Manager.

6.10.4. Fire Load Calculation

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 HL3 and ISO 1716. The calculations

shall be included in the Fire safety plan submitted as the source of heat value.

6.10.5. Fire Performance Deliverables

The fire performance deliverables shall be provided in accordance with following table before the production of proto passenger Door system.

Sl. No.	Deliverables	Remarks	Submission Schedule
1.	Fire safety plan	As per EN45545 HL3	Preliminary Design stage
2.	List of Non-Metallic Materials with details of material, mass & calorific value	EN45545 Part 1 to 7 (Hazard level HL3) latest editions	Within the Pre-Final Design stage
3.	Fire safety Test Reports of the items including heat release rate for standard items common with other projects of the subcontractor	As per EN45545 HL3	Pre-Final Design stage
4.	Fire safety Test Reports of the items including heat release rate for all other items	As per EN45545 HL3	Final Design stage

6.11. Quality Assurance Program

6.11.1. General

The subcontractor shall hold ISO 9001/ IRIS certification and shall manufacture the product accordingly. The subcontractor shall submit a copy of ISO 9001 / IRIS certification along with the offer. The subcontractor shall monitor and control the Quality systems as per ISO 9001/IRIS guidelines. BEML and/or CMRL's representative may periodically conduct compliance audits of the Subcontractor's Quality management system.

6.11.2. Quality assurance plan

The sub-contractor shall develop and submit a Quality assurance plan (QAP) to BEML/CMRL for review and approval based on ISO 9001 / 2000 / IRIS guidelines. The sub-contractor shall also comply with the Quality Assurance requirement of ERTS-RS Clause 18.8.

a. Process Control

b. Purchasing

c. Quality Audit

d. Inspection and Test Plan (ITP)

e. Quality Record

f. Design Control

6.11.3. Quality Audit

The subcontractor shall develop a quality audit program in accordance with the relevant Quality System and submit to BEML for information. The subcontractor shall submit the audit report to BEML for information. In addition, a copy of audit report issued by the accredited ISO certification body shall also be submitted to BEML on demand

7. Scope of Supply

7.1. General

The subcontractor shall be responsible for the scope of supply of the Passenger Door System, which shall comprise, unless specifically excluded,

1. The design, manufacture, testing, delivery, commissioning, integrated testing and rectification of defects during the comprehensive maintenance
2. Supply Spares, special tools, jigs & fixtures, special test and diagnostic equipment, special training equipment and any other items required for the comprehensive maintenance of cars in sufficient quantities.
3. Documentation and support material associated with the operation and maintenance of the system
4. Technical support to rectifying the defects and deficiencies as communicated by the CMRL/BEML during comprehensive maintenance.
5. Training of engineers, operations and maintenance staff including providing the training materials, training kits and demonstration equipment
6. Initial supply and installation of all consumables and materials required for testing, Commissioning and operation.
7. Final drawings, design calculations and other documents including operations and maintenance manuals for review and acceptance by the BEML/CMRL.
8. The Subcontractor shall meet the system technical requirements for Passenger Door System in accordance with ERTS-RS, as a minimum.

Note : If any special tools/equipments are required for installation of Door system onto carbody, the subcontractor shall supply 3 nos. of such equipment at his own cost.

7.2. Hardware

Subcontractor shall provide all components related to Passenger Door System, but not limited to, the following: Subcontractor shall provide all components related to Passenger Door System, but not limited to, the following:

1. Door Leaves (Left Hand & Right Hand) per entrance, meeting the performance requirements as per this PTS. The proposed design of door leaves shall be of proven design and the measures taken in design to prevent water ingress and subsequent swelling shall be detailed in the technical document.
2. Door leaf construction: Door leaf construction shall be as per ERTS RS clause 6. 3.16 (Similar finish material as adopted for Coach Sidewall i.e. Stainless steel shall be used for Door leaf construction. Outer finish of the door leaf shall be No.4 Stainless steel finish and Inside door skin Finish will be decided during design stage). Door Window glass shall be bonded with suitable glue to avoid fall of window glass. The door leaves shall be suitably sealed and has drainage provision in the bottom. There shall not be any drain holes on the floor sides. The proposed design of door leaves shall be of proven design and the measures taken in design to prevent water ingress and subsequent swelling shall be detailed in the technical document.

   Door leaf detailed construction will be finalised during design stage.
3. Door Window: Design Details will be finalised during pre-final design stage, refer to clause 6.3.18 & clause 3.4.9. of ERTS RS.
4. Kick plate shall be provided on both door leaves.
5. Hand grips for door leaves from both inside and outside.
6. Door operation Mechanism shall be designed to take modular concept into account including a motor, operating mechanism, close and lock mechanism with limit switches for both leaves, electric terminal & wirings and DCU etc. The limit switches shall be service proven and its detail information shall be submitted in design stage for approval. Limit switches used shall be of high reliability and with IP 65 protection. Life of the limit switches shall be at least 15 years. The number of contacts required for limit switches will be discussed and finalized during design freeze.
7. Door Control Unit shall be service proven and shall be interchangeable. Buzzer inside the DCU shall be provided.
8. The two door panels at each passenger doorway shall be synchronously controlled with Antidrag Feature shall be provided as per ERTS RS clause 6.2.2.

9. Spindles
10. Inter-locking mechanism: All doors are closed (each door leaf) & locked and proved with Limit switches by subcontractor. Limit switches shall be provided for each door leaf separately for door close proving with required Terminal Blocks (TB) on Door Drive unit.
11. Isolation device
    - Bypass Switch (Type of switch will be finalised during Design stage)
    - Mechanical isolation device (both internal & external) along with limit switch operation shall be recorded by the TCMS.
12. Door indicator Lights (Inside and outside):

    Door inside/Outside LED lamp will be provided by the car builder for each door and triggering of the indicator lamp shall be done by the DCU. Accordingly, subcontractor shall provide the provision for triggering of the Indication LED lamp (inside/outside) by the DCU.

    The functionality of individual door's exterior & interior door open LED indicators & external Car indication lamps shall be complied as per the requirements of ERTS RS clause 8.4.3 and 8.4.4.
13. Emergency Release Devices (Internal EED with square key and handle along with two positions 'normal' and 'emergency release' for each door shall be provided as per ERTS RS clause 6.7.2 and bi-stable manual emergency door release device External (EAD) with two positions 'normal' and 'emergency release' along indicating operation signs(arrows) with Limit switches. EAD total 4 nos./car shall be provided as per ERTS RS clause 6.7.3.
14. Requisite Bowden cables along with sleeves, P clips and P clip mounting screw for operation of Internal and external emergency devices.
15. Crew switch as per ERTS RS clause 6.4.6 along with electrical cables shall be provided. One door location per each interior side of the car (total two numbers in each car interior) One door location per each exterior side of the car (total two numbers in each car exterior). Crew switch with 3 position (Close, Normal and Open) shall be provided along with cables routing.
16. Threshold plate for door way with safety walk/ anti-skid strips along with rubber gap filler at the outer edge of the threshold to reduce the horizontal train to platform gap. Threshold plate shall be provided as per ERTS RS clause 3.4.8.
17. Lower guide rail (along with SS mounting screws and end caps)
18. Upper guide rail/ door hanging device(along with SS mounting T-bolts and flange nuts).
19. Weather strip along with brush and backside rubbers.

20. Side Sealing angles, water deflection angle, upper and lower acoustic seal & dust plates etc.
21. Aluminium brush holder along with nylon brush for door cover panel shall be provided.
22. Long stop request Push button and associated wiring shall be provided one for DM Car / 2 Nos. per train.
23. Grease for Saloon door Lubrication
24. Tools and Jigs required for door setting.
25. Cable, Terminal, port and connector between door system and car body.
26. In addition to 10 percent spares, 3 nos. of Diode terminal block, 2 Nos. end terminal plate, 2 Nos. end caps for the Din rail and (all Wago make) to be provided per DCU TB by subcontractor.
27. Cable insulation sleeve – Wires/cables routed on the Door drive unit shall be protected with Fire retardant insulation sleeves to protect the cables from direct metal contact by subcontractor.
28. All mating connectors, contacts/pins, lugs, Tools for carbody side wiring and necessary tools for crimping of the same for Door drive unit and Door control unit shall be provided by subcontractor.
29. Fire retardant heat shrinkable Cable markers shall be provided for the wiring in DCU and Door drive unit. Also, fire-retardant heat shrinkable Clear Sleeves shall be provided over the Cable marker by subcontractor for avoiding fading of the cable marking.
30. Relevant quality hardware such as bolts, nuts, spring washers, plain washers and other items required for installation of Passenger Saloon Door System.
31. All types of shims both metallic and non-metallic required for installation of Passenger saloon door system.
32. Dust protective caps to be provided for unused slots / ports in DCU shall be provided by the subcontractor.
33. All electronic equipment shall comply with IEC 60571/EN 50155, as a minimum.
34. Material and workmanship to be carried out as per ERTS RS chapter 19.
35. The transient current source (coil, magnet valve, contactor, relay and etc), the suppressor shall be included (if used any).
36. A minimum of 10 percent spare terminals and Pins shall be provided on each connector or terminal assembly.
37. All cable terminations shall be of the crimped type and soldered connections shall not be used.
38. If the signal current value is less than 10mA, gold contacts shall be used and

provided.

39. Equipment side connectors for Di-electric test - Subcontractor shall supply each door one full set of Terminal blocks, DCU connectors and its contacts as mounted on the equipments for each car-type (DM & T cars) to carry out vehicle level voltage withstand test at BEML factory. Detailed list shall be decided and finalised before first supplies."
40. Any other item deemed essential by the subcontractor, for installation & proper functioning, testing, commissioning and integrated testing of the door system.
41. Earth pad / stud and fasteners for fastening (preferably which suits to M6 and 6 sq. mm. cable)
42. During design stage, addition or deletion of hardware change at DCU shall be acceptable by sub-contractor without any cost implication.
43. Proven arrangement for fasteners shall be provided for safety in door system.
44. All information and contact details of the sub-suppliers shall be provided to contact the sub-suppliers after expiry of warranty.
45. The sub-contractor shall supply Passenger Door system hardware to establish a TCMS Test lab to replicate the actual TCMS architecture of the fleet (including train subsystems and interfaces with other designated Contractors) in order to mature the design development of software and hardware interfaces. The hardware shall be supplied to the BEML Factory (or elsewhere subject to CMRL approval). The lab shall be fully established at least 3 months prior to the start of integration type test activities. The sub-contractor shall also deploy engineering staff /resources to participate in lab-based development tests and activities. (ERTS RS 14.14)

NOTE: Sub-contractor shall supply the equipment and necessary test equipment for performing the test to confirm communication healthiness between TCMS & Door electronics at TCMS supplier premises in Japan in their own cost. Also, technical team members shall be present during the installation and the test period.

7.3. Software

7.3.1. The Subcontractor shall provide, as a minimum, the followings:

1. The Subcontractor shall supply Door Control Unit with software to BEML with 1st train delivery

2. The Subcontractor shall provide the requirements of the specification with respect to the production and verification and validation of software for Passenger door system.

3. Performance software program for maintenance

All software supplied for Passenger door system shall be designed structurally and logically, fully documented, thoroughly tested in a systematic manner such that they can achieve high quality.

7.4. Engineering Support

1. Subcontractor shall depute mechanical and electrical engineer(s) for following activities to BEML/ CMRL
2. The subcontractor shall provide sufficient staff and equipment to be able to present designs and conduct design review meetings and assist in other technical and administrative matters whenever/ how long required. Following meetings need to be attended during design approval and testing.

    a. PDR meeting
    b. PFDR meeting
    c. FDR meeting
    d. Testing and commissioning at BEML factory, depot & mainline.

7.5. Design Submission and Approval Responsibilities

7.5.1. General

1. The objective of the design submission process is to ensure that the proposed resulting works comply with the specifications, are capable of being produced consistently to exacting quality standards, achieve low life cycle costs and can be operated safely to the satisfaction of the Engineer.

7.5.2. Design Submission & Approval Responsibilities

BEML & sub-contractor shall obtain 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-15 “System Support”.

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

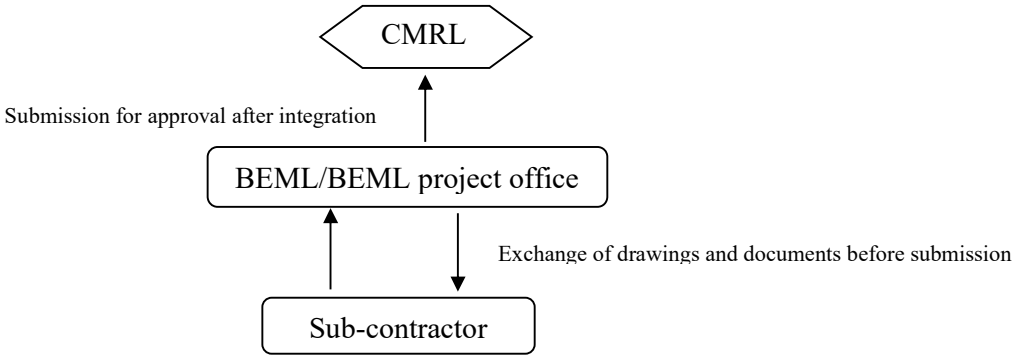
The drawings and documents related to interface shall be combined and integrated with the main principal part of system to form one combined material for submission to the client for approval.

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:

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:



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 / programmes 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	
Programmes 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)

7.5.3. Design Review

1) The Design reviews will be conducted to evaluate the progress and technical adequacy of the design and compatibility with the performance requirements as per technical provision of ERTS-RS 16.13. The sub-contractor shall ensure that the

submissions are as per ERTS-RS.

2) The design reviews shall take place in three (3) phases as detailed below as per ERTS:

   a. The Preliminary Design Review (PDR)

   b. The Pre-Final Design Review (Pre-FDR)

   c. The Final Design Review (FDR)

3) Sub-contractor shall ensure that relevant subject experts shall participate in both the physical and virtual design reviews and interface meetings.

4) Details of 3-D files shall be of the following but not limited to,

   a. Visualization of BOM (Bill of Materials) of equipment up to the level of LRU & SRU
   b. Views of all Components covering all the Recommended preventive as well as corrective maintenance of the OEMs.

7.6. Design Deliverables

1. For System, sub-system and components, the sub-contractor shall submit documents and drawings describing function description, product description, interface requirement description, RAM requirement description, Life cycle calculations, Type & routine test specifications, list and details of spares, related calculations etc.
2. Sub-contractor shall supply exhaustive documentation on complete Passenger Door system, its sub systems and components, Door electronics (hardware and software), project software details, explanation and functionality at component and system level. It shall also include trouble shooting and diagnostic details. explaining clearly the logics and software parameters etc.
3. The sub-contractor shall provide BEML with all necessary drawings, reports, calculations, technical specifications, technical data and similar documents of design, system assurance, quality assurance, manufacturing and testing with respect to PTS according to the time schedule approved by BEML.
4. These drawings and documents shall be delivered in English with the data format of, respectively, latest AutoCAD (2015) release. (Document - MS Word, spread sheet - MS excel, data base files - MS Access, Presentation file - MS Power Point).
5. The drawings shall contain minimum of three (3) views (for example, front view, top view and left side view). The sub-contractor shall provide STEP/IGES (Neutral format) file or CATIA file of 3D model of all Door system components & 2D drawings to BEML for preparing engineering mockup.
6. As-built drawings shall be updated on a regular basis based on the performance of trains up to first 2 years of DLP and shall be submitted along with final design document

delivery as per ERTS-RS.

7. In the event that a statutory body (e.g., Government of India Ministry of Railways, RDSO, Commissioner of Metro Railway Safety, etc.) requires design information in a particular format, it shall be incumbent upon the supplier to provide the same, as directed by the BEML. The sub-contractor shall also comply with ERTS-RS 16.12.
8. The sub-contractor shall submit the design deliverable submission schedule for acceptance within following requested due date, and resubmit it whenever updated.
9. The sub-contractor shall submit BEML all necessary documents and deliverables such as the detailed drawings, specifications, assumptions, calculations, back-up data, plan, procedure, reports, co-ordination & interface information which possibly affects performance, fitting for approval according to the schedule accepted by BEML.
10. It is sub-contractor's responsibility to provide sufficient support and information for obtaining "Notice of No Objection (NONO)" for design document pertaining to sub-contractor in accordance with ERTS-RS.

The sub-contractor shall submit, but not limited to, the following design deliverables in accordance with the required schedule as per ERTS-RS Appendix H – Deliverables associated with Passenger Door system and its interface:

Stage	**Document/Deliverable**	**Submission and approval**
Tender offer	Supporting documents for Qualification criteria as per Cl.4.	Along with tender technical offer
	Vendor approval documents including company profile with infrastructure facilities, product range, proposed manufacturing facility, supply credentials, Declaration etc., as per Cl.4	
	General Technical Description of proposed Passenger Door including door leaf construction, sealing arrangements, DCU details, Electrical, software, sound insulation & thermal insulation details and concept drawings.	
	Estimated weights of Passenger Door system.	
	ERTS RS & PTS clause by Clause compliance	
	Project Management Plan	
	Spares technical offer including and recommended special tools, jigs and fixtures.	

	Bill of Materials (BOM)	
Preliminary Design Review (PDR)	General System Description of proposed Door system.	
	Preliminary design Drawings (Dimensional Installation Drawings: Autocad or CATIA file)	Within 2 month of LOI/ contract award, submission and further updates including BEML/ CMRL approval
	Interfacing with carbody and other systems	
	Interfacing with TCMS & other electrical systems	
	List of standards and codes	
	RAMS documents	
	Fire safety plan	
	Noise and Vibration plan	
	Software Quality Assurance Plan	
	Inspection, Testing and commissioning Plan	
	EMC control plan	
Pre-Final Design Review (PFDR)	General Assembly, Installation and detail Component drawings of Door System in a AutoCAD or CATIA file	Within 2 months of LOI/ contract award, submission and further updates including BEML/ CMRL approval
	Preliminary/Final 3D model of Door assembly	
	Technical Description of proposed Passenger Door System with functional description, detailed technical specification, data sheets, simulations etc., of the system and subsystems.	
	List of standards and codes	
	Fire safety Test Reports of the items including heat release rate for standard items common with other projects of the subcontractor	
	RAMS Deliverables	
	SIL 2 certificate as per 6.3.25.	
	Preliminary test plan for Door systems & sub-systems	
	Preliminary outline of 6 types of manuals & Electronic manuals	
	Detailed Training proposal	

	Software documents	
Final Design Review (FDR)	Final Design Drawings (Dimensional Sub-assembly drawings: Autocad or CATIA file)	Within 3 months of LOI/ contract award, submission and further updates including BEML/ CMRL approval
	Type Test Procedure (incl. record sheet) & Report	
	Routine Test Procedure (incl. record sheet) & Report	
	Software deliverables	
	PCB Block Diagrams (ERTS-RS 19.55) Microprocessor details (ERTS-RS 19.57)	
	FAI Procedure & Report	
	Fire Safety Test Reports including heat release rates	
	Operating Rule Book	
	Final List of Spares, Special Tools, Test Equipment	
	Draft and final of 6 types of manuals & Electronic manual	
	Training Manuals & Materials	
	System Training Philosophy	
	System Maintenance Philosophy	
	Type test reports & FAI reports	
	All As-Built Drawings (Final drawings) of each part of Door system in Autocad, CATIA & Solid works.	
All stages	Design progress report	
	All PFDR & FDR design deliverable submission with updation based on type tests at unit level, car level, train level at subcontractor's place, BEML factory, depot and mainline, upto the satisfaction of CMRL.	
	Open items list	
	Master test plan and progress	
	Waiver request/Spec. Clarification items	

	Any other design data requested	
Note: Over and above mentioned documents, subcontractor shall submit any additional documents required by BEML/CMRL.		

11. BEML will review the submission of subcontractor's design submissions and will furnish review comments in writing or on marked up drawings and specifications to the subcontractor. Within one week of the receipt of comments, the subcontractor shall submit his proposals for implementation in the next submission. Once the design submission is acceptable to BEML, it will be submitted to CMRL for approval and it will be reviewed by them. Subcontractor shall re-submit the revised document incorporating CMRL comments issued during first review within one week. Sub-contractor shall submit requested documents/drawings during approval process within one week from each request.
12. Subcontractor shall establish the project schedule (including design completion schedule) by considering this review turnaround time.
13. In the event that the submission is rejected, the Subcontractor shall improve the design to the acceptable completion level and resubmit it for review within one week. Any adjustments in design activities to recover the lost time due to the re-submission shall be the full responsibility of the Subcontractor and shall submit the catch-up plan for no schedule impact.
14. **The Subcontractor shall be responsible for meeting the requirement of constructional details, material, and workmanship. 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 Door systems shall be met, to the requirements of ERTS RS Chapter-19, as a minimum**.
15. The subcontractor should take whole responsibility for occurring Liquidated Damage due to delays with regard to design data submission, production, supply, design error and so on.
16. The design, hardware & interfaces proposed/agreed during design will be subjected to review and updating /rectification/modification etc. based on the operational, maintenance reliability or safety requirements and generally in accordance with the subcontractor's proposals. In specific cases, the Project Manager may issue specific instructions in writing for undertaking the modifications to meet the above requirements. In such cases, the Project Manager instructions shall be implemented as instructed. The contractor shall abide by the Engineer's instructions without any additional cost.

7.7. Test Program

7.7.1. General

1) The sub-contractor shall be responsible for performance tests of the components under scope of supply as per ERTS-RS Section 17 and submit the compliance. BEML and/or CMRL/representative have the right to witness any of these tests at any stage

of test progress.

2) As per ERTS-RS, all the tests shall be carried out at the sub-contractor's cost, wherever performed, in the presence of and to the satisfaction of BEML/CMRL, who reserves the right to witness any or all of the tests and to require submission of any or all test specifications and reports. In the event of failure to meet the requirements of ERTS-RS Section 17 Technical Provisions in any test, the sub-contractor shall make necessary corrections to the equipment and re-test at his own expense.
3) All test plans, procedures, and reports shall meet the requirements of ERTS-RS clause 17.2 and 17.3 and are subject to review and approval by CMRL.
4) In case of any change in the place of manufacturing then related type tests shall be repeated.
5) The individual equipments, sub-systems and systems, shall be type and routine tested in accordance with the test specifications and test procedures drawn by the sub-contractor and approved by CMRL. The test specifications shall be based on the requirements specified in respective IEC Standard or any other equivalent International Standards. After successful completion of the tests, sub-contractor has to submit the test reports for review and acceptance by CMRL.
6) In addition to 'mandatory' tests as prescribed in IECs, the sub-contractor shall have to perform any additional test as requested by the Statutory Authority for obtaining the sanction of Rolling Stock for passenger service.
7) The sub-contractor shall carry out the routine test of equipment and assembly and also submit the type test reports carried out for same components.
8) Wherever any equipment, system or sub-system is not specifically covered by an internationally recognized specification or test procedure, or where the type and routine tests prescribed by IEC or other international standard do not adequately cover the requirement, tests which are acceptable both to the sub-contractor and to the CMRL/BEML, shall be devised.
9) If any of the required tests have been previously performed by the sub-contractor, under conditions similar to those defined in ERTS-RS, a copy of the test procedure and report may be submitted for CMRL's evaluation. Upon review of such submittals, CMRL may waive the actual performance of the test and accept the test results as being adequate to demonstrate compliance with the requirements of ERTS. CMRL will make every reasonable effort to accommodate and accept previously performed tests similar to ERTS-RS requirements. If Submitted data is not be acceptable to CMRL, the

sub-contractor shall complete the tests as specified, with no increase in contract cost or extension to the delivery schedule.

10) Approval may be given to waive tests required by the Technical Provisions if compliance with the requirements can be demonstrated adequately by analysis. A formal waiver request shall be made for each instance of such, and approval will be at CMRL's discretion.
11) All defects and shortfalls in the sub-contractor's system, discovered during all tests, shall be rectified and re-tested to the satisfaction of BEML/CMRL.
12) The sub-contractor shall provide full instrumentation to conduct all tests and carry out modifications as required.
13) All test procedures, reports including all maintenance activities and check lists shall be submitted and approved by BEML/CMRL.
14) The results of all tests shall be submitted to BEML/CMRL, who will record his conclusions as to whether or not the equipment being tested has passed satisfactorily.
15) The sub-contractor shall produce a test report, in three copies, and in an approved format, within and defined period following the test, for acceptance by BEML/CMRL.
16) To carry out the routine test of Passenger Door system at a train level (after dynamic commissioning of first trainset) the sub-contractor shall provide 2 set of the necessary hardware /software tools required for carrying out the routine test.

7.7.2. Inspection

1) The sub-contractor shall assure inspection and verification of compliance at all its facilities. Further inspections shall take place at the sub-contractor's, BEML's and CMRL's facilities to identify any components, systems, or equipment damaged during shipment or during any stage of the project.
2) All the materials, fittings, equipment, manufacturing processes and assembly workmanship shall be subject to inspection by BEML/CMRL, wherever carried out in accordance with the requirements specified in ERTS-RS clause 18.9. The sub-contractor shall submit the compliance to the ERTS-RS 18.9.
3) The sub-contractor shall perform First Article Inspection (FAI) of all the components. The test reports of all the FAI shall be submitted to the BEML/CMRL for review as per ERTS-RS18.9.7.
4) BEML/CMRL shall have free access to the sub-contractor's premises and to any other places where tests are proposed to be carried out, throughout the Contract, for the

purpose of reviewing and inspecting the designs and manufacturing processes, and mock-ups. The sub-contractor shall provide the BEML/CMRL full opportunity to inspect, examine, measure, and test any of the Works on site, or wherever carried out.

7.7.3. Test Procedure and Reports

1) Test and inspection procedures shall be carried out in accordance with IEC 61133 (2006) or latest unless otherwise specified within the requirements of this Performance Specification as per ERTS-RS 17.3.
2) For each test, the sub-contractor shall submit a detailed test procedure for each of equipment/subsystem for CMRL approval. Any such test procedures shall be prepared by the manufacturer of the system or component to be tested. The sub-contractor shall thoroughly review any test procedure before submittal to CMRL to ensure that testing also verifies system integration parameters.
3) Following points shall be complied as a minimum:
    a) All test equipments and measurement tools shall carry an appropriate and valid calibration label and certificate.
    b) The sub-contractor shall sign all reports of Tests.
    c) Test procedures shall be amended, as required by the employer throughout the duration of the contract, to reflect changes in system design or the identification of additional testing requirements.
    d) All costs including labor, supervision of testing, provision of specialized equipment and materials, and the cost of hiring consultants and the services of other specialized personnel or independent assessors etc. shall be borne by the sub-contractor. The sub-contractor shall also bear any expenses incurred due to re-testing caused by defects or failure of equipment or any other account to meet the requirements of the contract.

7.7.4. Test Classification

1) The tests to be performed as per ERTS-RS 17.4 on equipment's, sub-system, cars and trainset are categorized as follows:
    a) Design Conformance Tests
    b) Production Conformance Tests
    c) Train Acceptance Tests

7.7.5. Equipment Type Test & Routine Test

The Passenger Door Assembly shall be type and routine tested in accordance with relevant standard and specifications at subcontractor's works, at his own cost.

The subcontractor shall carryout the following type tests and routine tests as a minimum and shall submit the reports.

Test	Type Test	Routine Test
1. Strength test	O	—
2. Endurance Test	O	—
3. Shock & Vibration Test	O	—
4. Noise Test	O	—
5. EMC/EMI Test	O	—
6. Fire Safety Test	O	—
7. Visual Inspection	O	O
8. Dimensional Inspection	O	O
9. Functional Tests	O	O
10. Weight Checking	O	O
11. Water Tightness Test	O	O
12. Ageing test	O	—
13. Door panel bonding adhesive test	O	—
14. Thermal insulation test	O	—
15. Woodpecker test	O	O
16. Obstacle Detection	O	O
17. Door glass bonding and sealing	O	—
18. Manual Force on Opening	O	—
19. Manual Forces on Emergency Devices	O	—
20. DCU tests	O	—
21. Opening and Closing Times	O	O
22. Power Consumption	O	—
23. Earthing test	O	—
24. Software tests	O	—
25. Combination type test with TCMS	O	—

7.7.5.1. Strength Test

The strength test procedure and acceptance criteria shall comply with EN 14752 Latest version. The body side doors shall be tested for strength and shall meet the requirements as specified in ERTS RS Chapter 6.

7.7.5.2. Endurance Test (ERTS RS-17.5.3.6.1)

Two million operations shall be performed. A record of the velocity profile shall be taken at the beginning and the end of the test. It should also be demonstrated that no undue wear or compression of seals has occurred. This test shall be performed under representative dry and wet conditions. Endurance test shall be done on actual replica of the door portion of the car and door shall be as assembled in the car. Approval of CMRL shall be sought on the complete arrangement.

7.7.5.3. Vibration Tests

Vibration test shall be carried out as defined in IEC 61373. These tests shall be completed before the first car is ready for final assembly. Failures recorded during testing must correlate within specified reliability values. Door speed and noise tests shall be performed at the beginning, mid-point, and end of the life test for comparative evaluation. Door testing shall include the effects of wind.

7.7.5.4. Door Operation Test (ERTS RS 17.5.4.6)

Before delivery, the first three car rake shall have all doors operated in similar operating simulation for 1,000 continuous trouble-free cycles while loaded to AW4 conditions. Any door or door control failure occurring prior to completion of the test will nullify the test, and the test shall be re-run completely after the fault has been corrected.

Subcontractor to provide suitable test box and provide necessary support to do the test.

7.7.5.5. Functional Tests

All functions of door viz. opening and closing time, opening and closing force, obstacle detection, fault diagnosis, emergency release, isolation by isolation device etc. shall be tested as type tests.

7.7.5.6. Water Tightness test

The water tightness test shall be carried out as per clause 4.10.2 of EN 14752 with continuous water spraying for a duration of 15 minutes. Acceptance criteria as per EN 14752 shall be complied with.

7.7.5.7. Fire Safety Test

All non-metallic components in the Door system shall meet fire safety requirements as per category HL-3 of EN 45545. Fire safety test reports shall be submitted.

7.7.5.8. Software Test

The testing shall be carried out on an actual door gear & steps through the operation, simulating as many fault codes that can be practicably tested.

7.7.5.9. EMC/EMI test

The subcontractor shall carry out EMC test as per EN 50121-3-2 and shall fully meet the requirement of EMI/EMC as per ERTS RS clause 10.19, ERTS RS 2.18, ERTS RS 17.11.17 and ERTS-RS Appendix C.

7.7.5.10. DCU Tests

Subcontractor shall conduct the following tests for DCU, but not limited to the below table

Sl. no.	Test Description	Type	Routine	Reference Document
01	General	Required	Required	EN14752 Latest Version
02	Environment	Required	Required	
03	Low Temperature	Required	Not Required	
04	High Temperature (Dry Heat)	Required	Not Required	As per ERTS RS 19.54.3 class T3 and temperature shall be considered up to 80°C as specified in IEC/EN standard
05	Damp Heat	Required	Not Required	
06	Humidity cycling	Required	Not Required	IEC 60571
07	Dust and sand test & Mould growth tests	Required	Not Required	As per ERTS RS 19.54.3
08	Performance	Required	Required	
09	Burn in Test	Required	Not Required	
10	Earthy continuity test	Required	Required	

7.7.5.11. Noise test

Sound reduction index R_w of the door System in installed condition measured as per ISO 10140-2 shall be equal to or greater than 28 dBA.

7.7.5.12. Combination type test with TCMS

The subcontractor shall carry out Combination type test with TCMS at TCMS suppliers Factory/Lab location.

7.7.5.13. Ageing test

The subcontractor shall carry out ageing test of door leaf as per ISO 9142. There shall be no swelling and dimensional changes of the door leaf and functional performance changes of the door system after the ageing test.

7.7.5.14. Door panel bonding adhesive test:

The subcontractor shall carry out Door panel adhesive bonding test. The adhesives shall be type tested and certified for their performance under temperature cycles with 90% humidity & condensate.

7.7.5.15. Thermal insulation test

The thermal insulation performance of the door shall not be greater than 4.5 W/(m^2.K).

7.7.5.16. Woodpecker test

The subcontractor shall carry out 100% wood pecker check of door leaves as a routine test at subcontractor site before dispatch of the door system to BEML and the report shall be submitted.

7.7.5.17. Visual inspection

Visual inspection shall be done for 100% of the supplies. There shall be no cracks, damages or any other defects.

7.7.5.18. Dimensional inspection

The dimensional inspection shall be carried out for 100% of the supplies and test reports shall be submitted.

7.7.6. First Article Inspection (FAI)

1. The subcontractor shall offer the first set of Door assembly for First Article Inspection by BEML/ CMRL in accordance with the Engineer approved FAI plan prior to serial production in order to confirm that the item produced fully complies with the technical specifications, System design and manufacturing process.
2. The Subcontractor shall ensure that the produced equipment is compliant to all requirements prior to inviting for testing and FAI. The pre-test result prior to official testing/FAI shall be submitted with the invitation letter to request Engineer's witness.
3. At the FAI, the subcontractor shall make available all pertinent design and manufacturing process documentation, test records, material certifications, etc.

4. During FAI, if any inspections or tests indicate that specific hardware or documentation does not meet the specified requirements, the appropriate items shall be repaired, replaced, upgraded, or added by the Subcontractor at their own cost, as necessary to correct the noted deficiencies. After correction of deficiency, all tests necessary to verify the effectiveness of the corrective action shall be repeated.
5. If FAI has to be repeated due to non-compliances/ deficiencies noticed, the cost towards the same and the cost towards BEML/CMRL visit to subcontractor's place for witness of re-FAI shall be to subcontractor's responsibility.
6. Upon acceptance of the FAI by End User, the subcontractor is then free to proceed to manufacture all pertinent hardware. The hardware must meet or exceed the quality standards set at the FAI, and must incorporate any comments made by End User at the FAI.
7. Subcontractor shall note that the Engineer FAI clearance will not relieve the subcontractor's responsibility towards design, production, quality, reliability, availability, maintainability and safety of the systems and sub-systems during the revenue service.

7.7.7. Installation and Commissioning

1. After the Doors are delivered, the subcontractor shall depute his Engineer for the installation and commissioning of the Door System on the First Train set.
2. Modifications/ corrections, if any, shall be carried out by the subcontractor at his own cost.

7.7.8. BEML Factory Tests

7.7.8.1. Type Test, Completed car, unit and train tests

The individual cars and complete trains will be type tested by BEML under subcontractor's responsibility for saloon door system in accordance with IEC 61133. The subcontractor shall participate in this testing to ensure that the saloon door system meet the performance requirements specified in the contract and do not introduce any adverse effects into the train. The subcontractor shall be responsible for correcting any interfacing defects The subcontractor shall carryout hardware/ software modifications, if required, at his own cost.

7.7.8.2. Routine Test, Completed Car, unit and train tests

1. The individual cars and complete trains shall be routine tested by BEML under subcontractor's responsibility for saloon door system test in accordance with IEC 61133. The subcontractor shall be responsible for correcting any interfacing defects.
2. These tests will be a subset of those tests performed at Type Test, complete vehicle to demonstrate that the principal features of the door system are compliant with the

ERTS RS. This test shall include but not be limited to a test of all safety system.

7.7.9. Testing and Commissioning of cars/trains in Depot

7.7.9.1. Type Commissioning Tests

1. On the first train or trains delivered, BEML will undertake Type Test for saloon door system of commissioning tests at the depot to adequately demonstrate that the requirements of ERTS RS have been satisfied, under the subcontractor's responsibility.
2. The subcontractor's design engineer shall also participate in this testing to ensure that the saloon door system meet the performance requirements specified in the contract and do not introduce any adverse effects into the railway and its environment. This testing shall demonstrate compatibility between saloon door system and the interfacing system. The subcontractor shall be responsible for correcting any interfacing defects.

7.7.9.2. Routine Commissioning Tests

1. Following delivery of the trains to the depot, train will be commissioned by BEML and at an appropriate time the Engineer will witness certain of these tests to satisfy himself that the saloon door systems are acceptable for operating in passenger service.
2. This test for saloon door system shall be performed by BEML under subcontractor's responsibility. The subcontractor shall be responsible for correcting any interfacing defects.
3. These tests will be a subset of those tests performed at type commissioning test to demonstrate that the principal features of the door system are compliant with the ERTS RS.

7.7.10. Testing and Commissioning of cars/trains in Mainline

7.7.10.1. Noise Test

1. BEML will undertake Type Tests on the trains to demonstrate that the Noise levels of the car interiors are within the specified limits of the requirements of ERTS RS. The mainline tests will be carried out.
2. The subcontractor's design engineer shall also participate in this testing to ensure that the saloon door system meet the performance requirements specified in the contract. Modifications, if any, required to the door system sealing, to meet the train level contract requirements, shall be carried out by the subcontractor, at his own cost.

7.8. Submissions for Statutory Approvals

1) The sub-contractor shall be responsible for all necessary submissions required to obtain all statutory approval(s) necessary to permit the fleet to enter revenue operation as per ERTS-RS 17.11.
2) 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.
3) The sub-contractor shall also ensure that all the requirements are covered in their documents pertaining to the Passenger Saloon Door system which are stated in Enclosure 6 “Procedure for Safety Certification and Technical Clearance of Metro Systems” of this PTS.
4) The sub-contractor shall be responsible for submission of any additional data for design clearance and certification by the Commissioner for Metro Railway Safety (CMRS). All interface data interchange is described in Appendix C, Interfaces of ERTS-RS.
5) In the event that a statutory body (e.g., Government of India Ministry of Railways, RDSO, Commissioner of Metro Railway Safety, etc.) requires design information in a particular format, it shall be incumbent upon the sub-contractor to provide the same, as directed by the BEML.
6) OEM shall also support during the RDSO trials and Commissioner of Metro Railway Safety (CMRS) inspection along with the necessary instrumentation for the testing, if required. All the test data shall be recorded and report shall be submitted.

7.9. Operating Rule Book

The sub-contractor shall provide technical input associated with the Works to the BEML/CMRL for incorporation into the “Operating Rule Book” as per ERTS-RS 15.7.

7.10. Operating Procedure Manuals

The sub-contractor shall provide technical input associated with the Works to the BEML/CMRL for incorporation into the “Operating Procedures Manuals” as per ERTS-RS 15.8.

7.11. Operation and Maintenance Manuals (O&M Manual)

1. The subcontractor shall provide Operation and Maintenance (O&M) manuals, for use by supervisory, operating and technical staff of BEML/CMRL, conforming to ERTS-RS 15.9.
2. The O&M manual must provide all the essential operating and maintenance information to a level of detail that enables CMRL staff to operate, test, maintain, overhaul and repair the equipment to meet the specified performance requirements. The information contained within the manual shall comprise text, tables, technical illustrations and diagrams structured. It is the responsibility of the subcontractor to provide the required level of information for all sub-systems and equipment within its scope of supply. The subcontractor shall supply the following types of manuals as a minimum.

   Volume I : Technical Manual

   Volume II : Operation Manual

   Volume III : Maintenance Manual

   Volume IV : Faults Diagnostics Manual

   Volume V : Spare Parts Manual

   Volume VI : Special Tools and Test Equipment Manual

3. All the details specified in chapter-15 of ERTS-RS shall be covered in detail in the above volumes.

7.11.1. Operation manuals & technical description

The sub-contractor shall provide operating manuals and technical descriptions as per ERTS-RS 15.10.

7.11.2. Maintenance manuals

The sub-contractor shall provide the maintenance manuals for all equipment supplied as part of the Works as per ERTS-RS 15.11. The sub-contractor shall provide maintenance manuals explaining the components description, maintenance requirements, failure rectification and trouble-shooting, software installation, trouble-shooting, over-hauling maintenance details of the Passenger Saloon Door system together with its component subsidiary systems and individual item of equipment

7.11.3. Storage, Packing, Crating and Marking

The sub-contractor shall be fully responsible for the provision and maintenance of acceptable storage facilities for the Plant and any materials or equipment he intends to use for the carrying out of the Works as per ERTS-RS 18.15.

7.12. Training

1. The sub-contractor shall provide comprehensive training to the CMRL / BEML / Employer's staff in operation, maintenance, engineering, etc.., of the Passenger Door system in accordance with the training activities and works as per ERTS-RS Clause 15.4, 15.5, 15.12, 15.13, 15.14, 15.15, 15.16 & ERTS-CMC as a minimum.
2. The supplier shall provide according to requirement of BEML and CMRL training schedule, time, method and site etc.
3. The subcontractor shall provide a training proposal, one original and five colour copies and electronics copies of the training manual for use by CMRL / BEML for conducting in-house training.

4. Milestone Number	Milestone Activity	No of Days
RS-H4	Provision of Contractor's Driving Instructors for Training of Employer's operating personnel in India.	5 Man Days
RS-H5	Provision of Contractor's Instructors and OEM's Experts for on job Training and supervision of Employer's maintenance personnel in the metro train depot of CMRL in India.	70 Man Days

Table 1: Tentative Training Plan

The technical offer for training shall be submitted along with the technical offer

8. DNP / DLP / Warranty

1. Refer GCC, SCC, ERTS-RS & ERTS-CMC and related clauses of the tender.
2. Sub-contractor shall ensure minimum spare parts that he intends to make available during the installation, erection, commissioning and DNP/DLP/Warranty period.
3. 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.

9. Comprehensive Maintenance Contract

1. The sub-contractor shall support at all times throughout the Comprehensive Maintenance Contract (CMC) period, maintain Passenger Saloon Door system of Rolling Stock in accordance with the provisions of the Contract, Applicable Laws, Applicable Permits and Good Industry Practices.
2. "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 Passenger Saloon Door system as per ERTS-CMC Part- 2: Section VI C.

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

10. List of Annexures and Enclosures

10.1. Annexures

Annexure No.	Document Description	Remarks
1	Submittals Check Sheet	-
2	ECN Network Specific Requirements	-
3	General ICD	-
4	SDT - Safety Transmission Protocol Specification	Applicable for data transmission for controlling the functionalities corresponding to SIL2 only
5	Preliminary TCMS ICD of Door System	-
6	Door Interface Drawing GR-5678	-
A	**Spares as per Annexure-A**	

10.2. Enclosures

Enclosure No.	Document Description
1	Section VI A: Employer's Requirements Technical Specification (ERTS) – Rolling Stock (RS)
2	Section VI C: Employer's Requirements Technical Specification (ERTS) – Comprehensive Maintenance Contract (CMC) of Rolling Stock and Depot Machinery & Plant.
3	Format for Submission of Vendor/Subcontractor/Suppliers Credentials: Rolling Stock
4	Form Sys-3: Subcontractors/Manufacturers
5	Form MAN: Manufacturer's Authorization
6	Procedure for Safety Certification and Technical Clearance of Metro Systems by RDSO

11. PTS & ERTS Compliance

1. The subcontractor shall offer a valid and fully compliant proposal for the Passenger Door system as detailed in ERTS-RS, ERTS-CMC and PTS.
2. The subcontractor shall submit a detailed clause by compliance report for all the clauses of ERTS-RS, ERTS-CMC and PTS with regard to Door System.

3. The supplier must ensure that no separate offers or cost implications of whatsoever type due to any reasons are mentioned in the proposed offer in CBC. Such offers or claims shall be summarily rejected without giving any further opportunity.
4. Any clause of ERTS-RS, ERTS-CMC, PTS for which no comments have been provided in CBC by the supplier shall be construed as favorable to BEML.
5. It is suggested that supplier shall list out all deliverables or supply elements mentioned in this PTS and submit offer/ proposal for the same. Any queries can be addressed to BEML before submission of offer. Once the offer is submitted to BEML, it is deemed to be understood as inclusive of all deliverables, irrespective of whether it has been specifically asked or not.
6. The sub-contractor shall submit, along with the technical offer, the Clause-by-Clause Compliance for the ERTS-RS, ERTS-CMC and this PTS as follows:
    a. **Complied:** “Complied” shall be indicated by the sub-contractor where the sub-contractor is able to comply fully with the clause.
    b. **Noted & Complied to Passenger Door System scope of supply:** Where a clause merely provides information and no other comment is necessary, “Noted & Complied to Passenger Door System scope of supply” will suffice.
    c. “Noted” and/ or “any comments” shall be regarded as non-compliance from the subcontractor for his Scope of supply/ work.
7. **Offers with Non-compliance and deviations to any of the** ERTS-RS, ERTS-CMC and PTS **clauses with regard to Passenger Door System, are liable for rejection.**

12. Project Management

1. The sub-contractor 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-RS Chapter 16 “Management Program”.
2. The subcontractor shall comply with the detailed requirements to be specified later by BEML/ CMRL if any.
3. Along with the technical offer, the sub-contractor shall submit a Project Management Plan which shall provide a clear over-view of the Contractor's organization, the management system and methods to be used for completion of the works.
4. The Project Management Plan in line with ERTS-RS Clause 16.3 and shall provide the following information:
    a. An organization chart which clearly identifies all staff expected to be allocated to the Works; indicating reporting lines to the Key Staff or any additional departmental managers proposed.
    b. Resumes for each Key Staff member.
    c. A job scope clarifying of the duties and responsibilities of each departmental manager / Key Staff member.
    d. A resource plan for the project from NTP through the end of the CMC Period, showing the levels of staffing to be provided at each phase for each discipline

and functional area.

e. A description of the methodology to be used to track and control program progress against the program schedule.

f. Master Program Schedule as described in ERTS-RS Clause 16.6.

13. Submittals with Technical Offer

The sub-contractor shall submit all the document as per Annexure 1 - Submittals Check Sheet.

-End-of-Section-