



**Expression of Interest (EoI) for Technology Partnership for
Propulsion System**

Bharat Heavy Electricals Limited
(A Government of India Undertaking)
New Delhi – 110 049
India

Notice for Inviting
Expression of Interest for
Technology Partnership for Propulsion System

EoI Ref No.: BHEL/AA/TL/0710

Date: 24 June, 2024



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SECTION-1 **Disclaimer**

The information contained in this Expression of Interest (EoI) document provided to the Prospective Partner (s), by or on behalf of Bharat Heavy Electricals Limited (BHEL) or any of its employees or advisors, is provided to the Prospective Partner (s) on the terms and conditions set out in this EoI document and all other terms and conditions subject to which such information is provided.

1. The purpose of this EoI document is to provide the Prospective Partner (s) information to assist the formulation of their proposal. This EoI document does not purport to contain all the information each Prospective Partner may require. This EoI document may not be appropriate for all persons, and it is not possible for BHEL, its employees or advisors to consider the business/investment objectives, financial situation and particular needs of each Prospective Partner who reads or uses this EoI document. Each Prospective Partner should conduct his own investigations and analysis and should check the accuracy, reliability and completeness of the information in this EoI document and where necessary obtain independent advice from appropriate sources.
2. BHEL, its employees and advisors make no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of the EoI document.
3. BHEL may, in its absolute discretion, but without being under any obligation to do so, modify, amend or supplement the information in this EoI document.
4. The issue of this EoI does not imply that BHEL is bound to select and shortlist any or all the Prospective Partner (s). Even after selection of suitable Prospective Partner, BHEL is not bound to proceed ahead with the Prospective Partner and in no case be responsible or liable for any commercial and consequential liabilities in any manner whatsoever.
5. The Prospective Partner (s) shall bear all costs associated with the preparation, technical discussion/presentation and submission of response against this EoI. BHEL shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the EoI process.
6. Canvassing in any form by the Prospective Partner (s) or by any other agency on their behalf shall lead to disqualification of their EoI.
7. Notwithstanding anything contained in this EoI, BHEL reserves the right to accept or reject any application and to annul the EoI process and reject all applications, at any time without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons, thereof. In the event that BHEL rejects or annuls all the applications, it may at its discretion, invite all eligible Prospective Partners to submit fresh applications.
8. BHEL reserves the right to disqualify any applicant during or after completion of EoI process, if it is found there was a material misrepresentation by any such applicant or the applicant fails to provide within the specified time, supplemental information sought by BHEL.
9. BHEL reserves the right to verify all statements, information and documents submitted by the applicant in response to the EoI. Any such verification or lack of such verification by BHEL shall not relieve the applicant of his obligations or liabilities hereunder nor will it affect any rights of BHEL.



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SECTION-2

Schedule of EoI Process & Contact Details

A. Schedule of EoI process:

The schedule of activities during the EoI Process shall be as follows:

Sl. No.	Description	Date
1.	Issue of EoI document	24 June, 2024
2.	Last date of submission of EoI response	19 July, 2024

B. Contact Details:

Additional General Manager
Technology Licensing
Corporate Technology Management (CTM)
Bharat Heavy Electricals Limited (BHEL),
BHEL House, Siri Fort, New Delhi 110049
Tel: +91-11- 66337213 / 66337339
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SECTION – 3

Details of Expression of Interest

3.1 Introduction:

This Expression of Interest (EoI) seeks response from respondent who are willing to be associated with BHEL through a long-term Technology Partnership Agreement (with IPR) for development of Propulsion Systems for Rolling stock equipment- Electric Locomotives and Underslung Propulsion for distributed power trains. Partnership shall enable BHEL to Design & Develop, Engineer, Manufacture, Test, Supply, Field Install, Commission, Repair, Service and Retrofit the propulsion system for Rolling stock equipment and BHEL shall jointly own IPR rights for the Propulsion Systems developed through this Partnership.

3.2 About BHEL:

BHEL is a leading state-owned company, wherein Government of India is holding 63.17% of its equity. BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing enterprise in India, catering to the core infrastructure sectors of Indian economy viz. energy, transportation, and heavy engineering industry, defence, renewable and non-conventional energy. The energy sector covers generation, transmission and distribution of equipment for thermal, gas, hydro, nuclear and solar photo voltaic power plant. BHEL has been in this business for more than 50 years and BHEL supplied equipment account for approx. 200 GW of the total thermal generating capacity in India. BHEL is also listed in Indian stock exchanges. BHEL has 16 manufacturing units, 4 power sector regions, 8 service centers and 15 regional offices besides host of project sites spread all over India and abroad. BHEL has its footprint in all the inhabited continents with references in 88 countries including Malaysia, Oman, Iraq, Syria Sudan, Libya, Cyprus, Malta, Afghanistan, Bangladesh, Bhutan, New Zealand etc. The cumulative overseas installed capacity of BHEL manufactured power plants nearing 10,000 MW. The annual turnover of BHEL for the year 2023-24 was around US\$ 2.9 Billion. BHEL's highly skilled and committed manpower of approx. 28500; state-of-the-art manufacturing, R&D facilities and latest technologies helped BHEL to deliver a consistent track record of performance since long. To position leading state-owned companies as Global Industrial giant and as a recognition for their exemplary performance, Government of India categorized BHEL as "Maharatna Company" in 2013.

The high level of quality & reliability of BHEL products is due to adherence to international standards by acquiring and adapting some of the best technologies from leading companies in the world, together with technologies developed in its own R&D centers.

Our ongoing major technology tie-ups include agreements with Siemens Energy Global GmbH & Co. KG., Germany (for Steam Turbines, Generators and Condensers); Mitsubishi Heavy Industries Ltd., Japan (for Flue Gas Desulfurization Systems); Leonardo S.p.A, Italy (for Super Rapid Gun Mount); GE Technology GmbH, Switzerland (for Steam Turbine for Nuclear Power



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Plant and for Gas turbines); Indian Space Research Organization (ISRO) (for Space Grade Lithium-Ion Cells); CSIR-IIP (PVSA based Medical Oxygen Plant); NANO Company Ltd., Korea (for SCR Catalysts); HLB Power Company Ltd., Korea (for Gates and Dampers); Kawasaki Heavy Industries Ltd., Japan (for Stainless Steel Coaches for Metros); Valmet Automation Oy, Finland (for DCS System); Babcock Power Environmental Inc., USA (for Selective Catalytic Reduction Systems); Sumitomo SHI FW Energia Oy., Finland (for Circulating Fluidized Bed Combustion Boilers); HIMA Middle East FZE, Dubai (for KAVACH System/Train Collision Avoidance System) and Bhabha Atomic Research Centre (BARC) (for 50 kW Alkaline Water Electrolyser System for Hydrogen Production).

* More details about the entire range of BHEL's products and operations can be viewed by visiting our web site www.bhel.com

3.3 BHEL in Transportation Sector:

BHEL has been designing and manufacturing rolling stock for rail and urban transportation. BHEL has also been manufacturing Motors, Power electronics and Controllers for various transportation applications at its various factories. BHEL also has a Battery Packaging facility for space applications.

In transportation sector, BHEL is into the manufacturing of complete electric and diesel electric locomotives and electrical assemblies/components including traction motors, traction transformers, power & auxiliary converters and controls, gear wheels etc.

At its Jhansi plant, BHEL is manufacturing complete Electric Locomotives up to 6000 HP rating for mainline application of Indian Railways, Diesel Electric Locomotives from 350 HP to 3100 HP rating. Till date, BHEL has supplied more than 400 nos. of main line electric locomotives for Indian Railways and more than 350 nos. of diesel electric locomotives for shunting operations to different industries. BHEL is currently executing an order for manufacturing of complete Electric Locomotive of 6000 HP. Our Jhansi plant has an installed capacity of 75 nos. locomotives per year. At Jhansi, BHEL has complete state-of-the-art facilities for manufacturing, fabrication and testing of bogies, loco shells, under frames and other mechanical components of locomotives. BHEL has recently developed India's first state-of-the-art WAG7 Electric Locomotive with regenerative capabilities. BHEL has also developed India's first Traction Motor for 9000HP Electric Locomotives.

At its Bhopal and Bengaluru plants, among electrical propulsion equipment, BHEL is manufacturing and supplying traction motors, traction transformers, power converters (IGBT/GTO) & controls, auxiliary converters (IGBT/GTO) and vehicle control units for electric locomotives, diesel electric locomotives, EMUs, DEMUs & and metros trains of Indian Railways. BHEL's manufacturing range includes conventional DC drive, IGBT based 3-phase drive equipment up to 6000HP rating. BHEL has also been in the forefront of providing maintenance and spares/replacement support to Indian Railways for their locomotive fleet. BHEL has full-fledged service team stationed at major centers in the country.



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3.4 About EDN, Bengaluru:

BHEL's Electronics division (EDN) at Bengaluru is the nodal agency for electronics in BHEL & it provides a strong base in the areas of Automation and Power Electronics and to supplement the Company's pioneering efforts in the core sectors. The division is involved in the design, development, manufacturing, and servicing of a wide range of electronic products and systems. This includes control and automation systems, industrial electronics, power electronics, and various electronic components used in power generation, transmission, and distribution. Many of the power plants and industries in the country today are equipped with electronic products and systems that have been manufactured and supplied by BHEL EDN. EDN supplied equipment accounts for about 63 % of total Control & Instrumentation (C&I) equipment in the country and continue to be the leader in power industry for past several decades.

3.5 Scope of Cooperation:

BHEL is seeking response from Original Equipment Manufacturer(s) (OEMs) / Prospective technology partner for Technology Partnership (with IPR) for development of Propulsion Systems for Rolling stock equipment- Electric Locomotives and Underslung Propulsion for distributed power trains. The Propulsion system shall include Traction Converter, Auxiliary Converter and TCMS/VCU with interfacing. The complete solution of Propulsion system shall be preferred.

In case any sub system is not developed or manufactured by the respondent, the respondent can participate in this EoI with its proposal for addressing the complete solution of Propulsion System. In such case, further decision on response received shall be at BHEL discretion.

The proposed Technology Partnership (with IPR) should enable BHEL to Design & Develop, Engineer, Manufacture, Test, Supply, Field Install, Commission, Repair, Service and Retrofit the propulsion system and BHEL shall jointly own IPR rights for the Propulsion Systems developed through this partnership.

Prospective Technology Partner shall be responsible for all items applicable for relevant Indian Railway specification including upcoming revisions and updated functionalities / anticipated customer requirements like SIL requirements and implementation of HL grade components in future.

Interested OEMs/Prospective Technology partner (s) meeting the PQR requirement as specified in clause 3.6 of this EoI are invited to submit their response to this EoI, as per indicative scope of technology transfer given in **Annexure-1**.

Upon receipt of response(s) against this EoI, BHEL will review the response(s) to ascertain suitability of the offer and shortlist Prospective Partner (s) for further discussions. Detailed discussions on commercial and other terms and conditions to finalize the Technology Partnership Agreement (TPA) shall be held with shortlisted Prospective Technology Partner (s). The detailed terms and conditions for such agreement shall be mutually agreed upon.

BHEL intends to engage the same partner for both the projects viz. Electric Locomotive and Underslung propulsion for distributed power trains having the commonality in design.



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3.6 Prequalification requirements (PQR):

The Prospective Technology Partner shall meet following Qualification Requirements as on the date of submission of EoI (*to be substantiated by a documentary evidence*):

A) Electric Locomotive:

1. The Prospective Technology Partner should have designed, developed and executed minimum one (01) IGBT based propulsion equipment of Electrical /diesel locomotive for Indian Railways or anywhere in the world of minimum 4000 HP or above which shall be under commercial service as on the closing date of this EoI.

OR

B) Distributed Power Rolling Stock:

1. The Prospective Technology Partner should have designed, developed and executed minimum one (01) IGBT based propulsion equipment of EMU/DEMU anywhere in the world of minimum 1600 HP or above which shall be under commercial service as on the closing date of this EoI.

OR

2. The Prospective Technology Partner should have executed and supplied at least one (01) set of propulsion system installed in Train Sets with service speed of 160 kmph or more and the supplied set must be running successfully anywhere in the world as on date of closing of this EoI.

OR

3. The Prospective Technology Partner should have executed and supplied at least one (01) set of propulsion system installed in Metros and the supplied set must be running successfully anywhere in the world as on date of closing of this EoI.

OR

4. The Prospective Technology Partner should have designed, manufactured and supplied at least ten (10) sets of following equipment for Railway stock application on any railway system in the world and the supplied sets must be running successfully anywhere in the world as on date of closing of this EoI:

- a) IGBT based Main power converter-inverter, water/natural/forced air cooled of at least 500 KVA.



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3.7 Restrictions on Specified Transfer of Technology with an entity from a country which shares a land border with India

- 3.7.1 Respondent from a country which shares a land border with India will be eligible to respond to this EoI only if Respondent is registered with Competent Authority (Registration Committee constituted by the Department of Promotion of Internal Trade (DPIIT) of Govt. of India). Such registration should be at least valid for the entire period of EoI due date or any extension thereof.
- 3.7.2 Respondent from a country which shares a land border with India means: a) An entity incorporated, established or registered in such country; or b) A subsidiary of an entity incorporated, established or registered in such country; or c) An entity substantially controlled through entities incorporated, established or registered in such country; or d) An entity whose beneficial owner is situated in such a country; or e) An Indian (or other) agent of such an entity; or f) A natural person who is a citizen of such a country; or g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

3.8 Instructions:

- 3.8.1 The interested Prospective Technology Partner (s) should submit their response(s) along with enclosed annexures on or before **19 July, 2024**.

Annexure-1: Indicative Scope of Technology Partnership

Annexure-2: Prospective Partner's Experience in the field of Propulsion System for Rolling Stock Equipment

Annexure-3: General technical specifications of Propulsion System proposed for Technology Partnership

Annexure-4: Reference List: The Prospective Partner's major supplies in last 10 years

- 3.8.2 The response shall necessarily be accompanied with following details:

1. Company background
2. Product Profile
3. Technical details
4. Reference list of customers
5. Annual audited financial reports for last 3 (three) years.

- 3.8.3 **Language:** All correspondences and documents related to the EoI response shall be in English language, provided that any printed literature furnished by the Prospective Partner (s) may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in English language in which case, for purposes of interpretation of the bid, the English translation shall govern.

- 3.8.4 The Prospective Partner(s) shall abide by the terms & conditions, as applicable, of the EoI.



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- 3.8.5 All pages of the response against this EoI shall be duly signed by the authorised signatory.
- 3.8.6 Multiple proposals from the same Prospective Partner should not be submitted.
- 3.8.7 BHEL at its discretion shall inspect the Prospective Partner's works/office/reference site premises for the purpose of evaluation, as deemed necessary before selection of Partner. BHEL decision in this regard shall be final.
- 3.8.8 Any Prospective Partner which has been debarred/blacklisted by Central/State Governments of India or by any entity controlled by Central/State Governments of India from participating in any of their project, as on date of submission of EoI, shall not be eligible to submit the EoI.
- 3.8.9 BHEL shall receive applications pursuant to this EoI in accordance with the terms set forth herein, as modified, altered, amended and clarified from time to time by BHEL, and all applications shall be submitted in accordance with such terms on or before the date specified in this EoI for submission of applications.

In case any amendment/corrigendum to this EoI is issued, it shall be notified only at www.bhel.com

3.9 Process to be Confidential:

Information relating to the examination, clarification, evaluation and comparison of EoI and recommendations shall not be disclosed to Prospective Partner (s). Any effort by Prospective Partner (s) to influence BHEL in processing of EoI or selection decisions may result in the rejection of the response against EoI.

3.10 Governing Laws & Jurisdiction:

The EoI process shall be governed by, and construed in accordance with the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and / or in connection with the EoI process.



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Annexure-1

Indicative Scope of Technology Partnership

(a)	Design & Development of Prototype equipment for Propulsion system for Rolling stock equipment- Electric Locomotives and Underslung Propulsion for distributed power trains and Type testing of the same in the presence of BHEL & Indian Railways (IR) officials (if required by the customer). IPR generated during the proto type shall be Jointly owned.
(b)	Licensing & transfer of state-of-the-art technology relating to Design & Development, Engineer, Manufacture, Test, Supply, Field Install, Commission, Repair, Service and Retrofit the propulsion system for Rolling stock equipment for Electric Locomotives and Underslung Propulsion for EMU/ MEMU.
(c)	Transfer of improvements/modifications/developments/up gradations to be carried out by the Prospective Technology Partner during the period of proposed Agreement for taking care of new market requirements and obsolescence. Subsequent updates required due to component obsolescence or updates implemented by Prospective Partner(s) due to safety consideration would also be provided.
(d)	Assistance in planning & establishing the new manufacturing, assembly and testing facilities & processes/ suitable augmentation at BHEL's existing facilities/processes by way of expert advice in terms of identifying, sizing & selection and preparation of specification of equipment / machinery required for manufacturing, their layout and foundation etc. Deputation of Partner's expert for commissioning of the manufacturing facilities, design of special tools and dies, jigs & fixtures etc.
(e)	Support through engineering services from Partner's design office / manufacturing facilities for licensed products.
(f)	Training of BHEL engineers in Designing & Development, Engineering, Manufacturing, Testing, Supplying, Field Install, Commissioning, Repairing, Servicing and Retrofitting the propulsion system for Rolling stock equipment for Electric Locomotives and Underslung Propulsion for EMU/ MEMU.
(g)	Deputation of Partner's experts to assist BHEL in absorbing the technology for licensed products.
(h)	Transfer of applicable Proprietary hardware / software/computer programs including logics and source code.
(i)	The prototype equipment developed out of this partnership shall undergo the field & validation trials as mandated by the relevant IR specifications and it shall be the joint responsibility of both the parties to successfully complete this activity.



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(j)	Technology being proposed should be the latest/ state-of-the-art being marketed by the Prospective Partner.
(k)	BHEL intends to have a common hardware platform across various propulsion projects for ease of design and maintenance in field. The prospective partner shall give due importance to this aspect in hardware design.
(l)	Transfer of information to enable BHEL to source/procure those items, which Prospective Partner sources from other vendors (as these are not manufactured by the Prospective Partner for use in Electric Locomotives and Underslung Propulsion for EMU/ MEMU.
(m)	Prospective Partner has to carry out system engineering for the project and hence, shall provide inputs for procurement of other items which may include specifications, drawings etc. The responsibility of engineering for these items shall rest with BHEL. The design shall employ the latest components available in the market. Prospective partner should also provide OEM authorization certificates to BHEL for sourcing these corresponding components later.
(n)	Prospective partner to ensure obsolescence management of systems and/or components considered in the design. Hence, Prospective Partner to consider minimum life time of the components as 10 years and design the system accordingly. Component and/or system upgradation and updation in terms of hardware and software configuration for complete functionality has to be provided as Prospective Partner 's scope which shall be dealt under obsolescence management.

Signature & Seal:
Authorized Signatory of the Prospective Partner



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Annexure-2

Prospective Partner 's Experience in the field of Propulsion system for Rolling Stock equipment

SN	Requirement	Prospective Partner's response YES/NO and remarks, if any
(a)	Whether the Prospective Partner is an Original Equipment Manufacturer (OEM) / designer of proposed Propulsion system.	
(b)	Whether Prospective Partner is meeting below mentioned PQRs (as per clause 3.6 of this EoI) has been submitted by Prospective Partner and whether documentary evidence to substantiate the PQR submitted.	
i.	The Prospective Technology Partner should have designed, developed and executed minimum one (01) IGBT based propulsion equipment of Electrical /diesel locomotive for Indian Railways or anywhere in the world of minimum 4000 HP or above which shall be under commercial service as on the closing date of this EoI.	
ii.	The Prospective Technology Partner should have designed, developed and executed minimum one (01) IGBT based propulsion equipment of EMU/DEMU anywhere in the world of minimum 1600 HP or above which shall be under commercial service as on the closing date of this EoI.	
iii.	The Prospective Technology Partner should have executed and supplied at least one (01) set of propulsion system installed in Train Sets with service speed of 160 kmph or more and the supplied set must be running successfully anywhere in the world as on date of closing of this EoI.	
iv.	The Prospective Technology Partner should have executed and supplied at least one (01) set of propulsion system installed in Metros and the supplied set must be running successfully anywhere in the world as on date of closing of this EoI.	
v.	The Prospective Technology Partner should have designed, manufactured and supplied at least ten (10) sets of following equipment for Railway stock application on any railway system in the world and the supplied sets must be running successfully anywhere in the world as on date of closing of this EoI : 1) IGBT based Main power converter-inverter, water/natural/forced air cooled of at least 500 KVA.	



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(c)	Whether information on market share has been enclosed.	
(d)	Whether Prospective Partner's detailed reference list have been enclosed.	
(e)	Whether Prospective Partner's annual audited financial reports for last 3 years have been enclosed.	
(f)	Whether the technology transfer is the latest being marketed by the Prospective Partner.	
(g)	Whether customers (end users) letters / documentary evidence for satisfactory operation of Propulsion System which is being offered to BHEL under this EoI have been enclosed.	
(h)	Whether Prospective Partner's has been blacklisted / banned business dealings by Ministry of Railways or any Government Department of India.	
(i)	Whether Prospective Partner's any previous contract has been terminated either in full or part due to OEMs/Prospective partner (s) 's failure.	
(j)	Whether Prospective Partner's has suffered insolvency / bankruptcy.	
(k)	Whether Prospective Partner's have positive net worth as of last three financial years.	
(l)	Whether the Prospective Partner owns the IPRs for the technology being proposed for transfer under the Technology Partnership Agreement (TPA) or have an unencumbered right from the owner of the IPRs to sub-license the technology, if applicable. If yes, whether list of such IPRs is enclosed.	

Signature & Seal:
Authorised Signatory of the Prospective Partner



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Annexure-3

General technical specifications of Propulsion system proposed for Technology Partnership

A. Electric Locomotives:

a)	Specification for 6000 HP Loco Propulsion system: RDSO/2008/EL/SPEC/0071 Rev '6' issued in Dec 2023. Link to download specifications: https://rdso.indianrailways.gov.in/uploads/files/Spec_%2071%20Rev-6%20for%20Propulsion%20Spec_RDSO_2008_EL_SPEC_0071%2C%20Rev%206_clear.pdf
b)	Specification for composite converter: CLW/ES/3/IGBT/0518 ALT.B Link to download specifications: https://clw.indianrailways.gov.in/works/uploads/File/Alt-B_Spec_WAP5_Composite%20converter.pdf

B. Underslung Propulsion System Trainset:

a)	Specification for Under slung design of Trainset: RDSO/PE/SPEC/EMU/019 6-2024, (REV.1) Link to download specifications: https://rdso.indianrailways.gov.in/uploads/040424_Draft_Trainset%20Propulsion%20Specification%20(Rev%201)_Annexure-I%20To%20XIII.pdf
b)	Specification for Metro: RDSO/PE/SPEC/EMU/0182 (REV1)-2015 Link to download specifications: https://rdso.indianrailways.gov.in/works/uploads/File/3_phase_Electrics_Spec_Revised%20Final%20Draft_24.03.15_.pdf
c)	Specification for EMU/MEMU Link to download specifications: https://rdso.indianrailways.gov.in/uploads/1-ii-%20spec%20for%20EMU-MEMU-163.pdf

Signature & Seal:

Authorized Signatory of the Prospective Partner



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Annexure-4

Reference List: The Prospective Partner shall furnish a summary of the product reference as detailed below for major supplies in last 10 years:

Sl. No.	Project name / location	Product	Year of Supply	Rating of Equipment	Customer Name	Year of Commissioning

Signature & Seal:

Authorized Signatory of the Prospective Partner