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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

E- GLOBAL TENDER

No. RE2015TWMRI0001

For procurement of

DESIGN, MANUFACTURE, SUPPLY, TESTING & COMMISSIONING OF SELF-PROPELLED 8-WHEELER INSPECTION & MAINTENANCE CAR OF DIESEL ELECTRIC UNDER SLUNG TYPE WITH MEASURING AND RECORDING INSTRUMENTATION FOR OPERATION ON BROAD GAUGE (1676MM) ELECTRIFIED (25 KV A.C.) ROUTES OF INDIAN RAILWAYS.

Due Date of Opening: 12.07.2016

Railway Electrification(Stores)
Rail Bhavan, 1 Raisina Road
New Delhi – 110001

Price Rs.10,000 /- (Rupees ten thousand only) or 160 US Dollars

2.0 Tender/Bid Document consists of following:

a) Part -I

i) Bid Invitation
ii) Schedule of Requirements with special notes
iii) Additional Special conditions

b) Part-II

i) Instructions to Bidders (Section-I)
ii) General Condition of Contract (Section-II)
iii) Special Condition of Contract (Section-III)
iv) Annexures (Section –IV)

c) Part-III

i) Drawings, Specifications & Schedule of Technical Requirement (STR)

C O N T E N T S

Part- I

i) Bid Invitation

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

E- GLOBAL TENDER No. RE2015TWMRI0001

BID INVITATION FOR ELECTRONIC OFFERS

Electronic Bids are invited for and on behalf of the President of India from established manufacturers (or their authorized agents) of the stores for supply of the following:

SN	Tender No.	Description	Qty. reqd. (in Nos.)	Cost of Bid Document	Earnest Money or Bid Gaurantee	Last date of submission & opening of Bids
1.	RE2015TW MRI0001	Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.) as per Technical Specification No. TI/SPC/OHE/8WDETC/0092 of August' 2015 with measuring and recording instrumentation **(MRI)** as per Technical Specification TI/SPC/OHE/MRI/0140 of Nov.' 2015	29 (Twenty nine)	10,000/- (INR) Or 160 US dollars	20,00,000 (INR) Or 32,000/- US dollars	12.07.2016

2. Non-transferable Bid documents containing detailed description of stores and also other terms and conditions are available at www.ireps.gov.in and may be downloaded there from for on- line submission of E- bid.

3. The cost of Bid document is to be deposited either with the FA&CAO, Northern Railway, Baroda House, New Delhi- 110001 or can also be paid by submitting a Bank Draft (DD) drawn on any Indian Nationalised Bank in favour of the FA & CAO, Northern Railway, Baroda House, New Delhi payable at New Delhi. The scanned copy of receipt/DD as documentary evidence for payment of cost of bid documents shall be uploaded along with their e-bid at www.ireps.gov.in site. Original receipt towards the payment of cost of bid documents should be submitted manually with other documents to Director, Railway Electrification (Stores), Room No.114, Railway Board, Rail Bhavan, New Delhi-110001upto 14.30 hrs on the date specified for opening of bids.

4. Pre bid conference will be held with the prospective bidders for technical/ commercial discussions/ clarifications. This conference will be held in Railway Board on 03.05.2016 at 11.00 hrs. It is mandatory to submit fee equal to the cost of bid document in the manner as mentioned in para 3, before start of pre bid conference, and this shall be treated as the fee of bid document, the original receipt/DD is required to be submitted at the time of Pre bid conference. The copy of receipt/ DD is also required to be submitted along with tender document while uploading the e-Bid.

5. No manual offers shall be accepted against this tender.

6. In future all the corrigendum/notices w.r.t this tender shall be posted at www.ireps.gov.in only and not published in print media.

(Rajeev Saxena)
Director, Rly. Electfn.(Stores),
Railway Board
For & on behalf of the President of India

Part- I

ii) **SCHEDULE OF REQUIREMENTS**

E- Tender No.RE2015TWMRI0001

Name and address of the bidder
(to whom issued)

The Bids will be received up to 14.30 hrs, and will be opened thereafter on the date as specified in Bid Invitation.

Amount of Earnest Money to be deposited: _____
(See clause 6.1 of Instruction to Bidders).

SN	Tender No.	Description of Stores	Qty. (in Nos.)	Ultimate consignee	Port Consignee
1.	RE2015TWMRI0001	Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.) as per Technical Specification No. TI/SPC/OHE/8WDETC/0092 of August' 2015 with measuring and recording instrumentation as per Technical Specification TI/SPC/OHE/ MRI/0140 of Nov.' 2015	29 (twenty -nine)	To be advised later on.	CMM/BL, ER/Kolkata

1.1 Detailed breakup of cost is as follows:-

The breakup of price between vehicle (8W DETC) and measuring & recording instrumentation and their sourcing indigenous/ otherwise should be clearly indicated. (If break up is not given offer is liable to be summarily rejected). Please note that this breakup is taken only for the purpose of payments in two different currencies (in case of partly indigenous and partly imported offer) and calculation of price variation to be calculated as per para 3.0 of additional conditions of Bid. For the purpose of supply, integrated vehicle along with instrumentation is to be supplied as per Technical Specification of this tender. The cost of vehicle and instrumentation is to be quoted separately in Table A and B as follows:

Table-A					
SN	Details	Quantity	* Unit Basic Rate	Taxes & any other charges	Total all inclusive cost of 8W DETC with MRI (A)
1	**Cost of Vehicle** in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge				

	(1676 mm) Electrified (25 KV A.C.) as per Technical Specification No. TI/SPC/OHE/8WDETC/0092 of August' 2015 with measuring and recording instrumentation as per Technical Specification TI/SPC/OHE/ MRI/0140 of Nov.' 2015.				

Table-B				
Details	Quantity	* Unit Basic Rate	Taxes & any other charges	Total all inclusive cost of 8W DETC with MRI (B)
Cost of instrumentation in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.) as per Technical Specification No. TI/SPC/OHE/8WDETC/0092 of August' 2015 with measuring and recording instrumentation as per Technical Specification TI/SPC/OHE/MRI/0140 of Nov.' 2015.				

* The cost A + B should be the total cost of OHE recording car 8W- DETC with measuring & recording instrumentation, exclusive of the costs of items in C/D/E/F/G & H as mentioned in subsequent tables.

(Note: In case of partly imported and partly indigenous offer where import is done by railways, the interest on advance payment on imported portion for inter-se ranking shall be calculated as per para 4.3 of Additional Special conditions of Bid. Time period equal to 12 months shall be taken as default irrespective of time when the actual import is done by railways and advance payment is made to the contractor against B.G.)

Table C						
S.N.	Details	Quantity of 8W DETC with MRI	Unit Rate	Taxes & any other charges	Total all inclusive cost of spares per 8W DETC with MRI (c)	Total all inclusive cost (C)=(c* qty of 8W DETC with MRI
1.	Spare parts and special maintenance tools along with manpower required for two years normal maintenance during warranty period to cover all equipments/components of Measuring/ Recording system except vehicle. *(The cost must be quoted on lump sum basis for 2 years comprehensive maintenance of Measuring/ Recording system. However the list of spares to be enclosed is to be indicative and as per*					

	assessment made by the tenderer.).					

Table D						
S.No	Details	Quantity of sets of unit exchange spares to be quoted (= qty of tower cars/ 10, rounded off to next whole no.) (i)	Unit Basic Rate of each spare	Taxes and any other charges	Cost per Set of unit exchange spares (ii)	Total cost of Unit exchange spares (D)=(ii) X(i)
	Unit exchange spares for every set of 10 8W DETC with MRI or part thereof as per clause 1.16.2 of technical specification TI/SPC/OHE/8WDETC/0092 of August' 2015. Each set will consists of following: i) Flexible coupling/ Engine connection (complete) - 1 set ii) Traction Alternator along with Power Rectifier - 1 set iii) Air compressor (complete - 1 unit iv) Motorised Bogie (complete with Traction Motors and Break Gear)- 1set v) Battery charger for charging of starter Batteries - 1 unit vi) Auxiliary Alternator - 1 set					

Table-E						
S.No	Details	quantity of 8W DETC with MRI	Unit Basic Rate	Taxes and any other charges	Total cost of tools per 8W DETC with MRI (e)	Total all inclusive cost (E)=(e)*qty of 8W DETC with MRI
	Tools as per clause 1.17 of technical specification no. TI/SPC/OHE/8WDETC/0092 of August' 2015 of 8W DETC. List of tools & special tools for maintenance and overhaul of OHE Cars shall be supplied as per Annexure-8-A, 8-C by the Tenderer in accordance with Clause 6.1 of above mentioned technical specification.					

Table-F						
S.No	Details	quantity of 8W DETC with MRI	Unit Basic Rate	Taxes and any other charges	Total cost of testing kit per 8W DETC with MRI (f)	Total all inclusive cost (F)=(f)*qty of 8W DETC with MRI
	Testing Kit as per clause 1.18 of technical specification no. TI/SPC/OHE/8WDETC/0092 of August' 2015. The testing Equipment shall be supplied as per annexure-8-B of above specification.					

Table-G						
S.No	Details	quantity of 8W DETC with MRI	Unit Basic Rate	Taxes and any other charges	Total cost of training per 8W DETC with MRI (g)	Total all inclusive cost (G)=(g)*qty of 8W DETC with MRI
	Training as per clause 1.12 of technical specification No. TI/SPC/OHE/8WDETC/0092 of August' 2015 and clause 1.11.1 of Technical Specification No. TI/SPC/OHE/ MRI/0140 of Nov.' 2015. The training material shall be supplied as per Annexure 8-D of technical specification No. TI/SPC/OHE/8WDETC/0092 of August' 2015.					

Table-H									
	AMC for 05 years after warranty period for components as per clause 6 of Additional Special Conditions of Bid Tender. (It should cover all components as per para 1.16.1 of Technical Specification of MRI no TI/SPC/OHE/ MRI/0140 of Nov.' 2015). Lump sum cost must be quoted, however list of spares should also be indicated which should be comprehensive and as per the assessment of tenderer.								
		Cost (in Rs)			Taxes		PV Factor @ 10% per annum (vi)	Cost of AMC per 8W DETC with MRI after discounting factor for evaluation (in Rs) *	Total all inclusive cost for all 8W DEITC with MRI
		Material component (i)	Labour component (ii)	Total (iii)	VAT (iv)	Service Tax (v)			
a	First year AMC cost						0.7513		
b	Second year AMC cost.						0.6830		

c	Third year AMC cost						0.6209		
d	Fourth year AMC cost						0.5644		
e	Fifth year AMC cost						0.5132		
								Total Cost (G)	

NB: The AMC cost (H) will be calculated after multiplying quoted rates with PV factor i.e. after discounting annual cost @ 10% per annum.

* = [{(i) x (iv)} + {(ii) x (v)}] x (vi) / 100

For evaluation purposes, total cost of 29 nos. 8W DETC with MRI for Tables A+B+C+D+E+F+G+H will be considered.

*SPECIAL NOTES:

1. The e-bids should be uploaded at www.ireps.gov.in before the time and date specified for the same. Only the rates and the details required as per mandatory requirements as per para 2.0 below, are to be uploaded on the IREPS site. Other documents are to be submitted manually to the Director, Rly. Electfn.(Stores) Ministry of Railways (Railway Board), Room No.114, Rail Bhavan, New Delhi-110001 before the date & time specified for bid opening. Copy of bid with complete documents shall be submitted manually in 3 copies marked as 'ORIGINAL', 'DUPLICATE' and 'TRIPLICATE' and each copy of the bids should be complete in all respects. Please note all the three copies of bid must be hard /Spiral bound. In case of any variation in rate, the figures indicated in the e-bid shall be considered final. Bidders must note that original copy of Bid guarantee (EMD) instruments must reach this office within the specified time of bid submission/opening on bid opening date. In case original copies of aforesaid documents are not received upto 14.30 hrs of bid opening date, bid will be summarily rejected.

2. MANDATORY REQUIREMENTS OF ELECTRONIC TENDERS:

Bidders are required to fill-in and upload the following proforma giving an undertaking for submission of required information/ details at the time of on-line submission of their e-bid. Hard copy of following proforma duly signed by the digital signatory should also be submitted manually along with other documents to this office within the specified time limit i.e. upto 14.30 hours on bid opening date.

S.No.	Requirement Remarks	Remarks
1	Have you remitted the cost of the Bid Documents or *submitted the cost of bid documents with offer ?* *(If yes Please fill-up the money receipt No. and other details)*	Money receipt No. date ……. And amount Rs. …./USD….. or Bank Draft No. …..date ….. for Rs……/USD…. Name of bank……
2	Have you submitted a Bid Guarantee *as per clause 6 of Instructions to Bidders ?* *(If yes Please fill-up the bid guarantee No. and other details)*	Bid Guarantee No. …. Date……. Amount……..Name of bank issuing bid guarantee……..

3. Attention of the Bidders is invited to:

a) Eligibility Criteria for Bidders- clause 1 of 'Additional special conditions of Bid'
b) Bid Guarantee- clause 6 of 'Instruction to Bidders'
c) Discrepancy in rates quoted in words and figures- clause 7.4 of 'Instruction to Bidders'
d) Evaluation of Offers- clause 11 of 'Instruction to Bidders'.

4. Wherever conditions mentioned in different parts of Bid document differ/conflicts, sequence of preference will be Part-I, Part-III, Part-II.

5. Bidders are required to submit Performance Statement as per Annexure 3. The said performance statement is also required to be uploaded with e- bid.

6 Indigenous (domestic) bidders should quote "FOR station of dispatch" rate, giving the detailed break-up separately as per clause 9.8 of 'Instruction to Bidders'.

7. Foreign bidders should quote F.O.B prices on the basis of F.O.R stowed and Trimmed, and CFR prices giving the detailed break-up separately as per clause 9.0 of 'Instruction to Bidders'. For deliveries Free at destination in India, bidders may quote in Indian rupees for Indigenous component and imported portion in foreign currency separately.

8 The bidders should indicate the weight, size and volume of each of the package/container with the details of the materials proposed to be packed in such package and weight of each item. Basis of freight rate shall also be indicated in the bid.

9. The bidders should quote to the specification in all respects. Technical Specification is to be uploaded on the web site with their e-bid and a copy of same shall also be submitted manually with other documents. If there are any deviations to the specification, a Deviation Statement indicating the Clause/Sub-Clause, deviation proposed and justification thereof should be enclosed. In this connection attention of the bidders is invited to clause 5.1 of the Instructions to Bidders. In case of 'NIL' deviations, the same should be specified.

10. QUANTITY VARIATION CLAUSE:- The Purchaser reserves the right to vary the quantity mentioned in the "Schedule of Requirements" by ± 30%. Purchaser also reserves the right to increase the contract quantity by a maximum of 30% after the placement of order during the currency of contract keeping the overall quantity increase within 30% of the bid quantity.

11. Tenderers must quote separately for certain specific items indicated in the technical specifications. Quotations for spares should be in the same proforma as Annexure '1' (Offer form).

12. Warranty period shall be 30 months from the date of delivery or 24 months from the date of installation, whichever is earlier.

13. Incomplete offer are liable to be summarily rejected.
    a) E- Bids not supported with proof of remitting the cost of bid documents shall be rejected.
    b) E- Bids received not accompanied with specified 'Bid Guarantee' shall be considered unresponsive & rejected. Any fax/ swift message/ communication from the bank for establishing/ issuing the bid guarantee later on will not be entertained.
    c) E- Bids received after stipulated time & date of opening shall not be considered.
    d) In case complete Bid in all respects is not received manually within the specified time on the date of bid opening.

14. E- Bids are liable to be rejected if -
    a) E- Bid is not open for acceptance for a minimum period of 240 days from the due date of opening of bid and Bid Guarantee is not valid for 285 days.
    b) Bidders who are not manufacturer, quote without letter of authority from manufactures.
    c) Indian Bidder of foreign manufacturer is not enlisted with DGS&D under compulsory registration scheme.
    d) If any manufacturer/seller gives the letter of authority specific for this tender to more than one bidder, bid of all the bidders who have produced such letter of authority will be considered disqualified.

15. DELIVERY SCHEDULE: For prototype approval, timeline as given in para 4 of 'Instruction to Bidders' should be adhered. However the suppliers may quote early deliveries against this tender.

16. In case, the date of tender opening falls on Gazetted Holiday or is subsequently declared as such, the tender will be opened on the next working day at the appointed time.

17. Inspection shall be carried out by IR or its authorized representative(s).

18. PRE BID CONFERENCE:
    Indian Railways will hold pre-bid conference with the prospective bidders for technical and commercial discussions/ clarifications. This conference will be held in Railway Board on . .2016 at 11.00 hrs in which Indian Railways will clarify all related issues regarding the stores being procured including design parameters/ standards/ specifications and conditions of tender. The bidders may also come out with their suggestions, if any, for modification in tender specification for the purpose of improvement in technical and commercial conditions including eligibility criteria. As a result of the discussions in the pre bid conference, if it is considered necessary to modify the technical specification or any of the tender conditions, the same shall be carried out. The modified tender document will again be uploaded on the above website for tender opening. Costs for attending the pre-bid will be borne by the bidder.

The bidders may send all the points/ queries technical as well as commercial two weeks in advance of the pre bid conference for discussion during pre-bid conference. It is the responsibility of the prospective bidders that they should on their own attend the said conference at the indicated venue, date and time without waiting for any communication. It is mandatory to submit fee equal to the cost of bid document in the form as mentioned in para 3 of Bid Invitation for Electronic offers, before start of pre bid conference, and this shall be treated as the fee of bid document, the copy of which can also be submitted along with tender document.

The last date for submission of suggestion, if any for modification in tender specification/ commercial condition is 07 days after pre-bid conference. Suggestions received afterwards will not be considered.

Part I

iii) ADDITIONAL SPECIAL CONDITIONS OF BID

E- Tender No. RE2015TWMRI0001

1.0 ELIGIBILITY CRITERIA: (Note: In case of JV/Consortium, Eligibility Criteria is to be fulfilled individually or jointly)

1.1 Bids are invited from manufacturers/JVs/consortium who must qualify on either of two criterion as mentioned in paras 1.1.1 and 1.1.2,

1.1.1 Bidder should have manufactured, supplied, commissioned at least one number of OHE recording & monitoring Car (complete with Rolling Stock and Instrumentation System) capable of measuring all the OHE parameters as required in this tender, anywhere over worldwide Railways, and shall have completed at least 02 years satisfactory performance on the date of bid opening, for which certificate from user Railway(s) is to be submitted.

or

1.1.2 In case bidder does not fulfill criteria as in para 1.1.1 above, but is an existing and regular Rolling Stock Manufacturer, having adequate experience in design, manufacture, erection, testing and commissioning of

a) EMU/ MEMU/ DEMU, or
b) Locomotives/ Tower Wagons/ Tower Cars, or
c) Self propelled Utility vehicles for movement on Railway Tracks;

will be considered eligible provided:

i) The bidder shall generally meet the Schedule of Technical Requirement (STR) to manufacture the self- propelled 8- wheeler Diesel Electric Inspection and Maintenance Car under slung type for operation on BG (1676 mm), in accordance with RDSO's STR No. TI/STR/030 Rev. '0'. The bidder is required to furnish a certificate to this effect containing the details of equipments employed and quality control measures adopted.

And

ii) has supplied any of the above mentioned Rolling stocks with at least 2 years of satisfactory performance on the date of bid opening, for the above mentioned vehicles, for which certificate from the user is also to be submitted.

And

iii) for Measuring/Recording instruments of OHE parameters, the bidder shall submit proof of tie up with the OEMs (Here OEM means either a manufacturer as per para 1.1.1 above or manufacturer of recording and instrumentation

system whose system capable of measuring all the OHE parameters as required in this tender is running successfully on the tower wagons/inspection car of other manufacturers) along with the satisfactory performance from user Railway(s) for at least five number of such Measuring instruments for a minimum period of two years on the date of tender opening.

1.2 Additionally the bidder should submit following:

1.2.1 A performance statement of last five years consisting of a list of major supplies, effected in past, giving details of the purchasers name and address, order number and date and the quantity supplied and whether the supply was made within the delivery schedule is also to be furnished.

1.2.2 The detailed comprehensive AMC proposal for 05 years applicable after warranty period of 24 months on firm price basis.

1.2.3 The bidder should furnish a brief write-up, backed with adequate data, explaining his available capacity (both technical & financial), for manufacture and supply of the required goods/equipment, within the specified time of completion, after meeting all their current commitments. Lead partner should be an Indian firm in case of consortium.

2.0 Number of partners shall not exceed five including lead partner in case of JV/consortium.

2.1 A firm can be a partner in only one joint venture/consortium. Bids submitted by joint ventures/consortium, including the same firm as partners in more than one bid, will be rejected.

2.2 A copy of joint bid agreement entered into by Joint Venture/consortium partners shall be submitted with the bid as per Annexure '12'. JV/consortium agreement duly signed by all JV/consortium partners shall form a part of contract agreement. JV/consortium partners will also furnish an undertaking that they are not involved in dispute/litigation with any of their partners in India or elsewhere in the world. The Joint venture/consortium agreement should be registered/ notarized in India as per the laws of India.

2.3 The lead member of JV will be responsible for all financial covenants and bank guarantees.

3.0 PRICE VARIATION CLAUSE: It is applicable only for the base cost of Inspection Car (excluding instrumentation) in case vehicle is indigenously made, and not on the spares, tools, training, testing kit, AMC etc.

3.1 The increase/decrease in the price of vehicle portion of 8W DETC with MRI **(excluding taxes and duties) for Indigenous portion of rate only (As quoted in the bid)** would be governed by the following formula:

$P = P_O/100 (15 + 45L1/L0 + 19.6I1/10 + 0.4FA1/FA0 + 5A1/A0 +15E1/EO)$

Where,
P= Escalated/De-escalated price of the coach.
P_O= Base price of coach

L1= All India Consumer Price Index for Industrial Worker compiled by Labour Bureau, Ministry of Labour, for calendar month, three months prior to call for inspection of the coaches.

L0= All India Consumer Price Index for Industrial Worker compiled by Labour Bureau, Ministry of Labour (one month prior to opening of tender).

I1= Index number of wholesale price in respect of Iron and Steel compiled by Economic Adviser to Government of India (Ministry of Industry) for calendar month, 3 months prior to call for inspection.

I0= Index number of wholesale price in respect of Iron and Steel compiled by Economic Adviser to Government of India (Ministry of Industry) (one month prior to opening of tender).

FA1= Index number of wholesale price in respect of Ferro Alloy compiled by Economic Adviser to Government of India (Ministry of Industry) for calendar month, 3 months prior to call for inspection.

FA0= Index number of wholesale price in respect of Ferro Alloy compiled by Economic Adviser to Government of India (Ministry of Industry) (one month prior to opening of tender).

A1= Index number of wholesale price in respect of non-ferrous metal compiled by Economic Adviser to Government of India (Ministry of Industry) for calendar month, 3 months prior to call for inspection.

A0= Index number of wholesale price in respect of non-ferrous metal compiled by Economic Adviser to Government of India (Ministry of Industry) (one month prior to opening of tender).

E1= Index number of wholesale price index in respect of Electrical Machinery compiled by Economic Adviser, Government of India, Ministry of Industry, for calendar month, 3 months prior to call for inspection.

E0= Index number of wholesale price index in respect of Electrical Machinery compiled by Economic Adviser, Government of India, Ministry of Industry, (one month prior to opening of tender).

3.1.1 In case P is greater than P0, the difference P minus P0 shall constitute the amount on account of escalation on cost of wage and material. Otherwise, the difference P0 minus P shall constitute the amount to be recovered as de-escalation.

3.1.2 If the deliveries are not made according to the schedule and are delayed beyond the terminal
date of delivery owing to any circumstances whatsoever and an escalation in wage and material takes place, such increase will not be admitted unless specifically agreed to at the time of granting extension in the delivery schedule. In other words, the escalation will be pegged to the month supplies were due in terms of Delivery Clause of the contract.

3.1.3 The decision of the President of India in regard to wage and material escalation under this
clause shall be final and not be subject matter for legal disputes or arbitration.

3.1.4 The limit of price variation due to PVC on indigenous portion shall be within ±15% of indigenous portion.

3.2 Variation on account of foreign exchange rate and custom duty on the foreign exchange portion (As quoted in the bid) included in the landed CIF/Ex-works cost of indigenous offer shall be allowed. The price originally quoted shall clearly indicate the CIF component of the quoted price with break-up of FOB price, Ocean freight charges. The foreign exchange and customs duty variation shall be applicable only for the portion of the import element, for which documentary evidence shall be furnished.

The price will be subject to adjustment on account of variation in Foreign Exchange and Custom Duty in actual and as per the formula given below:

$$\text{Final Price} = \text{Base Price} \times \frac{(1 + \text{Final Customs Duty})}{(1 + \text{Base Customs Duty})} \times \frac{(\text{Final Exchange rate})}{(\text{Base Exchange rate})}$$

Where

Base Price	=	Price as per contract
Final Price	=	Revised price applicable after taking into account variation in Customs Duty/Exchange rate.
Final Customs Duty	=	Rate of Customs Duty, Countervailing Duty, Cess and additional Duty thereon at the time of import/Exchange rate.
Base Customs Duty	=	Rate of Customs Duty, Countervailing Duty, Cess and additional Duty thereon on due date of tender opening
Final Exchange Rate	=	Final Exchange Rate is the rate of quoted foreign currency to Rupee issued by Customs Department every month for assessing duty.
Base Exchange Rate	=	Base Exchange Rate is the rate of quoted foreign currency to Rupee issued by Customs Department for the month of due date of tender opening

3.3 Any upward revision on account of PVC as given in para 3.1 and 3.2 above shall not be applicable beyond the date of expiry of original contract delivery period or the

refixed delivery schedule. Purchaser however, is entitled for benefit on account of downward swing.

3.4 Supplier cannot prepone the supplies to take advantage of any likely downward price variation during scheduled delivery period.

4.0 PAYMENT:

Payment will be made only against supply of complete Intelligent OHE recording car.

i) 80% of the cost of complete Intelligent OHE recording car, as defined in table A of Clause 1.1 of SOR to be released on proof of inspection and dispatch documents;

ii) 20% of cost of Intelligent OHE recording car, as defined in table A of Clause 1.1 of SOR along with taxes and duties to be released after installation & commissioning and on furnishing a warranty bank guarantee* for 10% value as per annexure 11 fully indemnifying the purchaser against all losses incurred by the purchaser during the guarantee period stipulated in warranty clause.

iii) Payment for spares, testing kit and tools to be made 90% against proof of dispatch and inspection and balance 10% after receipt of goods in India on furnishing a warranty bank guarantee* for 10% value as per annexure 11 fully indemnifying the purchaser against all losses incurred by the purchaser during the warrantee period stipulated in warranty clause.

iv) Cost of training to be released after completion of training.

v) Payment towards AMC shall be released on quarterly basis by the concerned railways.

* *The warranty bank guarantee should be issued by a nationalized Indian Bank or a Scheduled Bank in India. In case the same is issued by a foreign bank outside India, confirmation of the guarantee by any nationalized bank in India is required. Scheduled bank shall mean a bank so defined under Section 2(e) of the Reserve Bank of India Act, 1934. The complete particulars of the bank i.e. mailing address, telephone & Fax numbers and E-mail ID should be invariably indicated on the guarantee bonds*.

4.1 For Foreign Supplies:

Payment against foreign supplies shall be made through irrevocable & unconfirmed 'letter of credit'. All charges of Letter of Credit, levied by Foreign Bankers shall be borne by the contractor.

i) Payment on proof of inspection and shipment within 30 days of receipt of shipping documents as specified under:

a) 2 copies of negotiable cum original bill of landing.

b) Signed certified commercial invoice showing the description, weight and volume of such packages shipped.

c) Certificate that the amounts claimed are correct in terms of the contract.

d) A copy of contractor's letter addressed to the insurer and port consignee advising the closing particulars as per Annexure attached.

e) Inspection Certificate issued by the Inspecting Officer.

4.2 For Indigenous supplies:

i) Payment on proof of inspection and dispatch documents as specified, within 30 days of receipt of specified documents.

4.3 **For partly imported and partly indigenous supplies.**

The Standard payment terms shall be as for indigenous supplies as per clause 4.0 above. However, the following interim payment can be considered if desired by the tenderer.

i) 100% payment for imported components/assemblies on proof of inspection and dispatch of documents as specified to be made through letter of credit to be opened as in clause 4.1 above, within 30 days of receipt of specified documents against Bank Guarantee for full amount valid till satisfactory commissioning of the machine at its ultimate destination. No CST on this value would be payable in such cases.

ii) In case components/assemblies for the machine(s) are imported by the manufacturer and the machine(s) is supplied FOR, the payment shall be as per clause 4.0 above and CST as legally leviable on the value of the machine shall be to Purchaser's account.

iii) The above 100% payment under (i) for imported portion will be available to a tenderer only if the indigenous value addition is more than 20% of the cost of machine. To decide the inter-se position of the offers, interest on this 100% payment under (i) shall be worked out at the interest rate equal to prime lending rate as notified by State Bank of India on the date of opening of tender plus 2%. Time period equal to 12 months shall be taken as default irrespective of time when the actual import is done by railways and advance payment is made to the contractor against B.G.

4.4 In all cases, for indigenous supplier as well as foreign supplier, payment will be made only on fully assembled machines.

4.5 Any part payment if required in Indian rupees towards local expenses etc. in India, the same shall be payable at the rate of exchange (BC Selling) ruling on the date of opening of tender and shall not be subject to any further exchange variation on any account.

4.6 If a tenderer requests for a variation in the payment terms and if such variation is acceptable to the purchaser, the same would be evaluated at an interest rate equal to the prime lending rate as notified by State Bank of India on the date of

opening of tender plus 2% for all earlier payments for the purpose of comparison with the other tenderers.

4.7 In case the supplier fails to supply the machines as per the contractual delivery schedule 100% payment under clause 4.3(i) above would be levied an interest at the rate of 2% more than the Prime Lending Rate of State Bank of India for the delayed period beyond scheduled delivery period.

5.0 TRAINING:

i) Cost of training to be part of bid evaluation.

ii) The contractor shall arrange for the training the maintenance and operating personnel of Indian Railways at their works and at installation site.

iii) The training shall necessarily cover following areas besides any other relevant topic:

a) Basic design and technical features of recording car,

b) Operation and maintenance of recording car

iv) (a) The detailed Programme of training will be drawn up within 4 months from the date of issue of contract. The living costs of IR personnel and the transportation cost upto the place of training shall be borne by IR.

(b) The contractor shall provide free of charge to IR personnel necessary information, working dress where needed, any safety glasses/equipment and office supplies during the training period.

(c) The contractor shall designate qualified, specialists to advice and train IR technical personnel and explain relevant aspects, related to product.

(d) IR technical personnel deputed for training shall observe the laws and regulations of the country of training as well as rules and regulations of the facilities in which they undergo training. The training shall be imparted during the normal working periods and working days. One working day normally denotes eight working hours.

(e) Each group of trainees from IR shall be accompanied by a leader who shall oversee the progress.

The purchaser shall finalize the training schedule with the contractor within 4-6 months of the contract. Travel, lodging and boarding costs would be borne by IR.

6.0 ANNUAL MAINTENANCE CONTRACT (AMC)

6.1 The Tenderer shall quote for AMC of all Equipments/Components of Measuring System such as Transducers, Load Cells, Strain Gauges, High Resolution Camera, On Board Computers, Laser Printers and Plotters, UPS and other Interface Equipments. The Annual Maintenance shall be for 05 years after warranty period is over. The Tenderer shall quote year wise rates of AMC detailing the various maintenance schedules enlisting the requirement of material/ spare parts, consumables, and services to be rendered by him in regular intervals. All these materials, spare parts, consumables and labour requirement shall be arranged by the successful Tenderer during the course of AMC. The AMC shall be comprehensive for all Equipments of Measuring system covering scheduled as well as break down maintenance. The Tenderer shall keep adequate spares in stock accordingly. AMC shall be inclusive of replacement of parts, if required, either due

to breakdown or due to regular wear and tear or due to obsolescence. Tenderer has to ensure all required spares are available, & in case of non-availability, the feature is to be upgraded without any extra cost.

6.2 The cost of 8WDETC with MRI, including the AMC cost of Measuring System, shall be considered while evaluating the inter-se tender position. It shall be compulsory for the Tenderer to quote for AMC without which the offer shall be summarily rejected.

6.3 Tenderer shall submit various maintenance schedules such as Daily/Weekly, Monthly, Quarterly, Half yearly and Yearly schedules of all Equipments along with the offer. However for all the scheduled maintenances, maximum 2 days or 48 hours shall be allowed per quarter.

6.4 During warranty period, scheduled maintenance such as Daily/Weekly checks, Monthly, Quarterly, Half yearly and Yearly schedules of Measuring Equipment/Components shall be done by the successful contractor for which no extra cost shall be paid by the Railways. However, Scheduled maintenance of Car Equipments/Components, other than Measuring Equipments, shall be carried out by the Railways during the warranty period.

6.5 Penalties for delay in attending complaints under maintenance contract (AMC) shall be governed by the clause 6.8 below.

6.6 The AMC agreement shall be entered with the concerned Railway as per the accepted rate in the contract.

6.7 Rates of AMC are to be quoted in Indian Rupees only and no Price Variation is permitted on AMC charges. It may be noted that only Service Tax is applicable on AMC charges. There should be at least one quarterly visit for preventive maintenance at the consignee end. No passes will be issued by railways for AMC visits.

6.8 Special conditions for reliability of vehicle during both Warranty period (2 years) and AMC period (05 years)

The successful bidder will be fully responsible for maintaining the Intelligent OHE recording car up to the required standard and with a pre-defined standard of reliability for the earlier specified Warranty period and AMC period for the defined components/parts of the vehicle for the respective period. Reliability will be measured by following parameters; i) Maximum downtime allowed per year shall be 15 days or 360 hours including both scheduled maintenance and failures, ii) There should not be more than 2 (two) failures in a year.

(IOH/POH period shall not be counted in the downtime period).

Beyond the above defined Downtime, the penalties shall be @ Rs. 5000/- per day for 15th to 30th day in the year, Rs. 20,000/- per day for the 31st to 60th days and after this period performance bank guarantee shall be liable to forfeiture. In case of 3rd failure or more, penalty of Rs. 50,000/- per case shall be levied in addition.

Downtime is defined as non-availability of the OHE recording car for its intended use. While failure is defined as malfunctioning of the entire unit or its parts/components so as to make the OHE recording car unfit for line operations to meet out the intended requirements. Here downtime for the purpose of penalties during the AMC period shall take into account the failures/ malfunctioning of Measuring/ Recording equipments only.

7.0 A substantially responsive bid will be that conforms to all terms and condition and specification of the bidding document without any material deviation, reservation or omission. A material deviation, reservation or omission is one that:

a) affects, in any substantial way the scope, quality, or performance of the goods and related services specified in the contract; or
b) limits in any substantial way, inconsistent with the bidding documents, the purchaser's rights or bidder's obligations under the contract; or
c) If rectified would unfairly affect the competitive position of other bidders presenting substantially responsive bid.

7.1 The bidder submitting clause wise compliance shall be considered a responsive bid. For any non material deviation mentioned in bid document, clarifications can be taken by RDSO at bid evaluation stage after observing the conditions mentioned in 7.0(a), (b) and (c) above.

CHECK LIST-I (for indigenous suppliers)

1.	Have you purchased the Bid Documents or *submitted the cost of bid documents with offer ?*	Yes/No
2.	Have you submitted a Bid Guarantee *as per clause 6 of Instructions to Bidders* ?	Yes/No
3.	Have you furnished a Letter of Authority ? (If manufacture is not quoting directly). (Annexure 6)	Yes/No
4.	Have you furnished a Performance Statement ? (Annexure 3)	Yes/No
5.	Have you furnished the Statement of Equipment & Quality Control ? (Annexure 4)	Yes/No
6.	Have you furnished the Statements of Deviations indicating clauses /sub-clauses, deviation proposed in the prescribed format given as Annexure-9. The bidder shall also submit certificate of compliance as per Annexure-9(1). In case of 'Nil' deviations the same should be specified.	Yes/No
7.	Have you quoted in the prescribed proforma ?(Annexure 1 or 2)	Yes/No
8.	Have you kept your offer valid for 240 days ?	Yes/No

Signature & Seal of the Manufacturer/Bidder

CHECK LIST – II. (For foreign suppliers)

i.	Have you submitted the authorization letter authorizing your agent to quote on this tender?	Yes/No
ii.	Have you indicated the complete name and address of the agents and details of the services to be rendered by the agents?	Yes/No
iii.	Is the agent going to render after sale service?	Yes/No
iv.	In case the answer to (iii) is yes, confirm that the agent has necessary infrastructure and competent staff to render the same.	Yes/No
v.	Have you submitted a copy of your agreement with your Indian Agents ?	Yes/No
vi.	Manufacturer or their sole selling agents may note that an agent can represent only one firm in a tender and any manufacturer cannot submit more than one offer against a tender through different sole selling agents or one directly and others through sole selling agents. In such a situation all the offers will be rejected.	Noted
vii.	Have you indicated your Indian Agent's Income Tax Permanent Account Number?	Yes/No
viii	Are you aware that any payment against the contract, if placed, to your Indian agent directly by you in currency other than in Indian Rupees is against the Indian Laws ?	Yes/No
ix.	Are you aware that failure to disclose the full amount of remuneration / agency commission payable to your Indian Agents shall render the contract void?	Yes/No
x.	If Indian agent of a foreign manufacturer is bidder, enlistment details with DGS&D under compulsory registration scheme have been enclosed.	Yes/No

Signature & Seal of the Manufacturer/Bidder

GOVERNMENT OF INDIA
(BHARAT SARKAR)
MINISTRY OF RAILWAYS
RAIL MANTRALAYA
(RAILWAY BOARD)

BID DOCUMENTS
PART-II

RAIL BHAWAN, RAISINA ROAD,
NEW DELHI-110001, INDIA

FAX NO: +91 11 23386011

CONTENTS

Part-II

SECTION-I

INSTRUCTIONS TO BIDDERS

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Clause No.

INSTRUCTIONS TO BIDDERS

1. GENERAL INSTRUCTIONS

1.1 On behalf of the President of India, the Director, Railway Electrification (Stores), Ministry of Railways, (Rail Mantralaya) (Railway Board), New Delhi, INDIA (hereinafter referred to as the Purchaser), invites Bids from manufacturers or other bidders authorized by manufacturer for the supply of items indicated in the "Schedule of Requirements".

1.2 Offer in the prescribed form at Annexure 1 or 2 (as applicable), should be submitted before the time and date fixed for the receipt of offers as set forth in the tender papers. Offers received after the stipulated time and date, shall not be considered.

1.3 All information in the offer must be in English. Information in any other language must be accompanied by its authenticated translation in English; failure to comply with this may render the offer liable to be rejected. In the event of any discrepancy between an offer in a language other than English and its English translation, the English translation will prevail.

2. TECHNICAL INFORMATION

2.1 Specifications indicated in the "Schedule of Requirements" forms part of ‘Bid Document” and may also be obtained on payment from the following: —

(i) Indian Railway Standard Specifications form.
(a) The Controller of Publications, Civil Lines, Delhi-110054, INDIA.
(b) Office of the High Commissioner for India, Publication Branch, India- House, Aldwych, London-WC.

ii) Indian Standards Specifications from the Director General, Indian Standards Institution, Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi-110001, INDIA.

(iii) Particular Specifications, Drawings and details from Director General, Research Designs and Standards Organisation, Manak Nagar, Lucknow-226011, INDIA or Integral Coach Factory, Perambur, Chennai as the case may be.

2.2 The equipments offered should be in accordance with the stipulated drawings and specifications in "Schedule of Requirements".

2.3 Details of variations from the drawings and specifications, if any, should be clearly indicated and in such an event where alternative product is offered, a certificate from the users must be furnished to the effect that the product offered is an alternative acceptable to the users in the country of origin and in one or more other countries, The names of users in those foreign countries should also be indicated.

2.4 The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the tender specifications. However, the decision of the Purchaser in this regard shall be final. In this connection, bidders must submit the "Statement of Deviations" from tender (Annexure-9) indicating clauses /sub-clauses, deviation proposed and justification thereof. The bidder shall also submit certificate of compliance as per Annexure-9(1). In case of 'Nil' deviations the same should be specified.

3. AGENTS AND SERVICE FACILITIES IN INDIA—AGENCY COMMISSION

3.1 Foreign bidders quoting direct against the Bid invitation and who want Indian Agents/Associates and /or servicing facilities in India should indicate in their offer the name and address of their Indian Agent /Associates or the representatives they have for servicing in India.

3.2 Bidders should quote -

(i) Net FOB and CFR prices exclusive of the amount of remuneration or commission and

(ii) Agency Commission/remuneration payable to the Indian Agents. It should be understood that the purchaser will make direct payment of such commission to the Indian Agents in respect of a contract arising out of invitation to Bid, where the Indian Agents' remuneration/commission covers a part of the contract price.

3.3 Bidders are required to furnish following details -

(i) The precise relationship between the foreign manufacturer/principals and their Indian Agents;

(ii) The mutual interest which the manufacturer/principal and the Indian Agents have in the business of each other,

(iii) Any payment which the Agent receives in India or abroad from the manufacturer/Principal whether as a commission for the contract or as a general retainer fee;

(iv) Indian Agent's Income-Tax permanent Account number;

(v) All services to be rendered by the Agent whether of general nature or in relation to the particular contract and the facilities/infrastructure available with them for the same and

(vi) Past performance.

3.3.1 Enlistment of Indian Agents with DGS&D under compulsory registration scheme, if Indian agent is quoting directly as bidder. In such cases enlistment details with DGS&D under compulsory registration scheme are required to be enclosed. (Authority rule 143 of GFR 2005-Min.of Finance).

3.4 In the case of foreign bids, the Agency Commission payable to the Indian Agents shall be indicated in foreign currency in the space provided in the offer form. However, Agency Commission finally payable to the bidder's Agent in India under the contract will be converted to Indian Rupees at the telegraphic transfer buying rate of exchange ruling on the date of placement of the order as quoted by State Bank of India and shall not be subject to any further exchange variation. The Agency Commission shall be paid in non-convertible Indian Rupees to the Indian Agents only after successful completion of the contract, commissioning of the machines or equipment wherever involved. No Agency commission shall be paid on 'Training' and 'AMC' charges.

3.5 Manufacturer or their sole selling agents may note that an agent can represent only one firm in a tender and any manufacturer cannot submit more than one offer against a tender through different sole selling agents or one directly and offers through sole selling agents. In such a situation all the offers will be rejected.

3.6 The agent is representative of Manufacturer/ Principal,/Bidder accordingly Manufacturer/ Principal,/Bidder shall be responsible for the conduct of their appointed agent. This may please be noted.

4. **DELIVERY SCHEDULE**

4.1 Time line for delivery:

i) Firm has to submit final/detailed drawings to RDSO and get it approved within ~~three~~ five months of placement of supply order for prototype. Out of these five months, firm will have total 3 months for preparation and submission of drawings in one/multiple step, including the cases of resubmission of drawings. While RDSO has to approve drawings in a total time of 2 months.

ii) Manufacture of Prototype by firm and its Clearance by RDSO- within next nine months. Here, total 6 months time is on firm's account while 3 months time on RDSO's account.

iii) Supply is to commence in 2-3 months after the prototype approval.

iv) Purchaser also requires that total supplies be completed in next 12 months time.

5. OFFERS:

5.1 All offers addressed to the President of India should be made in the offer form as per proforma attached at Annexure '1' or '2' or '2A' and should be clear and complete in all respect. The offer form should be accompanied by a statement of deviation from Tender Specification in the proforma and a statement of Deviation from the Standard Terms and Conditions of the Tender in the proforma enclosed as Annexure '9'. No deviation other than those mentioned in the statements as Annexure '9' will be permissible or will be treated as binding. Manufacturers may enclose with their offer any other documents containing explanatory memorandum etc. should they so desire. Deviations as mentioned above should not have any financial implications. However if any quoted deviation is found to have financial implication and is not accepted, the tenderer has to accept the original terms and conditions of the tender at its quoted price, failing which its offer is liable to be rejected summarily.

5.2 The price quotations and other financial terms should be given in the offer form and not in the other accompanying documents or statements. If necessary, the reverse of the form may be utilized for this purpose.

6**. EARNEST MONEY/ BID GUARANTEE**

6.1 Bid Security for the amount stipulated in the "Bid Invitation" shall accompany each tender. The bid security shall be denominated in the currency of the bid or another freely convertible currency, and shall be in one of the following forms:

(a) Deposit receipt, Pay orders and Bank Draft in favour of the Financial Adviser and Chief Accounts Officer, (CORE/Allahabad or FA&CAO of any of the seventeen

zonal railway), from a Nationalized Indian Bank or scheduled commercial bank in India.

(b) Bonds of IRFC and KRCL (Acceptable in the name of bidder only).

(c) In case bank guarantee is submitted as earnest money it should be issued by a nationalized Indian bank, or a scheduled bank in India in the format as per Annexure-5 **(in case bank guarantee is submitted by bidder) and as per Annexure 5A (in case bank guarantee is submitted by Indian Agent for and on behalf of bidder)** and having a validity period of 285 days (45 days beyond Bid Validity). In case the Bank Guarantee is issued by a foreign bank outside India, confirmation of the same by any nationalized bank in India is required, For the avoidance of doubt, Scheduled Bank shall mean a bank as defined under Section 2(e) of the Reserve Bank of India Act, 1934. It shall be ensured that the complete particulars of the Banks' (issuing bank guarantee) mailing address including telephone number, fax number & E-mail ID are invariably indicated on the Bid bonds.

(d) The EMD should be valid for 45 days beyond validity of the bid.

(e) The Bank Guarantees(BGs) to be submitted by the bidders may be sent directly to the Purchaser by the issuing bank under registered Post A.D. and a copy of BG submitted along with the offer.

(f) Indian agent can pay BID Guarantee, if authorized by the Bidder, in manner other than Bonds of IRFC and KRCL.

6.2 If the validity of the offer is extended, BID Guarantee Money/Bank Guarantee duly extended shall also be furnished, failing which the offer after the expiry of the aforesaid period shall not be considered by the Purchaser.

6.3 No interest will be payable by the Purchaser on the BID Guarantee Money.

6.4 The BID Guarantee deposited is liable to be forfeited if the bidder withdraws or amends impairs or derogates from the BID Invitation in any respect within the period of validity of the offer.

6.5 The BID Guarantee of the successful bidder will be returned after the Contract Performance Guarantee as required is furnished and formal contract duly signed is received by the Purchaser.

6.6 If the successful bidder fails to furnish a Contract Performance Guarantee and or fails to return the formal contract duly signed within fifteen days of the receipt of the formal contract, then the BID Guarantee Money is liable to be forfeited by the Purchaser.

6.7 The BID Guarantee Money of all unsuccessful bidders will be returned by the Purchaser within one month of the placement of contract on successful bidder.

6.8 **Any bid not accompanied by a Bid Guarantee in one of the approved forms given in Clause 6.1 above shall be considered as unresponsive & rejected.**

7, **SUBMISSION OF OFFERS**

7.1 The bids should be submitted in 4 copies marked as 'ORIGINAL', 'DUPLICATE', 'TRIPLICATE' and 'QUADRUPLICATE'; each of the bids should be complete in all respects. **Please note all the four copies of bid must be hard /Spiral bound.**

7.2 Any individual (s) signing the BID or other documents connected with the bid should specify whether he is signing-

(i) as sole proprietor of the concern or as an attorney of the sole proprietor,

(ii) as a partner or partners of the firm;

(iii) as a Director, Manager or Secretary in the case of a Limited Company duly authorised by a resolution passed by the Board of Directors or in pursuance of the Authority conferred by Memorandum of Association.

7.3 In the case of a firm not registered under the Indian Partnership Act, all the partners or the attorney duly authorised by all of them should sign the tender and all other connected documents. The original power of attorney or other documents empowering the individual or individuals to sign should be furnished to the Purchaser for verification, if required.

7.4 All prices and other information like discounts etc. having a bearing on the price shall be written both in figures and words in the prescribed Offer Form. **In case of any discrepancy in rates quoted in words & figures the Rates quoted in words shall be considered.**

7.5 Offer in the prescribed form (Annexure-1 or 2 as applicable) should be addressed to the President of India through the Director, Railway Electrification (Stores), Ministry of Railways, (Railway Board), Rail Bhavan, Raisina Road, New Delhi-110001—INDIA.

7.6 Offers shall be as per the ITT, the General and Special Conditions of Contract given in the Bid Documents. However, the bidder shall indicate his acceptance or otherwise against each clause and sub-clause of ITT, the General and Special Conditions of Contract as mentioned in para 5.1 above. The Purchaser, however, reserves the right to accept or reject these deviations and Purchaser's decision thereon shall be final.

7.7 Offers are required from the actual manufacturers of the stores or Bidders authorised who should submit a letter of authority from their Principals/Manufacturer as in Annexure-6. **Offers from brokers and middlemen shall not be accepted.**

7.8 Each page of the offer must be numbered consecutively, should bear the bid number and should be signed by the bidder at the bottom. A reference to the total number of pages comprising the offer must be made at the top right hand corner of the first *page.*

8. **LOCAL CONDITIONS**

8.1 It will be imperative on each bidder to fully acquaint himself of all the local conditions and factors which would have any effect on the performance of the contract and cost of the stores. In his own interest, the foreign bidder should familiarise him-self with the applicable Income Tax Act, the Companies Act, the Customs Act and related Laws in force in India.

The Purchaser shall not entertain any request for clarifications from the bidder regarding such local conditions. No request for the change of price, or time schedule of delivery of stores shall be entertained after the BID is submitted to the Purchaser.

9. **PRICE BASIS AND INDEMNITY**

9.1 Foreign bidder shall quote his prices on the basis of (i) FOB nearest Port of shipment having facilities to handle the same, and also indicate CFR PRICE at the Indian Port of Entry indicated in the Schedule of Requirement.

9.2 Under the CFR price, the FOB price and Ocean freight charges shall be indicated separately.

9.3 The terms FOB and CFR shall be as defined in the current edition of International Rules for the interpretation of the Trade Terms published by the International Chamber of Commerce, Paris and commonly referred to as INCOTERMS.

9.4 These prices should not include agency commission payable to Indian Agents which shall be exhibited as already indicated in clause-3.2. The Indian Agent's commission shall be shown in foreign currency as a definite amount and not as a percentage.

9.5 The prices should be stated only in one currency and should either be in US Dollars or in a freely convertible currency. However the portion of the bid price relating to components of Indian origin to be incorporated in the stores and/or supply shall be stated in Indian Rupees. The contract price will normally be paid in the currencies in which the price is stated in the successful tender. However, purchaser reserves the right to effect payment of the equivalent amount in the currency or currencies of the country of origin of the goods in case the price is stated in other currencies. The equivalent amount will be calculated on the basis of rates of exchange prevalent on the date of payment.

9.6 The prices quoted shall be firm (except for variation due to price variation clauses of the tender) and not subject to any variation. In the case of CFR delivery, Ocean freight charges included must also be firm and no variation will be allowed on this account after the opening of tenders.

9.7 Quoted Rates should be made only for units specified in the "Schedule of Requirements".

9.8 Bidders submitting indigenous offers shall indicate the “Free at Station of dispatch” Price, which shall include all state and Central Taxes and Excise Duties leviable on the Final finished supplies tendered for, handling & Other charges. A complete break-up showing the ex-factory price, taxes and excise duties, transit, incidentals and handling charges and insurance charges, if any, shall also be given.

9.9 Statutory Duties shall be paid against documentary evidence as per actual as applicable during the currency of the contract.

9.9.1 For Octroi and Entry tax necessary exemption certificate shall be issued by the consignee. In case this certificate is not accepted by the State authorities / Local bodies the same shall be on contractor's account.

9.9.2 New statutory taxes/ duties and changes in existing statutory taxes/duties will be paid as actual during currency of contract. Documentary evidence regarding imposition of such duties and taxes and payments made must be furnished for any reimbursements. Purchaser reserves the right to make recoveries in case of any waiver or reduction of such duties, with retrospective effect, by the government.

9.10 CENVAT CREDIT:

9.10.1 The prices quoted by the bidders should take into account the credit availed on inputs under the CENVAT credit rules 2004. The bidders should also state quantum set offs in respect of duties on inputs (as admissible under law) that is being totally and unconditionally passed on to the purchaser, in the prices quoted per unit of the item.

9.10.2 In the event of additional CENVAT credit being extended by the Govt. of India, to cover items ordered against present tender, the same shall be passed on to the purchaser. The bill for payment should accompany the following certificate:

a) We hereby declare that no additional CENVAT benefit has accrued to us beyond what has already taken into account while submitting our offer and incorporated in the rates shown in the contract.

b) We hereby declare that no additional CENVAT benefit of Rs….. per machine/unit has accrued to us beyond what was taken into account while submitting our offer & incorporated in the rates shown in the contract. We are passing on the same to the purchaser and the bill has been prepared accordingly.

9.11 Sales Tax/CST/VAT/Input Tax under VAT scheme:

9.11.1 The concessional tax regime so far as available to the Govt. departments has been withdrawn w.e.f. 1.4.2007. Govt. Departments will have to pay CST @ normal VAT rates prevalent in the seller's state for purchase involving inter-state movement of goods.

9.11.2 However, goods of special importance (called declared goods) as incorporated in Section 14 of the CST Act will continue to suffer/enjoy confessional rate of tax since State Governments cannot impose tax at higher rates than envisaged in CST Act. Iron and steel items as listed in Section 14 of CST Act 1956, for instance will suffer CST @ 4% only.

9.11.3 The bidder should quote the exact percentage of VAT that they will be charging extra.

9.11.4 While quoting the rates the bidder should pass on (by way of reduction in prices) the set off/ input tax credit that would become available to them by switching over to the system of VAT from the existing system of sales tax, duty stating the quantum of such credit per unit of the item quoted for.

9.11.5 The bidder while quoting for tenders should give the following declaration:
"We agree to pass on such additional set offs/input tax credit as may become available in future in respect of all the inputs used in the manufacture of the final production in the date of supply under the VAT scheme by way of reduction in price and advise the purchaser accordingly.

9.11.6 The suppliers while claiming the payments will furnish the following certificate to the Paying authority:
" We hereby declare that additional set off/input tax credit to the tune of Rs…..has accrued and accordingly the same is being passed on to the purchaser and to that effect the payable amount may be adjusted".

9.11.7 Even for contracts where CST is payable, this input tax credit may become admissible to the suppliers where the supplier happens to be located in the state in which VAT has been implemented. Accordingly the certificate under para 9.11.6 above should also be obtained in all such existing contracts where CST is payable.

9.11.8 For the states in which VAT has not yet been introduced, the existing system of Sales Tax will continue.

10 **INSURANCE**

10.1 In the case of FOB & CFR offer insurance shall be arranged by the Purchaser.

10.2 In the case of indigenous offers, since the offer will be evaluated on FOR Station of dispatch, transit insurance, if required shall be arranged by the purchaser.

11. EVALUATION OF THE OFFERS

11.1 The bids/ tenders received would be evaluated on the basis of landed price at port mentioned in Schedule of Requirement or at station of despatch (in case of indigenous offer). To facilitate evaluation and comparison, the Purchaser will convert all Bid Prices expressed in the amounts in various currencies in the Bid Price as payable, to Indian Rupees at the B.C. selling exchange rate established by the State Bank of India, New Delhi as on the date of Bid opening.

11.2 The bids received will be evaluated by the Purchaser to ascertain the best and lowest acceptable tender in the interest of the purchaser, as specified in the specifications and tender documents.

11.3 Wherever Specified Training, Installation. Commissioning, Annual Maintenance charges etc. will be added to the landed Price as mentioned in SOR.

11.4 **BASIS OF THE EVALUATION OF OFFERS**

11.4.1 The Bids received would be evaluated on the basis of either:
a) Free at Destination price quoted on the Lines indicated in para 9.8 above.

OR

b) Quoted FOB price plus ocean freight as quoted by the Bidder & if not quoted by the bidder then Ocean freight intimated by the Ministry of Shipping, Transport Bhavan, Government of India, New Delhi plus Agency commission, insurance, charges on FOB cost as per Board's open cover policy on FOB cost quoted applicable Custom Duty, inland freight, clearance and handling charges up to the station of dispatch.

OR

c) Quoted CFR prices plus agency commission, insurance on FOB cost, applicable Customs Duty, inland freight, clearance and handling charges up to the station of dispatch.

OR

d) For partly imported and partly indigenous assembled/manufactured machines, Free at dispatch price quoted for indigenous components on the lines indicated in para 9 plus FOB/CFR price for imported components as per (b) & (c) above.

Purchaser reserves the right to adopt any of the above basis.

Cargo handling charges prior to the shipment, wherever applicable shall be to the contractor's account. The terms FOB and C&F shall be defined in accordance with 'INCOTERMS' 2000.

11.4.2 The following components would be added to FOB price (excluding agency commission) to calculate the landed price of an imported offer-
(i) Ocean freight as quoted by the bidder & if not quoted then Ocean freight as advised by Ministry of Shipping including firm and variable component,

(ii) Insurance charges as per IR's open cover policy

(iii) 1% Port handling charges on calculated CIF value

(iv) Landed cost = CIF value (add agency commission to the FOB cost, if any plus Insurance on FOB cost plus freight)+ customs duty (as applicable) + 1% port handling charges on CIF value.

(v) Thereafter, other charges as leviable and as required in terms of tender conditions (Viz. Training, installation & commissioning charges etc. as quoted, if any) are to be added to the total landed price to arrive at the total price of the offer.

11.5 After selecting the lowest evaluated Bid on this basis, the Purchaser reserves the right to sign the contract either on (i) CFR or (ii) FOB price quoted by the supplier.

12. PAYMENT TERMS shall be as per para 4 of Part I,(iii) Additional Special conditions of Bid/tender.

13. DEDUCTIONS

13.1 Payment as in clause 12 above shall be subject to deduction of any amounts for which the contactor is liable under the contract against this tender or any contract in respect of which the President of India is the Purchaser.

14. PAYMENT PROCEDURE

14.1 Payment against foreign contracts will be arranged through normal banking channels except where payment through Letter of Credit has been stipulated in the contract. In the case of payment through the Letter of Credit, all charges levied by the foreign Banks shall be borne by the Contractor. In case the contract is covered by financing from a bilateral or multilateral source, the payment shall be governed by the terms & conditions applicable in the relevant credit/ loan agreement.

15. SHIPPING ARRANGEMENTS

15.1 In the event of an order being placed on CFR basis, the contractor shall arrange shipment in accordance with the requirements of the Ministry of Shipping, Transport Bhavan, Government of India, New Delhi, INDIA, The Purchaser will, however, in accordance with the option clause, have the right to change over the contract to FOB basis, if considered necessary, after giving one month's notice to the contracting firm. Shipping arrangements in the case of FOB contracts shall be made by the Shipping Co-ordination and Chartering Division/Shipping Coordination Officer, Ministry of Shipping Transport Bhavan, New Delhi, INDIA, in accordance with details given in Annexure-7. Particulars of cargoes for which shipping space will be required in the execution of contract should be furnished in detail (as per Annexure-8) to the Chief Controller of Chartering, Shipping Co-ordination Officer, Ministry of Shipping Transport Bhavan, Govt. of India, New Delhi, INDIA, as soon as possible after the relevant contract is finalized.

16. PACKING

16.1 The items tendered will have to undergo arduous transportation before reaching the destination and will have to be stored and handled in tropical climatic conditions (including monsoons) before they are put to the actual use. It is, therefore, imperative that packing for every item is decided by taking into consideration, *inter-alia,* the above vital factors, so as to eliminate damage/ deterioration of items in transit/ transhipment/ handling or during storage.

16.2 The specification of the packing proposed shall be indicated.

16.3 The packing advices should bring out the weight, dimensions and size of each bundles/ packages. Where is not possible to give weight of the bundles/packages, the contractor must indicate the volume of the bundles/ packages, the number of pieces per bundle/package, number of bundles/ packages, and total weight of the items supplied.

16.4 Where the materials are shipped in bundles/ packages the pieces in each bundle/package should be of uniform sizes to facilitate quick acceptance and payment. The number of pieces in each bundle/ package should also be the same.

17. IMPORT LICENCE (In case of Indigenous Bidders)

17.1 The successful bidders will have to apply to the proper Government Authority for grant of requisite import license (if any) for such items as required within 14 days of the advance letter of acceptance/telegraphic acceptance and the purchaser will only render such assistance as considered necessary.

18. ACCEPTANCE OF TENDER/ BID

18.1 The Purchaser may accept a tender for a part or whole of the quantity offered, reject any tender without assigning any reason and may not accept the lowest or any tender.

18.2 Acceptance of tender will be communicated by either FAX/ Letter of tender direct to the bidder or through his authorised agents. In case where acceptance is indicated by FAX, the letter of acceptance of tender will be delivered by post to the contractor as soon as possible, but the FAX communication shall be deemed to conclude the contract.

19. EFFECTS AND VALIDITY OF OFFER

19.1 The submission of any offer connected with these specifications and documents shall constitute an agreement that the bidder shall have no cause of action or claim, against the Purchaser for rejection of his offer. The Purchaser shall always be at liberty to reject or accept any offer or offers at his sole discretion and any such action will not be called into question and the bidder shall have no claim in that regard against the Purchaser.

19.2 The offer shall be kept valid for acceptance for a minimum period of two hundred and forty (240) calendar days from the date set for opening of tenders.

19.3 The purchaser may solicit the bidder's consent to an extension of the period of bid validity. The request and the responses thereto shall be made in writing (or by FAX). If the bidder agrees to the extension request, the validity of bid guarantee provided shall also be suitably extended. A bidder may refuse the request without forfeiting its bid guarantee. A bidder granting the request will not be permitted to modify its tender.

19.4 Offers shall be deemed to be under consideration immediately after they are opened and until such time the official intimation of award is made by the Purchaser to the bidder. While the offers are under consideration, bidders and/or their representatives or other interested parties are advised to refrain from contacting the Purchaser by any means. If necessary, the purchaser will obtain clarifications on the offers by requesting for such information from any or all the bidders, either in writing or through personal contact, as may be considered necessary. Bidders will not be permitted to change the substance of their offers after the offers have been opened.

~~**20. OFFERS BY FAX**~~ Deleted. Offer has to be submitted electronically in e-bid.

21. GENERAL

21.1 Tenderers must ensure that the condition laid down for submission of offers detailed in the preceding paras, are completely and correctly fulfilled.

21.2 Tenders which are not complete in all details as stipulated above may be summarily rejected.

22. LAST DATE OF RECEIPT OF THE TENDERS

22.1 The offers complete in all respects should reach the Director, Railway Electrification (Stores), Ministry of Railways (Railway Board), Rail Bhavan, Raisina Road, New Delhi-110001, INDIA, not later than 14-30 hrs. on the date specified in the "Schedule of Requirements".

22.2 The tenders received shall be opened in the presence of such of the bidders or their representatives, who may like to be present at 15-00 hrs on the date specified in the "Schedule of Requirements" and the names of bidders and the rates tendered by them will be read out.

22.3 Offers received after due date and time shall not be considered.

23. CLARIFICATIONS

23.1 Bidders requiring any clarification on the bid documents may notify the Purchaser in writing. They should send in their queries not later than 20 days before the due date of submission specified in Bid document.

23.2 The Purchaser shall endeavour to respond to the questions raised or clarifications sought by the bidders. However, the Purchaser reserves the right not to respond to any question or provide any clarification, in its sole discretion, and nothing in this clause shall be taken or read as compelling railway requiring the Purchaser to respond to any question or to provide any clarification.

23.3 To facilitate evaluation of Bids, the Purchaser may, at its discretion, seek clarifications from any Bidder regarding its Bid. Such clarification(s) shall be provided within the time specified by the Purchaser for this purpose. Any request for clarification(s) and all clarification(s) in response thereto shall be in writing.

24. AMENDMENT OF TENDER DOCUMENT

24.1 At any time prior to the deadline for submission of bid, the Purchaser may, for any reason whether at its own initiative railway in response to clarifications requested by an bidder, modify the tender document by the issuance of amendment.

24.2 Any amendment thus issued will be sent in writing to all those who have participated in Pre-bid conference and will be publicised on website.

DIRECTOR, RAILWAY ELECTRIFICATION (STORES)
Ministry of Railways
(Railway Board), Rail Bhavan
Raisina Road, New Delhi-110 001(India)

SECTION –II

GENERAL CONDITIONS OF CONTRACT

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GENERAL CONDITIONS OF CONTRACT

1. DEFINITIONS

1.1 Throughout these conditions and in the specifications, the terms :—
(i) "The Purchaser" means the President of India, acting through the Executive Director, Railway Electrification (Stores), Ministry of Railways, (Railway Board), Rail Bhawan, Raisina Road, New Delhi-110001, INDIA, unless the context otherwise provides.

(ii) "The Inspecting Officer" means the person, firm or department nominated by the Purchaser to inspect the stores on his behalf and *the* Deputies of the Inspecting Officer so nominated.

(iii) "The Contractor" means the person, firm or company with whom the order for the supply is placed and shall be deemed to include the Contractor's successors (approved by the Purchaser), representatives, heirs, executors and administrators, as the case may be, unless excluded by the terms of the contract.

(iv) "Contract" means and includes the bid invitation, instructions to tenderers, general conditions of contract, acceptance of tender including advance acceptance of tender, special conditions of contract, particulars and other conditions specified in the acceptance of tender, the agreement entered into between the Purchaser and the contractor including all attachments and Appendices thereto and all documents incorporated by reference therein and also includes a repeal order, which has been accepted or acted upon by the contractor and a formal agreement, if executed.

2. EXECUTION

2.1 The whole contract is to be executed in the most approved, substantial and workman like manner, to the entire satisfaction of the Purchaser or his nominee, who, both personally and by his deputies, shall have full power, at every stage of progress, to inspect the stores at such times as he may deem fit and to reject any of the stores, which he may disapprove, and his decision thereon, and on any question of the true intent and meaning of the specification shall be final and conclusive.

3. RESPONSIBILITY OF THE CONTRACTOR FOR EXECUTING CONTRACT

3.1 **Risk in the Stores** —The contractor shall perform the contract in all respects in accordance with the terms and conditions thereof. The stores and every constituents part thereof, whether in the possession or control of the contractor, his agents or servants or a carrier, or in the joint possession of the contractor, his agents or servants and the Purchaser, his agents or servants, shall remain in every respect at the risk of the contractor until their actual delivery to the consignee at the stipulated place or destination or where so provided in the acceptance of tender, until their delivery to a person specified in the "Schedule of Requirements", as interim consignee for the purpose of despatch to the consignee. The contractor shall be responsible for all loss destruction, damage of, deterioration of or to the stores from any cause whatsoever while the stores after approval by the inspector are awaiting despatch or delivery or are in the course of transit from the contract to the consignee, or the interim consignee as the Case may be. The contractor alone shall be entitled and responsible to make claim against Railway Administration or any other carrier in respect of non-delivery, short-delivery, mis-delivery, loss, destruction,

damage or deterioration of the goods entrusted to such by carrier the contractor for transmission to the consignee or the interim consignee as the case may be.

3.2 Consignee's Right of Rejection

(i) Notwithstanding any approval which the Inspector may have given in respect of the Stores or any materials or other particulars or the work or workmanship involved in the performance of the contract (whether with or without any test carried out by the 'Contractor or the Inspector or under the direction of the Inspector and notwithstanding delivery of the stores where so provided to the interim consignee, it shall be lawful for the consignee, on behalf of the Purchaser, to reject the stores or any part, portion of consignment thereof within 90 days after actual delivery thereof to him at the place or destination specified in the schedule, if such stores or part/portion of consignment thereof is not in all respect in conformity with the terms and conditions of the contract whether on account of any loss, deterioration or damage before despatch or delivery or during transit or otherwise how-so-ever.

(ii) Provided that where, under the terms of the 'contract the stores are required to be delivered to an interim consignee for the purpose of despatch to the consignee, the stores shall be at the Purchaser's risk after their delivery to the interim consignee but nevertheless it shall be lawful for the consignee on behalf of the Purchaser to reject the stores or any part/portion of consignment thereof upon their actual delivery to him at the destination, if they are not in all respects in conformity with the terms and conditions of contract, except where they have been damaged or have deteriorated in the course of transit or otherwise after their delivery to the interim consignee.

(iii) The provisions contained in the clause-23 relating to the removal of stores rejected by the Inspector shall, *mutatis mutandis,* apply to stores rejected by the consignee as herein provided.

4 INDEMNITY

4.1 The contractor shall at all times indemnify the Purchaser against all claims which may be made in respect of the said work for infringement of any right protected by patent registration design or trade mark; provided always that in the event of any claim in respect of an alleged breach of a patent registered or trade mark being made against the Purchaser he shall notify the contractor of the same and the contractor shall be at liberty, but at his own expense, to conduct negotiations for settlement or any litigation that may arise there from.

5. PRICES

5.1 The prices stated are to include all costs of stamping, painting marking, protection or preservation of the stores and any claim what-so-ever that may arise from the manufacture packing, shipment, marking or delivery of stores in accordance with those consideration and include payment by the contractor of Dock and Harbour dues, port's rates, export taxes and other fees or charges, if any, levied because of exportation. The prices stated are also to include all rights (if any) of patent, registered design or trade mark and the contractor shall indemnify the Purchaser against all claims in respect of the same.

6. TRANSFER AND SUBLETTING

6.1 The contractor shall not sublet (otherwise than that which may be customary in the trade concerned), transfer, assign or otherwise part with directly or indirectly to any person or persons, whatever is in this contract, or any part thereof without the previous written permission of the purchaser or his nominee.

7. DRAWINGS

7.1 If any dimensions figuring upon a drawing differ from those obtained by scaling the drawings, the figured dimensions shall be taken as correct.

8. ALTERATIONS

8.1 The Purchaser or his nominee may require such alteration to be made on the work, during its progress as he deems necessary. Should these alterations be such that either party to the contract considers an alteration in price justified, such alteration shall not be carried out until amended prices have been submitted by the contractor and accepted by the Purchaser. Should contractor proceed to manufacture such stores without obtaining the consent in writing of the Purchaser to an amended price, he shall be deemed to have agreed to supply the stores at such price as may be considered reasonable by the Purchaser.

9. PROGRESS REPORT

The contractor shall render such reports as to the progress of the contract and in such form as may be called for by the Purchaser or his nominee. The submission and acceptance of these reports shall not prejudice the right of the Purchaser in any manner.

10. DELIVERY- INVOICES AND FREIGHT

Delivery F.O.B

10.1 The stores shall be delivered by the contractor free on board such vessels in such port or ports named in the quotation, as the Purchaser or his nominee may require.

10.2 Such number of inspection certificates, advice notices, packing accounts and invoices, as may be required by the Purchaser or his nominee, shall be furnished by the contractor at his own cost.

10.3 Freight for the conveyance of the stores or any part thereof will engaged by the Purchaser or his nominee, who will give due notice to the contractor when and on board what vessels they or such part thereof are to be delivered. Should the stores or any part thereof be not delivered within 7 days of the receipt of such notice by the contractor, the contractor will be liable for all payments and expenses that the Purchaser may incur or be put to, by reason of such non-delivery including dead and extra freight demurrage or vessels and any other charges incurred by the Purchaser what-so-ever.

Delivery CFR

10.4 “For CFR delivery the stores shall be delivered free of expense to the Purchaser on Board the vessels with ocean transportation to named Indian Port.

10.5 The seller shall ensure use of Lloyds classified vessel. A certificate to this effect shall invariably be sent by the seller to the Port Consignee(s) and also to the Purchaser and the

Paying Authority along with other shipping documents. Any extra expenditure by way of extra insurance etc., if incurred, for use of non-classified/ over aged vessel, shall be on seller's account.

11. CUSTOMS DRAWBACK

11.1 If, by reason of a customs notification published after the placing of the contract, the stores to be supplied shall become, on exportation, subject to customs drawback in respect of duty paid on them or on the materials used in their manufacture, the contractor shall recover the amount of the drawback and the contract price of the stores shall be reduced by the amount so recovered.

12. MARKING

12.1 The marking of all goods supplied shall comply with the requirement of the Indian Acts relating to merchandise marks or any amendment thereof and for the rules made there under. The following marking of the materials is required:

(a) The following particulars should be stencilled with indelible paint on all the materials/packages supplied loose;

(i) Contract number
(ii) Specification No.
(iii) Item No.
(iv) Port consignee
(v) Abbreviated consignee marks

(b) The marking as in (a) above should be on labels securely clamped to the packages or bundles so as not to break loose during transit. The use of steel tags for this purpose should be avoided.

(c) In addition to the marking as specified above, distinguishing colour marks should be given so as to distinguish the ultimate consignee in India.

13. PACKING

13.1 The contractor will be held responsible for the stores being sufficiently and properly packed so as to ensure their being free from any loss or damage on arrival at their destination,

13.2 Where materials are to be supplied in bundles, the gross weight should not exceed 1.9 metric tonne per bundle for shipments to Indian Ports.

14. SUPPLY OF DRAWINGS, TRACINGS AND SPECIFICATIONS

14.1 Any drawings, tracings or descriptions specified shall, unless otherwise directed, be furnished by the contractor with the first consignment of the work to which they relate and no payment whatsoever will be made until such drawings, tracings or descriptions have been furnished to the satisfaction of the Purchaser.

15. **CORRUPTION AND PAYMENT OF COMMISSION**

15.1 Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the contractor, his agents or servants, or any one on his/their behalf to any employee, representative or agent of the Purchaser or any person on his behalf in relation to the execution of this or any other contract with the Purchaser shall, in addition to the criminal

liability under the laws in force, subject the contractor to cancellation of this and all other contracts with the Purchaser, and also for payment of any loss resulting from any such cancellation to the like extent and the Purchaser shall be entitled to deduct the amounts so payable from any money otherwise due to the contractor under this or any other contract. Any question of dispute as to the commission of any offence under the present clause shall be settled by the Purchaser in such manner and on such evidence or information as may be thought fit and sufficient and his decision shall be final and conclusive on the matter.

16. DELIVERY PERIOD

16.1 The earliest possible delivery is required in India. The Purchaser attaches the utmost importance to timely deliveries and requests the manufacturers to take note of the liquidated damage and risk purpose conditions as are applicable in case of delays in supplies.

17. **LIQUIDATED DAMAGES**

17.1 In the event of the contractor's failure to have stores ready for delivery by the time or times respectively specified in the letter of acceptance or contract, the Purchaser may withhold any payment until the whole of the stores have been fully supplied and delivered and may deduct or recover from the contractor as liquidated damages (and not by way of penalty), a sum at the rate of 2 percent (two per cent) of the price of any stores which the contractor has failed to deliver as aforesaid for each and every month (part of a month being treated as a full month) during which the stores may not be ready for delivery, subject to a limit of 1O% of the Contract Value. Provided, however, that if the delay shall have arisen from any cause which the Purchaser may admit as reasonable ground for further time, the Purchaser may in his discretion allow such additional time as he may consider to have been required by the circumstances of the case and shall forego the whole or such part, as he may consider reasonable of his claim for such loss or damages as aforesaid.

18. FORCE MAJEURE

18.1 In the event of any unforeseen event directly interfering with the supply of stores arising during the currency of the contract, such as insurrection, restraint imposed by the Government act of legislative or other authority; war, hostilities, act of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restriction, or act of God, the contractor shall, within a week from the commencement thereof, notify the same in writing to the Purchaser with reasonable evidence thereof. If the force majeure condition(s) mentioned above be in force for a period of 90 days or more at any times, the purchaser shall have the option to terminate the contract on expiry of 90 days of commencement of such force majeure by giving 14 days notice to the contractor in writing. In case of such termination, no damages shall be claimed by either party against the other, save and except those which had occurred under any other clause of this contract prior to such termination.

19. PERFORMANCE GUARANTEE BOND

19.1 After a letter of acceptance is issued by the Purchaser, the Contractor shall furnish Performance Guarantee Bond in the proforma attached (Annexure-I0) from a Nationalised Indian Bank or scheduled commercial foreign Bank branches operating in India governed

by Reserve Bank of India guidelines or foreign bank duly countersigned by a Nationalised Indian bank within 15 days from the receipt of the letter of acceptance of the tender by the contractor or the execution of the contract whichever is earlier, for an amount equivalent to 10% of the value of the contract in the same currency of the contract price. The expenses to be incurred for the counter signature of a Nationalised Indian Bank shall be borne by the contractor. On the Performance and completion of the contract in all respects the Performance Guarantee Bond will be returned to the Contractor without any interest. In case furnishing of an acceptable Performance Guarantee Bond is delayed by the contractor beyond the period provided above and Bond is accepted by the Purchaser, liquidated damages, as provided in clause 17 for the period of delay in submission of the Bond, may be levied. Alternatively, the Purchaser may declare the contract as at an end and forefit the EMD. The PG bond will be submitted through the issuing bank directly to the purchas*er.*

19.2 The Performance Guarantee Bond shall remain in full force and effect during the period that would be taken for satisfactory performance and fulfillment in all respects of the contract i.e. till satisfactory commissioning of the machine(s) at consignee's works, and shall in the first instance be valid up to twelve months after the date of last shipment/delivery of the goods contracted to be purchased provided that before the expiry of the date of validity of the Performance Guarantee Bond, the Contractor on being called upon by the Purchaser from time to time, shall obtain from the Guarantor Bank, extension of time for validity thereof for a period of six months, on each occasion. The extension or extensions aforesaid, executed on non Judicial stamp paper of appropriate value must reach the purchaser at least thirty days before the date of expiry of the Performance Guarantee Bond on each occasion.

19.3 As and when an amendment is issued to the contract, the contractor shall, within fifteen days of the receipt of such an amendment furnish to the Purchaser an amendment to the Performance Guarantee Bond rendering the same valid for the contract as amended.

19.4 This Performance Guarantee Bond and/or any amendment thereto shall be executed or stamped paper of requisite money value in accordance with the laws of the country in which the same is/are executed by the party competent to do so. The Performance Guarantee Bonds executed in India shall also be got endorsed by the Collector under Section 32 of the Indian Stamp Act, 1989 for adequacy of the Stamp Duty, by the contractor.

19.5 The Performance Guarantee Bond will be returned to successful supplier within 60 days following completion of contractors performance obligations including satisfactory commissioning of all the machines.

20. INSPECTION

20.1 Inspection will be carried out by the Purchaser or his nominee. The cost of the inspection will be on Purchaser's account subject to other provisions herein contained. At least four weeks notice must be given to the inspecting authority to enable him to arrange the necessary inspection.

20.2 Facilities for Test and Examination
(i) The contractor shall provide, without extra charge, all materials, equipment, tools labour and assistance of every kind which the Purchaser or his nominee may consider necessary for any tests and examinations, which he or his nominee shall require to be made on the contractor's premises and shall pay all costs attendant thereon.

(ii) The contractor shall also provide and deliver free of charge, at such places as the Purchaser or his nominee may nominate, such material as he or his nominee may require for test by chemical analysis or independent testing machines. The cost of any such tests will be defrayed by the purchaser unless it is stated in the specification that it is to be paid by the contractor.

20.3 Notification of Result of Inspection
On the stores being found acceptable by the Inspecting Officer, he shall furnish the contractor with necessary copies of the Inspection Notes duly completed, for being attached to the contractor's bill in support thereof.

20.4 Certification of Inspection and Approval
(i) No stores will be considered ready for delivery until the Purchaser or the Inspecting Officer nominated by him shall have certified in writing that they have been inspected and approved by him.

(ii) It shall be the responsibility of the contractor to ensure that only such goods as have been duly inspected and approved by the Inspecting Authority are offered for arranging shipment to the Government of Indian Forwarding Agents and to furnish to them a certificate as under: -
"Certified that the goods offered for arranging shipment have been duly inspected and approved by the prescribed in accordance with the terms of the contract and a copy of the Inspection Certificate issued in this regard is enclosed."

21. INSPECTING OFFICER – POWER OF REJECTION
21.1 The Inspecting Officer shall have the power:-
(i) Before any Stores or part thereof submitted for inspection, to certify that they cannot be in accordance with the contract owing to the adoption of any unsatisfactory method of manufacture.

(ii) To reject any stores submitted as not being in accordance with the specifications.

(iii) To reject the whole of the installment tendered for inspection, if after inspection of such portion thereof as may in his discretion think fit, he is satisfied that the same is unsatisfactory.

(iv) To mark the rejected stores with a rejection mark, so that they may be early identified if re-submitted.

21.2 The Inspecting Officer's decision as regards the rejection shall be final and binding on the contractor.

22. CONSEQUENCES OF REJECTION

22.1 If on the Stores being rejected by the Inspecting Officer or consignee at the destination, the contractor fails to make satisfactory supplies within the stipulated period of delivery, the purchaser shall be at liberty to: —

(i) Request the contractor to replace the rejected stores forthwith but in any event not later than a period of 21 days from the date of rejection and the contractor shall bear all the cost of such replacement, including freight, if any, on such replacing and replaced stores but without being entitled to any extra payment on that or on any other account.

(ii) Purchase or authorise the purchase of quantity of the stores rejected of others of a similar description (when stores exactly complying with the particulars are not, in the opinion of the Purchaser, which shall be final; readily available) without notice to the contractor, (risk) and without affecting the contractor's liability as regards to the supply of any further installment due under the contract, or

(iii) Cancel the contract in the event of action being taken under sub-clause (ii) above or this sub-clause, the provisions of clause- 17 of the General Conditions of Contract shall apply as far as applicable.

22.2 Where, under a contract, the price payable is fixed on F.O.B. port of export or F.O.R. despatching station, the contractor shall, if the stores are rejected at the destination by the consignee, be liable in addition to his other liabilities including refund of price recoverable in respect of the stores so rejected, to reimburse to the purchaser, the freight and all other expenses incurred by the Purchaser in this respect.

23.3**. Rejected Stores**

On rejection of any stores submitted for inspection at a place other than the premises of the contractor, such stores shall be removed by the contractor at his own cost, subject as hereinafter stipulated, within 14 days of the date of intimation of such rejection. If the concerned communication is addressed and posted to the contractor at the address mentioned in the schedule, it will be deemed to have been served on him at the time when such communication would in course of ordinary post reach the contractor. Provided that the contractor or Inspector may call upon the contractor to remove dangerous, infected or perishable stores within 48 hours of the receipt of such communication and the decision of the Inspector in this behalf shall be final in all respects. Provided further that where the price or part thereof has been paid, the consignee is entitled without prejudice to his other rights to retain the rejected stores till the price paid for such stores is refunded by the contractor and that such retention shall not in any circumstances be deemed to be the acceptance of the stores or waiver of rejection thereof.

22.4 All rejected stores shall in any event and circumstances remain and always be at the risk of the contractor, immediately on such rejection. If such stores are not removed by the contractor within the periods aforementioned, the Inspector may remove the rejected stores and either return the same to the contractor at his risk and cost by such mode of transport as the Purchaser or the inspector may decide, or dispose off such stores at the contractor's risk and on his account and retain such portion of the proceeds, if any, from such disposal, as may be necessary to recover any expense incurred in connection with such disposals (or any price refundable as a consequence of such rejection). The

Purchaser shall in addition, be entitled to recover from the contractor, the handling and storage charges for the period during which the rejected stores are not removed/disposed off in accordance with the provisions thereof.

23. ACCEPTANCE OF STORES DESPATCHED AFTER EXPIRY OF DELIVERY PERIOD

23.1 In cases where only a portion of the stores ordered is tendered for inspection at the fag end of the delivery period and also in cases where inspection is not completed in respect of the portion of the stores tendered for inspection during the delivery period because of the reason that adequate notice for inspection in accordance with clause-20 of General Conditions of Contract was not given by the contractor, the Purchaser reserves the right to cancel the order for the balance quantity, at the risk and expense of the contractor without any further reference to him. If the stores tendered for inspection during or at the fag end of the delivery period are not found acceptable after carrying out the inspection, the Purchaser is entitled to cancel the contract in respect of the same at the risk and expense of the contractor. If however, the stores tendered for inspection are found acceptable, the Purchaser may grant an extension of the delivery period subject to the following conditions:

(a) The Purchaser has the right to recover from the contractor the liquidated damages on the stores, which the contractor has failed to deliver within the period fixed for delivery.

(b) That no increase in price on account of any statutory increase in or fresh imposition of Customs Duty, Excise Duty, Sales Tax, CST/VAT, Freight Charges, foreign exchange variation or on any account of any other tax or duty leviable in respect of the stores specified in the contract, which takes place after the date of delivery period stipulated in the said Acceptance of Tender shall be admissible on such of the said stores as are delivered after said date.

(c) That not withstanding any stipulation in the contract for increase in price on any other ground no such increase which takes place after the delivery date stipulated in the contract shall be admissible on such of the stores as are delivered after the said date.

(d) But nevertheless the purchaser shall be entitled to the benefit of any decrease in price on account of reduction in or remission of Customs Duty, Excise Duty, Sales Tax CST/VAT, freight charges, foreign exchange variation or on account of any other ground which takes place after the expiry of the above mentioned date namely the delivery date stipulated in the contract. The contractor shall allow the said benefit in his bills or in the absence thereof shall certify that no decrease in price on account of any of these factors has taken place.

23.2 The contractor shall not despatch the stores till such time an extension in terms of clause 23.1(a) to (*d)* above is granted by the Purchaser and accepted by the contractor. If the stores are despatched by the contractor before an extension letter as aforesaid is issued by the Purchaser and the same are accepted by the consignee, the acceptance of the stores shall be deemed to be subject to the conditions *(a)* to *(d)* mentioned in clause-23.1 above.

23.3 In case where the entire quantity has not been tendered for inspection within the delivery period stipulated in the contract and the Purchaser chooses to grant an extension of the delivery period, *the same* would be subject to conditions *(a)* and *(d)* mentioned in clause 23.1 above.

24. EXPORT LICENCE

24.1 If required, the contractor shall apply to the appropriate Government Authority of the exporting country for the grant of the requisite Export Licence within seven days of the receipt of contract.

25. ARBITRATION

25.1 ***(a)*** **For Domestic** Bidders/**Tenderers**

In the event of any question, dispute or difference arising under these Conditions or any Special Conditions of Contract or 'Instructions to Tenderers' or in connection with this contract (except as to any matters the decision of which is specifically provided by these Conditions or 'Instructions to Tenderers' or the Special Conditions) the same shall be referred to the sole arbitration of a Gazetted Railway Officer appointed to be the Arbitrator, by any Member of the Railway Board, Ministry of Railways, New Delhi, INDIA. The Gazetted Railway Officer to be appointed as Arbitrator, however, will not be one of those who had an opportunity to deal with the matters to which the contract relates or who in the course of their duties as railway servants had expressed views on all or any of the matters under dispute or difference. The award of the Arbitrator shall be final and binding on the parties to this contract.

(b) **For Foreign Bidders/Tenderers**

In the event of any dispute or difference arising between the parties hereto relating to any matter arising out or connected with this agreement, such dispute or difference shall be referred to the award of two Arbitrators, one Arbitrator to be nominated by the Purchaser and the other to be nominated by the contractor or in the case of the said Arbitrators not agreeing, then to the award of an Umpire to be appointed by the Arbitrators in writing before proceeding with the reference, and in case the Arbitrators cannot agree to the Umpire, who may nominated by the Chief Justice of India. The award of the Arbitrators, and in the event of their not agreeing, of the Umpire appointed by them or by the Chief Justice of India, shall be final and binding on the parties. Subject as aforesaid, the Indian Arbitration and Reconciliation Act, 1996 the rules there under and any statutory modification or re-enactment thereof, shall apply to the arbitration proceedings under this agreement. The venue of the arbitration in all cases shall be in India.

25.2 In the event of the arbitrator dying, neglecting or refusing to act, or resigning or being unable to act for any reason or his award being set aside by the court for any reason, it shall be lawful for the authority appointing the arbitrator to appoint another arbitrator in place of the outgoing arbitrator in the manner aforesaid.

25.3 The arbitrator may from time to time, with the consent of all the parties to the contract enlarge, the time for making the award.

25.4 Upon every and any such reference, the assessment of the cost incidental to the reference and award respectively shall be at the discretion of the arbitrator.

25.5 Subject as aforesaid, the Arbitration Act—1996 and the rules there under and any Statutory modification thereof, for the time being in force, shall be deemed to apply to the arbitration proceedings under this clause.

25.6 Work under the contract, if reasonably possible, may continue during the arbitration proceedings and no payment due to or payable by the Purchaser shall be withheld on account of such proceedings.

25.7 The venue of arbitration shall be the place from which the acceptance note is issued, or such other place as the arbitrator at his discretion may determine.

25.8 In this clause the authority to appoint the arbitrator includes, if there be no such authority, the officer who is, for the time being discharging the functions of that authority, whether in addition to other functions or otherwise.

26. LAWS GOVERNING THE CONTRACT

26.1 This contract shall be governed by the laws of India for the time being in force.

26.2 Irrespective of the place of delivery, the place of performance or place of payment under the contract, the contract shall deemed to have been made at the place in India from where the contract has been issued.

26.3 Jurisdiction of Courts

The courts of the place from where the contract has been issued shall alone have jurisdiction to decide any dispute arising out of or in respect of the contract.

27. HEADINGS

27.1 The headings of conditions hereto shall not affect the construction thereof.

28. SECRECY

28.1 The contractor shall take all reasonable steps necessary to ensure that all persons employed in any work in connection with the contract, have full knowledge of the Official Secrets Act and any regulations framed there under.

28.2 Any information obtained in the course of the execution of the contract by the contractor, his servants or agents or any person so employed, as to any matter whatsoever, which would or might be directly or indirectly, of use to any enemy of India, must be treated as secret and shall not any time be communicated to any person.

28.3 Any breach of the aforesaid conditions shall entitle the Purchaser to cancel the contract and performance bank guarantee will be encashed. In the event of such cancellation, the stores or parts manufactured in the execution of the contract shall be taken by the Purchaser at such price as he considers fair and reasonable and the decision of the Purchaser to such price shall be final and binding on the contractor.

SECTION-III

SPECIAL CONDITIONS OF CONTRACT

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SPECIAL CONDITIONS OF CONTRACT

The following special conditions shall apply to contracts for the supply of plant and machinery and manufactured equipment. But where they differ from the General Conditions, the Special Conditions shall over-ride the General Conditions.

1. DEFINITIONS

1.1 *(a)* The term "Work" means all the work specified or set forth and required in and by the said specifications, drawings and "Schedule of Requirements", here to annexed or to be implied there from or incidental thereto, or be hereafter, specified or required in such explanatory instructions and drawings (being in conformity with the said original specification (s), drawing (s), and "Schedule of Requirements" and also in such additional instructions and drawings not being in conformity as aforesaid, shall from time to time, during the progress of the work hereby contracted for, as are supplied by the Purchaser).

(b) The term 'Test" shall mean such test or tests as are prescribed by the specification (s) to be made by the Purchaser, or his nominee, during inspection and at the time of commissioning after erection at site, before the machine is taken over by the Purchaser.

2. PERFORMANCE OF WORK

2.1 The work shall be performed at the place or places specified in the tender or at such other place or places as may be approved by the Purchaser.

3. SPECIFICATIONS

3.1 If the contractor shall have any doubt as to the meaning of any portion of the conditions of the specifications, drawings or plans, he shall (before submitting the tender) set forth the particulars thereof and submit them to the Purchaser in writing, in order that any such doubt may be removed.

4. MISTAKES IN DRAWINGS

4.1 The contractor shall be responsible for and shall pay for any alterations of the works due to any discrepancies, errors or omissions in the drawings or other particulars, whether they have been approved by the purchaser or not, provided that such discrepancies, errors or omissions are not due to inaccurate information or particulars furnished to the contractor on behalf of the Purchaser. If any dimensions figured upon a drawing or plan differ those obtained by scaling the drawing or plan the dimensions as figured upon the drawing or plan shall be taken as correct.

5. VARIATIONS

5.1 No alterations, amendments, omissions, additions, suspensions, or variations of the work (hereinafter referred to as "Variations") under the contract as shown by the drawing or the specifications shall be made by the contractor except as directed in writing by the Inspector, but the Inspector shall have full power, subject to the proviso hereinafter contained, from time to time, during the execution of the contract, by notice in writing to

instruct the contractor to make such variation without prejudice to the contract, and the contractor shall carry out such variations and be bound by the same conditions, so far as applicable, as though the said variation occurred in the specifications. If any suggested variation would, in the opinion of the contractor, if carried out, prevent him from fulfilling any of his obligations or guarantees under the contract, he shall notify the Inspector thereof in writing and Inspector shall decide forthwith, whether or they shall carried out. If the Inspector confirms his instructions, the contractor's obligations and guarantees shall be modified to such an extent as may, in the opinion of the Inspector, be justified. The difference of cost, if any occasioned by any such variations shall be added to or deducted from the contract price as the case may require. The amount of such difference, if any, shall be ascertained as determined in accordance with the rates specified in the schedules of prices, so far as the same may be applicable, and where the rates are not contained in the said schedules or not applicable they shall be settled by the Purchaser and contractor jointly. But the Purchaser shall not become liable for the payment of any charge in respect of any such variations, unless the instructions for the performance of the same shall have been given in writing by the Inspector.

5.2 In the event of Inspector requiring any variations, such reasonable and proper notice shall be given to the contractor, as will enable him to make his arrangements accordingly, and in cases where goods or materials are already prepared, or any designs, drawings or patterns made or work done is required to be altered, a reasonable sum in respect thereof shall be allowed by the Purchaser, provided that no such variations shall, except with the consent in writing of the contractor, be such as will involve an increase or decrease in the total price payable under the contract by more than 10 percent thereof.

5.3 In any case, in which the contractor has received instructions from the Inspector for carrying out the work which either then or later, will, in the opinion of contractor, involve a claim for additional payment, the contractor shall, as soon as reasonably possible, after receipt of the instructions foresaid, advise the Inspector to that effect.

6. OBLIGATION TO CARRY OUT INSPECTOR'S INSTRUCTIONS

6.1 The contractor shall also satisfy the Inspector that adequate provision has been made:-

(i) to carry out his instructions fully and with promptitude;

(ii) to ensure that parts required to be inspected before use are not used before inspections; and

(iii) to prevent rejected parts being used in error. Where, parts rejected by the Inspector have been rectified or altered, such parts shall be segregated for separate inspection and approval before being used in the work.

7. RESPONSIBILITY FOR COMPLETENESS

7.I Any fittings or accessories, which may not be specifically mentioned in the specifications but which are usual or necessary, are to be provided by the contractor without extra charge, and the equipment must be complete in all details.

7.2 In all cases where the contract provides for tests on site, the Purchaser, except where otherwise specified, shall provide, free of charge, such labour materials, fuels, stores apparatus and instruments as may be requisite from time to time and as may reasonably be demanded; to efficiently carry out such tests of the plants, materials or workmanship etc., in accordance with the contract.

7.3 In the case of contracts requiring electricity for the completion of the works and for test on site, such electricity, when available, shall be supplied free to the contractor at the pressure of the ordinary supply. Unless otherwise specified, the purchaser will supply free of charge to the contractor:—
(a) unskilled labour;
(b) timber, stores and lifting tackle necessary for the erection of the plant and all consumable stores including fuel and lubricating oils required during erection, setting to work and testing of the plant. The contractor shall also provide-
(i) skilled labour and
(ii) tools and any other equipment which may be necessary.

8. SOURCE OF FINANCING & PAYMENT
8.1 Foreign exchange required for the proposed import will be made available from free resources or Rupee payment arrangement or from bilateral credit on the choice of the purchaser.

9. SHIPMENT OF STORES BEYOND THE STIPULATED DELIVERY PERIOD FOR FOB CONTRACT.
9.1 In the event of the contractor failing to ship the stores duly inspected and passed within the stipulated delivery, the Purchaser is entitled to cancel the contract in respect of the same at the risk and cost of the contractor or invoke the clauses providing other remedies such as liquidated damages as provided in the contract. However, if he so chooses, the Purchaser may grant an extension of the delivery period subject to:

(a) The Purchaser recovering from the contractor liquidated damages as stipulated in the conditions of contract for the stores, which the contractor has failed to ship within the period fixed for delivery after the inspection and a passing of the stores.

(b) The Purchaser retains the right to recover any additional expenditures which may arise on account of variation in exchange rates, Custom Duty, Freight, insurance charges etc. directly relatable to the delay in shipping of the stores.

(c) Any additional expenditure incurred by the Purchaser on Custom Duty, Freight Charges and also extra cost which may arise on account of variation in exchange rate during the extended delivery schedule shall be borne by the Contractor.

9.2 The contractor shall not despatch the stores till such time an extension in terms of the above is granted by the Purchaser. If the stores are despatched by the contractor before an extension letter as aforesaid is issued by the Purchaser, the supply of the stores shall be deemed to be subject to conditions set above.

10. WARRANTY
10.1 The contractor shall warrant that everything to be furnished hereunder shall be free from defects and faults in design, material, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for goods of the type ordered and in full conformity with the contract specifications and samples if any, and shall if operable, operate properly.

10.2 This warranty shall survive inspection of, payment for and acceptance of the goods, but shall expire 30 (thirty) months after the delivery at ultimate destination in India or 24 (Twenty four) months from the date of commissioning and proving test of equipment at ultimate destination in India, whichever shall be earlier, except in respect of complaints, defects and/or claims notified to the contractor within 3 (Three) months of expiry of such date. Any approval of acceptance by purchaser of the stores or of the material incorporated herein shall not in any way limit the contractor's liability.

10.3 The contractor's liability in respect of any complaints defects and/or claims shall be limited to the furnishing and installation of replacement parts free of any charge or the repair of defective parts only to the extent that such replacement or repair are attributable to or arise from faulty workmanship or material or design in the manufacture of the stores, provided that the defects are brought to the notice of contractor within 3 (Three) months of their being first discovered during the guarantee period of 3 (Three) months from the date of expiry of warranty period, or at the option of the Purchaser to the payment of the value, expenditure and damage as hereafter mentioned.

10.4 The contractor shall, if required, replace or repair the goods or such portion thereof as is rejected by the Purchaser free of cost at the ultimate destination or at the option of Purchaser, the contractor shall pay to Purchaser value thereof at the contract price or in the absence of such price at price decided by the Purchaser and such other expenditure and damages as may arise by reason of the breach of the conditions herein specified.

10.5 All replacement and repair that the Purchaser shall call upon the contractor to deliver or perform under this warranty shall be delivered and performed by the contractor within 2 (Two) months, promptly and satisfactorily.

10.6 Prompt clearance of the warranty replacement on arrival at Port/Airport shall be the responsibility of the contractor or his representatives after payment of Customs and other duties as applicable".

10.7 If the contractor so desires, the replaced parts can be taken over by him or his representative in India for disposal as he deems fit at the time of replacement of goods/parts. No claim whatsoever shall lie on the Purchaser for the replaced parts thereafter.

10.8 The warranty herein contained shall not apply to any material which shall have been repaired or altered by the Purchaser, or on his behalf in any way without the consent of the contractor, so as to affect the strength, performance or reliability or to any defects to any part due to misuse, negligence or accident.

10.9 The decision of the Purchaser in regard to contractor's liability and the amount, if any, payable under this warranty shall be final and conclusive.

11. DELIVERY SCHEDULE

11.1 The contractor shall supply stores in accordance with the delivery schedule indicated in the” Schedule of Requirements" annexed.

SECTION-IV

ANNEXURES

TABLE OF CONTENTS

Annexure

Annexure-1

GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

(RAILWAY BOARD)

This proforma is to be used only for offers of fully imported goods by tenderers.

To,

THE PRESIDENTOF INDIA,

acting through the Director Railway Electrification (Stores),

Ministry of Railways, Railway Board.

New Delhi-110001

OFFER FORM for Tender No...,.....Date of opening.....Time.....Hours

1. We.....hereby certify that we are established firm of manufacturers and authorised agents of M/s.....with factories at .... which are fitted with modern equipment and where the production methods, quality control and testing of all materials and parts manufactured or used by us are open to inspection by the representative of Indian Railways. We hereby offer to supply the following items at the prices and within the period of delivery indicated below :

Table "A"

Item No	Description	Specification	Unit	Qty	Price per unit exclusive of Agency commission (in the currency/ currencies of manufacturer's country/ countries or US$)			Agency commission per unit (in the currency/ currencies of manufacturer's country/ countries or US$)	Total CFR value of offer per unit (Inclusive of agency commission in the quoted currency/ currencies)	Terms of payments	Delivery period	Gross weight and dimensions of package per unit*	Total all including cost of DETC with MRI
					FOB port of country of supply 6(a)	CFR Indian Port 6(b)	Port handling inland freight & incidentals 6(c)						
1	2	3	4	5	6			7	8=6(b)+7	9	10	11	12=5x8
	Cost of Vehicle in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.)	No. TI/SPC/OHE /8WDETC/0 092 of August' 2015 and TI/SPC/OHE / MRI/0140 of Nov.'2015											

Table "B"

Item No	Description	Specification	Unit	Qty	Price per unit exclusive of Agency commission (in the currency/ currencies of manufacturer's country/ countries or US$)			Agency commission per unit (in the currency/ currencies of manufacturer's country/ countries or US$)	Total CFR value of offer per unit (Inclusive of agency commission in the quoted currency/ currencies)	Terms of payments	Delivery period	Gross weight and dimensions of package per unit*	Total all including cost of DETC with MRI
					FOB port of country of supply 6(a)	CFR Indian Port 6(b)	Port handling inland freight & incidentals 6(c)						
1	2	3	4	5	6			7	8=6(b)+7	9	10	11	12=5x8
	Cost of instrumentation in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.)	No. TI/SPC/OHE /8WDETC/0092 of August' 2015 and TI/SPC/OHE / MRI/0140 of Nov.'2015											

(To be quoted in INR only for table C to table G)

Table-C

S.N.	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Unit exchange spares
1.	Unit exchange spares for every set of 10 OHE cars or part thereof as per clause 1.16.2 of technical specification. Each set will consists of following: i) Flexible coupling/ Engine connection (complete) - 1 set ii) Traction Alternator alongwith Power Rectifier- 1 set iii) Air compressor (complete - 1 unit iv) Motorised Bogie (complete with Traction Motors and Break Gear)- 1set v) Battery charger for charging of starter Batteries - 1 unit vi) Auxiliary Alternator - 1 set				

Table-D

S.N.	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Tools
1.	Tools as per clause 1.17 of technical specification. List of tools & special tools for maintenance and overhaul of OHE Cars shall be supplied as per Annexure-8-A, 8-C by the Tenderer in accordance with Clause 6.1 of technical specification.				

Table-E

S.N	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Testing Kit
1.	Testing Kit as per clause 1.18 of technical specification. The testing Equipment shall be supplied as per annexure-8-B.				

Table-F

S.N	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Training
1.	Training as per clause 1.12 of technical specification. The training material shall be supplied as per Annexure 8-D. *(Break up cost for training material and training fee may be provided to assess the VAT/ Service Tax)*				

Table-G

AMC for 05 years after warranty period for components as per clause 6 of Additional Special Conditions of Bid Tender. (It should cover all components as per para 1.20.1 of Technical Specification). Lump sum cost must be quoted, however list of spares should also be indicated which should be comprehensive and as per the assessment of tenderer.

		Cost (in Rs)			Taxes		PV Factor @ 10% per annum (vi)	Cost of AMC per 8W DETC with MRI after discounting factor for evaluation (in Rs) *	Total all inclusive cost AMC for 8W DETC with MRI
		Material component (i)	Labour component (ii)	Total (iii)	VAT (iv)	Service Tax (v)			
a	First year AMC cost						0.7513		
b	Second year AMC cost.						0.6830		
c	Third year AMC cost						0.6209		
d	Fourth year AMC cost						0.5644		
e	Fifth year AMC cost						0.5132		
Total Cost (G)									

NB: The AMC cost (G) will be calculated after multiplying quoted rates with PV factor i.e. after discounting annual cost @ 10% per annum.

* = [{(i) x (iv)} + {(ii) x (v)}] x (vi) / 100

For evaluation purposes, total cost of 29 nos. 8W DETC with MRI for Tables A+B+C+D+E+F+G will be considered.

* The information how may number of units be able to come in one 20" & 40" container should be **invariably given** for freight comparison

2. We are agreeable to payment of agency commission to our Agents in India in non-convertible Indian Rupees. The relevant information is given below.

(To be filled in by the Bidder)

(a) The name and address of the Agent.....

(b) Service to be rendered by the Agent..... .... „

(c) Amount at remuneration for the Agent..... ....

This proforma is to be used only for offers of imported goods by tenderers.

3. It is hereby certified that we have understood the Instructions to Bidders, and also the General and Special Conditions of Contract attached to the tender and have thoroughly examined specifications drawings and/or patterns quoted in the 'Schedule of Requirements' and are thoroughly aware of the nature of stores required and our offer is to supply stores strictly in accordance with the requirements and according to the terms of the tender. We agree to abide solely by the General and Special Conditions of Contract and other conditions of the tender in accordance with the tender documents if the contract is awarded to us.

4. We hereby offer to supply the stores detailed above or such portion thereof, as you may specify in the acceptance of tender at the price quoted and agree to hold this offer open for acceptance for a period of 240 days from the date of opening of tender, We shall be bound by the communication of acceptance despatched within the prescribed time.

5. Earnest Money/Bid Guarantee for an amount equal to..... .....is enclosed in the form specified in Clause-6 of the 'Instructions to Bidders'.

Dated..... .....Signature and seal of Manufacturer/Bidder

Note.— (i) The Bidders may prepare their own offer forms as per this proforma.

(ii) No change in the proforma is permissible.

(iii) No erasures or alterations in the text of the offer are permitted. Any correction made in the offer shall be initialled by the bidder.

(iv) Please refer to clause 3.3 of instructions to Bidders before filling column 7.

(v) FIGURES IN Columns 6 to 9 (both inclusive) should be in both figures and words

In case of discrepancy in rates quoted in words and figures, the rates quoted in words shall be considered.

Signature and Seal of

Manufacturer/Tenderer Bidder

Annexure-2

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

This proforma is to be used only for offers of indigenous goods by tenderers.

To,
THE PRESIDENT OF INDIA,
Acting through the Director Railway Electrification (Stores),
Ministry of Railways, Railway Board.
New Delhi-110001

OFFER FORM for Tender No.....Date of opening.....Time.....Hours

1. We.....hereby certify that we are established firm of manufacturers and authorised agents of M/s.....with factories at .... which are fitted with modern equipment and where the production methods, quality control and testing of all materials and parts manufactured or used by us are open to inspection by the representative of Indian Railways. We hereby offer to supply the following items at the prices and within the period of delivery indicated below :

Table "A"

Item No	Description	Specification	Unit	Qty	Price per unit	Total value of offer (in Indian Rupees)	Terms of payments	Delivery period	Break-up of Price in Column-6 (In Indian Rupees) See table below	Break-up of Price in Column-11 (a) (In Indian Rupees) See table below	Gross weight and dimensions of package per unit
1	2	3	4	5	6	7	8	9	10	11	12
	Cost of Vehicle in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.)	TI/SPC/OHE/8 WDETC/0092 of August' 2015 and TI/SPC/OHE/ MRI/0140 of Nov.'2015									

Table 'B'

Item No	Description	Specification	Unit	Qty	Price per unit	Total value of offer (in Indian Rupees)	Terms of payments	Delivery period	Break-up of Price in Column-6 (In Indian Rupees) See table below	Break-up of Price in Column-11 (a) (In Indian Rupees) See table below	Gross weight and dimensions of package per unit
1	2	3	4	5	6	7	8	9	10	11	12

	Cost of Instrumentation in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.)	TI/SPC/OHE/8 WDETC/0092 of August' 2015 and TI/SPC/OHE/ MRI/0140 of Nov.'2015									

COLUMN 10

Break-up of Price in Column-6 (In Indian Rupees) for both tables A & B

Ex factory price	Excise Duty	Other levies	Sales tax, CST/VAT, Input Tax credit	Packing and forwarding in detail	F.O.R station of despatch price	Total (in Indian Rupees
A	B	C	D	E	F	G

Note: For station of dispatch price will be compared with landed price at port of imported offer.

This proforma is to be used only for offers of indigenous goods by tenderers.

Table-C

S.N.	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Unit exchange spares
1.	Unit exchange spares for every set of 10 OHE cars or part thereof as per clause 1.16.2 of technical specification. Each set will consists of following: i) Flexible coupling/ Engine connection (complete) - 1 set ii) Traction Alternator alongwith Power Rectifier - 1 set iii) Air compressor (complete - 1 unit iv) Motorised Bogie (complete with Traction Motors and Break Gear) - 1 set v) Battery charger for charging of starter Batteries - 1 unit vi) Auxiliary Alternator - 1 set				

Table-D

S.N.	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Tools
1.	Tools as per clause 1.17 of technical specification. List of tools & special tools for maintenance and overhaul of OHE Cars shall be supplied as per Annexure-8-A, 8-B by the Tenderer in accordance with Clause 6.1 of technical specification.				

Table-E

S.N	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Testing Kit
1.	Testing Kit as per clause 1.18 of technical specification. The testing Equipment shall be supplied as per annexure-8-C.				

Table-F

S.N	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Training
1.	Training as per clause 1.12 of technical specification. The training material shall be supplied as per Annexure 8-D. (Break up cost for training material and training fee may be provided to assess the VAT/ Service Tax)				

Table-G

	AMC for 05 years after warranty period for components as per clause 6 of Additional Special Conditions of Bid Tender. (It should cover all components as per para 1.20.1 of Technical Specification). Lump sum cost must be quoted, however list of spares should also be indicated which should be comprehensive and as per the assessment of tenderer.								
		Cost (in Rs)			Taxes		PV Factor @ 10% per annum (vi)	Cost of AMC per 8W DETC with MRI after discounting factor for evaluation (in Rs) *	Total all inclusive cost for 8W DETC with MRI
		Material component (i)	Labour component (ii)	Total (iii)	VAT (iv)	Service Tax (v)			
a	First year AMC cost						0.7513		
b	Second year AMC cost.						0.6830		
c	Third year AMC cost						0.6209		
d	Fourth year AMC cost						0.5644		
e	Fifth year AMC cost						0.5132		
Total Cost (G)									

Total Value of offer in INR (A+B+C+D+E+F+G) =

2. It is hereby certified that we have understood the Instructions to Bidders, and also the General and Special Conditions of Contract attached to the tender and have thoroughly examined specifications drawings and/or patterns quoted in the 'Schedule of Requirements' and are thoroughly aware of the nature of stores required and our offer is to supply stores strictly in accordance with the requirements and according to the terms of the tender. We agree to abide solely by the General and Special Conditions of Contract and other conditions of the tender in accordance with the tender documents if the contract is awarded to us.

3. We hereby offer to supply the stores detailed above or such portion thereof, as you may specify in the acceptance of tender at the price quoted and agree to hold this offer open for

acceptance for a period of 240 days from the date of opening of tender, We shall be bound by the communication of acceptance despatched within the prescribed time.

4. Earnest Money/Bid Guarantee for an amount equal to..... .....is enclosed in the form specified in Clause-6 of the 'Instructions to Bidders'.

Dated..... ..... Signature and seal of Manufacturer/Bidder

Note: (i) The Bidders may prepare their own offer forms as per this proforma.
(ii) No change in the proforma is permissible.
(iii) No erasures or alterations in the text of the offer are permitted. Any correction made in the offer shall be initialled by the bidder.
(iv) Figures in Columns 6 to 9 (both inclusive) should be in both figures and words. In case of discrepancy in rates quoted in words and figures, the rates quoted in words shall be considered.

ANNEXURE – 2A

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

THE PRESIDENT OF INDIA,
Acting through the Director Railway Electrification (Stores)
Ministry of Railways, Railway board
New Delhi -110 001

This Proforma is to be used for offers of Partly imported and partly indigenous goods.

OFFER FORM for Tender No. ---------- Date of opening ---------- Time ---------- Hours

1. We, ---------- hereby certify that we are established firm of manufacturers and authorized agents of M/s. ----------with factories at --------- which are fitted with modern equipment and where the production methods, quality control and testing of all materials and parts manufactured or used by us are open to inspection by the representative of Indian Railways. We hereby offer to supply the following items at the prices and within the period of delivery indicated below: -

Table “A"

Item No	Description	Specification	Unit	Qty	Price per unit	Total value of offer (in Indian Rupees)	Terms of payments	Delivery period	Break-up of Price in Column-6 (In Indian Rupees) See table below	Break-up of Price in Column-11 (a) (In Indian Rupees) See table below	Gross weight and dimensions of package per unit
1	2	3	4	5	6	7	8	9	10	11	12
	Cost of Vehicle in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.)	TI/SPC/OHE/8WDETC/0092 of August’ 2015 and TI/SPC/OHE/ MRI/0140 of Nov.’2015									

Table “A” (INDIAN COMPONENT)

Ex-Factory Price Total (In Indian Rs.)	Excise Duty	Other Levies	Sales Tax//CST/ VAT/INPUT TAX CREDIT	Packing and forwarding in detail	F.O.R. Station of dispatch Price	Total (In Indian Rs.)
10 (a)	10 (b)	10 (C)	10 (d)	10 (e)	10 (f)	10 (g)

Table ‘B’

Item No	Description	Specification	Unit	Qty	Price per unit exclusive of Agency commission (in the currency/ currencies of manufacturer’s country/ countries or US$)			Agency commission per unit (in the currency/ currencies of manufacturer’s country/ countries or US$)	Total CFR value of offer per unit (Inclusive of agency commission in the quoted currency/ currencies)	Terms of payments	Delivery period	Gross weight and dimensions of package per unit*	Total all including cost of DETC with MRI
					FOB port of country of supply 6(a)	CFR Indian Port 6(b)	Port handling inland freight & incidentals 6(c)						
1	2	3	4	5	6			7	8=6(b) +7	9	10	11	12=5x8
	Cost of instrumentation in the Description of Stores: Design, manufacture, supply, testing & commissioning of self-propelled 8-wheeler inspection & maintenance	No. TI/SPC/OHE/8WDETC/0092 of August’ 2015 and TI/SPC/O											

	car of diesel electric under slung type for Operation on Broad Gauge (1676 mm) Electrified (25 KV A.C.)	HE/ MRI/0140 of Nov.'2015									

Break up of Ex-Factory Price in "Column – 10 (a)" (In Indian Rupees)
(To be quoted in INR only for table C to table G)

Table-C

S.N.	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Unit exchange spares
1.	Unit exchange spares for every set of 10 OHE cars or part thereof as per clause 1.16.2 of technical specification. Each set will consists of following: i) Flexible coupling/ Engine connection (complete) - 1 set ii) Traction Alternator alongwith Power Rectifier - 1 set iii) Air compressor (complete - 1 unit iv) Motorised Bogie (complete with Traction Motors and Break Gear) - 1 set v) Battery charger for charging of starter Batteries - 1 unit vi) Auxiliary Alternator - 1 set				

Table-D

S.N.	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Tools
1.	Tools as per clause 1.17 of technical specification. List of tools & special tools for maintenance and overhaul of OHE Cars shall be supplied as per Annexure-8-A, 8-B by the Tenderer in accordance with Clause 6.1 of technical specification.				

Table-E

S.N	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for Testing Kit
1.	Testing Kit as per clause 1.18 of technical specification. The testing Equipment shall be supplied as per annexure-8-C.				

Table-F

S.N	Details	Quantity	Unit Rate	Taxes & any other charges	Total all inclusive cost for 8W DETC with MRI
1.	Training as per clause 1.12 of technical specification. The training material shall be supplied as per Annexure 8-D. (Break up cost for training material and training fee may be provided to assess the VAT/ Service Tax)				

Table-G

AMC for 05 years after warranty period for components as per clause 6 of Additional Special Conditions of Bid Tender. (It should cover all components as per para 1.20.1 of Technical Specification). Lump sum cost must be quoted, however list of spares should also be indicated which should be comprehensive and as per the assessment of tenderer.

		Cost (in Rs)			Taxes		PV Factor @ 10% per annum (vi)	Cost of AMC per 8W DETC with MRI after discounting factor for evaluation (in Rs) *	Total all inclusive cost for 8W DETC with MRI
		Material component (i)	Labour component (ii)	Total (iii)	VAT (iv)	Service Tax (v)			
a	First year AMC cost						0.7513		
b	Second year AMC cost.						0.6830		
c	Third year AMC cost						0.6209		
d	Fourth year AMC cost						0.5644		
e	Fifth year AMC cost						0.5132		
								Total Cost (G)	

NB: The AMC cost (G) will be calculated after multiplying quoted rates with PV factor i.e. after discounting annual cost @ 10% per annum.

* = [{(i) x (iv)} + {(ii) x (v)}] x (vi) / 100

For evaluation purposes, total cost of 29 nos. 8W DETC with MRI for Tables A+B+C+D+E+F+G will be considered.

* The information how many number of units would be able to come in one “20 & 40” container should be **invariably given** for freight comparison

Total value of offer in INR (A+B+C+D+E+F+G) =

2. It is hereby certified that we have understood the Instructions to Tenderers, and also the General and Special Conditions of Contract attached to the tender and have thoroughly examined specifications/drawings quoted in the ‘Schedule of Requirements’ and are thoroughly aware of the nature of stores required and our offer is to supply stores strictly in accordance with the requirements and according to the terms of tender. We agree to abide by the General and Special Conditions of Contract and other conditions of the tender in accordance with the tender documents if the contract is awarded to us.

3. We hereby offer to supply the stores detailed above or such portion thereof, as you may specify in the acceptance of tender at the price quoted and agree to hold this offer open for acceptance for a period of 240 days from the date of opening of tender. We shall be bound by the communication of acceptance dispatched within the prescribed time.

4. Earnest Money/Bid Guarantee for an amount equal to. -------- is enclosed in the form specified in Clause – 6 of the 'Instructions to Tenderer.

Dated …… .

Signature and seal of
Manufacturer/Tenderer

Note:

i) The tenderers may prepare their own offer forms as per this proforma.

ii) No change in the proforma is permissible

iii) The tenderers should indicate whether they possess the industrial license from Government of India for manufacturing and marketing the items offered. If collaboration with a foreign firm for manufacturing of the items offered is involved, the details of the same should be indicated.

iv) No erasures or alterations in the text of the offer are permitted. Any correction made in the offer shall be initialed by the tenderer.

v) The detailed break up of ex-factory price should be indicated here and if so required by the purchaser the tenderer shall produce satisfactory proof in regard to the reasonableness of the same.

vi) The foreign exchange needed for the import of the components and import licence where necessary, should be arranged by the supplier. The purchaser will, however, render assistance required in this regard Clause – 15 of the 'Instructions to Tenderers'.

vii) Figures in columns 6,7 10 and 11 should be both in figures and words. In case of discrepancy in rates quoted in words and figures, the rates quoted in words shall be considered.

viii) Tenderers offering indigenous goods (Group A & B offers) may also take into account in their bids any benefits available for supplies against IDA/BRD Credit through International Competitive Bidding, regarding deemed export after ascertaining from the appropriate Government Agency/Agencies.

(ix) The purchaser reserves the right to accept or reject deviations from General and Special Conditions of Contract and the additional price for complying with the conditions of contract in each case and his decision thereon shall be final.

Annexure-3

PROFORMA FOR PERFORMANCE STATEMENT

Tender No....,.....Date of opening.....Time.....Hours

Name of the firm……

S.No.	**Order placed by (Full address of Purchaser**	**Order No. and date**	**Description and quantity of stores ordered**	**Value of order**	**Date of completion of delivery**		**Remarks indicating reasons for late delivery, if any**	**Has the equipment been satisfactorily commissioned and is it giving trouble free service?**
					As per contract	Actual		

Signature and seal of *Manufacturer/Bidder*

ANNEXURE—4

PROFORMA FOR EQUIPMENT AND QUALITY CONTROL

Tender No.....,.....Date of opening.....Time.....Hours.
Name of the Firm ……

***(Note-All** details **required** only for the items tendered}*

1. Name & full address of the firm

2. Telephone & Telex No. Office/Factory/Works

3. Telegraphic address

4. Location of the manufacturing factory

5. Details of Industrial Licence, wherever required as per statutory regulations

6. Details of plant *&* machinery erected and functioning in each Deptt.

(Monographs *&* description pamphlets be supplied if available).

7. Details of the process of manufacture in the factory in brief

8. Details & stocks of raw material held

9. Production capacity of item (s) quoted for, with the existing plant & machinery

9.1 Normal
9.2 Maximum

10. Details of arrangement for quality control of products such as laboratory, testing Equipment etc.

11. Details of staff

11.1 Details of technical supervisory staff-in-charge of production & quality control

11.2 Skilled labour employed

11.3 Unskilled labour employed

11.4 Maximum No. of workers (skilled & unskilled) employed on any day during the 18 months preceding the date of application.

12. Whether stores are tested to any standard specification, if so; copies of original test certificate should be submitted in triplicate.

13. Are you registered with the Directorate General of Supplies & Disposals, New Delhi, INDIA, • If so, furnish full particulars of registration, period of currency etc.

14. Are you a Small Scale Unit, registered with the National Small Industries Corporation Ltd., New Delhi, INDIA. If so, furnish full particulars of registration, currency period etc.

Signature and seal of the
Manufacturer/Bidder

ANNEXURE—5

(Please see clause-6 of 'Instructions to Bidders')

PROFORMA BANK GUARANTEE FOR BID GUARANTEE

(ON BANK'S LETTERHEAD WITH ADHESIVE STAMP)

Ref..... Date.....

Bank Guarantee No. .....

To,
The PRESIDENT OF INDIA
acting through the Director Railway Electrification (Stores),
Ministry of Railways, (Railway Board),
Rail Bhavan,
NEW DELHI-110001

Dear Sir,

In accordance with your invitation to tender No.....for Supply *of.....M/s.....* hereinafter called the bidder with the following Directors on their Board of Directors/Partners of the firms:

1. 2.
3. 4.
5. 6.
7. 8.
9. 10.

wish to participate in the said tender for the supply of ..... as a Bank Guarantee against Bid Guarantee for sum of ..……..... of.....……..... (in words & figures) valid for(285) two hundred and eighty five days from..... required to be submitted by the bidder as a condition for the participation, this Bank hereby guarantees and undertakes during the above said period of (285) two hundred and eighty- five days to immediately pay, on demand by the Director Railway Electrification (Stores), Ministry of Railways, (Railway Board), New Delhi-110 001, INDIA, in writing the amount of..... .....(in words & figures) to the said Director Railway Electrification (Stores), Ministry of Railways, (Railway Board) New Delhi-110 001, INDIA, and without any reservation and recourse, if:—

(i) the bidder after submitting his tender, modifies the rates or any of the terms and conditions thereof, except with the previous written consent of the Purchaser; or

(ii) the bidder withdraws the said bid within 240 days after opening of bid; or

(iii) the bidder having not withdrawn the bid, fails to execute the contractual documents within the period provided in the contract; or

(iv) having executed the contract fails to give the bonds so aforesaid within the period provided in the contract.

This guarantee shall be irrevocable and shall remain valid up to 4.00 P.M. on ..... if further extension to this guarantee is required, the same shall be extended to such required periods on receiving instructions from M/s..... on whose behalf this guarantee is issued.

Date
Place

Signature:.....

Witness

Printed Name .....
(Designation)

(Bank's Common Seal)

ANNEXURE—5A
(Please see clause-6.1 of 'Instructions to Tenderers')

PROFORMA BANK GUARANTEE FOR BID GUARANTEE
(**Submitted by Indian Agent on behalf of Bidder**)
(ON BANK'S LETTERHEAD WITH ADHESIVE STAMP)

Ref.....
Date.....
Bank Guarantee No. .....

To,
The PRESIDENT OF INDIA
acting through the Director Railway Electrification (Stores),
Ministry of Railways, (Railway Board),
Rail Bhawan,
NEW DELHI-110001

Dear Sir,

In reference to letter No……. dated…….of 'Bidder' M/s …..(Name and address of Bidder) authorising M/s…….(Name and address of Indian Agent) as Bidder's Indian Agent and in accordance with your invitation to tender No.....for Supply of.....we, M/s.....(Name of Indian agent), hereinafter called the Indian Agent of the Bidder with the following Directors on their Board of Directors/Partners of the firms:

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.

Agree to submit this bank guarantee for and on behalf of the 'Bidder' who wish to participate in the said tender for the supply of ..... . I/we, the Indian agent of the bidder assume and own the responsibility for payment of the dues under this guarantee. As a Bank Guarantee against Bid Guarantee for sum of ……..... of ……..... (in words & figures) valid for (285) two hundred and eighty five days from.....required to be submitted by the bidder as a condition for the participation, this Bank hereby guarantees and undertakes during the above said period of (285) Two hundred and eighty five days to immediately pay, on demand by the Director Railway Electrification (Stores), Ministry of Railways, (Railway Board), New Delhi-110001, INDIA, in writing the amount of.....……(in words & figures) to the said Director Railway Electrification (Stores), Ministry of Railways, (Railway Board) New Delhi-110001, INDIA, and without any reservation and recourse, if:-

(i) the bidder after submitting his tender, modifies the rates or any of the terms and conditions thereof, except with the previous written consent of the Purchaser; or

(ii) the bidder withdraws the said bid within 240 days after opening of bid; or

(iii) the bidder having not withdrawn the bid, fails to execute the contractual documents within the period provided in the contract; or

(iv) having executed the contract fails to give the bonds so aforesaid within the period provided in the contract.

This guarantee shall be irrevocable and shall remain valid up to 4.00 P.M. on ..... if further extension to this guarantee is required, the same shall be extended to such required periods on receiving instructions from M/s..... on whose behalf this guarantee is issued.

Date
Place

Signature:.....

Witness *Printed Name*

.....
(Designation)

(Bank's Common Seal)

Annexure—6

PROFORMA FOR AUTHORITY FROM MANUFACTURERS

No..... Dated.....

To,
THE PRESIDENT OF INDIA,
acting through the Director, Railway Electrification (Stores),
Ministry of Railways, (Railway Board),
New Delhi-110001.

Dear Sir,
Subject.—Executive Director, Railway Electrification (Stores), Ministry of Railways Tender No....., we..... ..... an established and reputable manufacturers of..... having factories at.....do hereby authorize M/s....., ...(Name and address of Agents) to represent us, to bid, negotiate and conclude the contract on our behalf with you against Tender No..... No company/ firm or individual other than M/s..... are authorised to represent us in regard to this business against this specific tender.

Yours faithfully

(NAME)
for & on behalf of M/s....,.....
(Name of Manufacturers)

Note: This letter of authority should be on the Letter-Head of the manufacturing concern and should be signed by a **person** competent and having the power of attorney to bind the manufacture.

Annexure-7

(Please see clause-15,1 of Instruction to Bidders')

DETAILS OF SHIPPING ARRANGEMENTS OF LINER CARGOES

IN RESPECT OF [F.O.B./F.A.S.] CONTRACTS FOR IMPORTS

1. Shipping arrangements will be made by the Ministry of Shipping, Transport Bhawan, New Delhi, INDIA (Cable: TRANSCHART: NEW DELHI: Telex :VAHAN/IN-031-61157,61158,61159 FAX +91 11 23718614), through their respective forwarding Agents/Nominees as mentioned below, to whom adequate notice about the readiness of cargo for shipment should be given by the Sellers from time to time at least six weeks in advance of the required position for finalising the shipping arrangements.

Area	*Forwarding Agents!Nominees*
(a) U.K. including Northern Ireland (also Eire), the North Continent of Europe (Germany, Holland, Belgium, France, Norway, Sweden, Finland and Den mark) and ports on the Continental Sea Board of the Mediterranian, *(i.e.* French and Western Italian Ports) and also Adriatic Ports.	M/s. **Schenker & Co.,** 2000 Hamburg-11, POB No. 110313 (Cable : SCHENKERCO HAMBURG) Telex : 217004-33 SHD 212675 Telephone No. 040/36135-0 FAX:
(b) U.S.A., Canada, Mexico & South America, Brazil	M/s. OPT Overseas Project Transport Inc.,46, SELLERS STREET, KEARNY, NEW JERSEY 07032, Tel. (201)998-7771 Telex : 673-3586 Fax (201) 988-7833
***(c)* Japan**	**The** First Secretary (Commercial) Embassy of India, Tokyo, Japan. (Cable: INDEMBASSY TOKYO) Telex: INDEMBASSY J-2485O Telephone : 262 2391, FAX:
(d) Australia, Algeria, Bulgaria, Romania, Czech Republic, Slovakia, Egypt.	The Shipping Corporation of India Ltd., GDR 'Shipping House' 229/232 Madame Cama Road, Bombay-400 021 (Cable : SHIP INDIA BOMBAY), Telex: 31-2209 SCID IN' Telephone 022-22026666
(e) Russia, Ukraine, etc. (CIS states)	-----do------
(f) Poland	----do-----
(g) Pakistan *and* Other areas not specifically mentioned above.	Shipping coordination Officer, Ministry of Surface Transport (Chartering Wing), New Delhi (Cable :TRANSCHART: NEW

DELHI: Telex :VAHAN/IN-031-61157,
61158,61159 FAX +91 11 23718614)

2**.** BILLS OF LADING
The Bills of Lading should be drawn to indicate 'Shipper and Consignee' as under:—

SHIPPER; The Government of lndia
CONSIGNEE: As per consignee's particulars in the contract, (The name and address of the 'Port Consignee and Ultimate Consignee' should both be indicated).

3.Two non-negotiable copies of the Bill of Lading indicating the freight amount and discount, if any allowed, should be forwarded to the Shipping Co-ordination Officer, Ministry of Shipping, Transport Bhawan, Parivahan Bhavan, New Delhi, India after the shipment of each consignment is effected.

4. The Seller should avoid the use of over-aged vessels for the shipment of the goods under the contract and if so used, the cost of additional insurance, if any, shall be borne by the Seller.

Annexure-8

(Please see clause 15.1 of' Instructions to Bidders').

PROFORMA FOR INDICATING PARTICULARS OF CARGOES FOR WHICH SHIPPING SPACE IS REQUIRED TO BE ARRANGED BY THE SHIPPING CO-ORDINATION AND CHARTERING ORIGANISATION OF THE MINISTRY OF SHIPPING

S. No.	
Name of the supplier with telegraphic/ postal address/Fax No.	
Name of the consignee with telegraphic/ postal address	
Description	
Quantity	
Cargo availability, whether shipload or parcel, if parcels, size of parcels	
Period over which shipment to be completed	
Loading Port	
Discharge Port	
Nature of contract, FOB or CFR	
Any special conditions in the contract relating to ship	

Signature and seal of Manufacturer/Tenderer

Note:-- This form should be filled in and sent (in duplicate) to the Chief Controller of Chartering (in respect of bulk cargoes) and the Shipping Co-ordination Officer (in respect of general liner cargoes), Ministry of Shipping, Transport Bhavan, New Delhi, India with a copy to the Executive Director, Railway Stores(P) Ministry of Railways, Railway Board, Rail Bhawan, New Delhi-110001, INDIA as soon as possible after the relevant contract is finalized

Annexure—9

(Please see clause 2.3, 2.4 and 7.6 of' Instructions' to Tenderers')

PROFORMA FOR STATEMENT OF DEVIATIONS

(1) The following are the particulars of deviations from the requirements of the. Tender specifications—

CLAUSE	DEVIATION	REMARKS (Including-justification)

(2) The following are the particulars of deviations from the requirement: of the Instructions of Tenderers, General and Special Conditions of Contract-

CLAUSE	DEVIATION	REMARKS (Including-justification)

Signature and seal of
the Manufacturer/Tenderer

Note:- Where there is no deviation the statement should be returned duly signed with an endorsement indicating ' 'No Deviations'.

Annexure—9(1)

CERTIFICATE OF COMPLIANCE

This Certificate is issued in the full knowledge that the proposal submitted is in clause by clause compliance with the purchaser's requirements and there is no material deviation from the tender specification.

Signed _____

Authorised Representative

Annexure—10

(Please see clause 20 of 'General Conditions of Contract')

PROFORMA OF BANK GUARANTEE FOR CONTRACT
PERFORMANCE GUARANTEE BOND

Ref..... **Date.....**

Bank Guarantee No.....

To,
THE PRESIDENT OF INDIA.
acting through the Director, Railway Electrification (Stores)
Ministry of Railway,
(Railway Board). Rail Bhavan,
New Delhi-110001, INDIA.

1. Against contract vide Advance Acceptance of the Tender No..... dated..... covering supply of..... (hereinafter called the said 'contract') entered into between the President of India and.....(hereinafter called the 'Contractor) this is to certify that at the request of the Contractor we..... Bank Ltd., are holding in trust in favour of the President of India, the amount of..... ..... (write the sum here in words) to indemnity and keep indemnified the President of India (Govt. of India) against any loss or damage that may be caused to or suffered by the President of India (Govt. of India) by reason of any breach by the Contractor of any of the terms and conditions of the said contract and/or the performance thereof. We agree that the decision of the President of India (Govt. of India), whether any breach of any of the terms and conditions of the said contract and/or in the performance thereof has been committed by the Contractor and the amount of loss or damage that has been caused or suffered by the President of India (Govt. Of India) shall be final and binding on us and the amount of the said loss or damage shall be paid by us forthwith on demand and without demur to the President of India (Govt. of India).

2. We..... .....Bank Ltd., further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for satisfactory performance and fulfilment in all respects of the said contract by the Contractor *i.e. till.....(viz.* the date up to 12 months after the date of last shipment/delivery, of the goods ordered) hereinafter called the 'said date' and that if any claim accrues or arises against us..... Bank Ltd., by virtue of this guarantee before the said date, the same shall be enforceable against us.....Bank Ltd.), notwithstanding the fact that the same is enforced within six months after the said dale, provided that notice of any such claim has been given to us.....Bank/Ltd., by the President of India (Govt. of India) before the said date. Payment under this letter of guarantee shall be made promptly upon our receipt of notice to that effect from the President of India (Govt. of India).

3. It is fully understood that this guarantee is effective from the date of the said contract and that we.....Bank Ltd., undertake not to revoke this guarantee during its currency without the consent in writing of the President of India (Govt. of India).

4. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Contractor in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payments so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor shall have no claim against us for making such payment.

5. We.....Bank Ltd., further agree that the President of India (Govt. Of India) shall have the fullest liberty, without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said contract or to extend time of performance by the Contractor from time to time or to postpone for any time or form time to time any of the powers exercisable by the President of India (Gov of India), against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said contracts and we.....Bank Ltd., shall not be released from our liability under this guarantee by reason of any such variation or extension being granted to the said Contractor or for any forbearance and/ or omission on the part of the President of India or any indulgence by the President of India to the said Contractor or by any other matter or thing what-so-ever, which under the law relating to sure lies, would, but for this provision have the effect of so releasing us from our liability under this guarantee.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the **Contractor.**

Date..... ***Signature.....***

Place.....

Witness.....

Printed Name.....

.....

(Designation)

…….

Bank's Common Seal

ANNEXURE – 11

PROFORMA OF BANK GUARANTEE FOR 10% CONTRACT VALUE TOWARDS WARRANTY GUARANTEE

To,
THE PRESIDENT OF INDIA,
acting through the Director, Railway Electrification (Stores),
Ministry of Railway,
(Railway Board), Rail Bhavan, Raisina Road,
New Delhi-110001, INDIA.

Sub.— Guarantee No.....for..... (Amount).
Covering equipment (s) Serial no.....supplied to.....(Consignee/s).

Ref.— Contract No.....dated.....
Placed on M/s.....

1. WHEREAS M/s.....one of our constituents, (hereinafter called the "Sellers") have agreed to sell to you (hereinafter referred to as the "Government") Nos. of..... (give description) as per contract No..... dated..... (hereinafter called "the said contract").

2. AND WHEREAS according to the terms of said contract, it has been stipulated that payment of 10% of the value of the stores would be made, provided that the Sellers furnish to the Purchaser a Bank Guarantee from a recognised bank, acceptable to the Purchaser for 10 per cent of the value of the said contract, valid for a period covering in full the Guarantee Period as per the warranty clause of the said conditions of the contract, being the conditions attached to and forming part of the said contract.

3. AND WHEREAS the Sellers have approached us to give the said Bank Guarantee on their behalf in your favour for an amount representing 10 per cent of the value of the said contract which you have agreed to accept.

4. That in consideration of the promises and at the request of the said Sellers, we hereby irrevocably undertake and guarantee to pay to the Government of India or at such other place as may be determined by you forthwith on demand and without any demur, any sum upto a maximum amount of..... representing 10 per cent of the value of the stores despatched under the said contract in case the Seller make default in paying the said sum or make any default in the performance, observance or discharge of the guarantee contained in the said contract.

5. We agree that the decision of the Government, whether any default has occurrred or has been committed by the Sellers in the performance, observance or discharge of the guarantee aforesaid shall be conclusive and binding on us M/s..... ……..

6. Government shall be at liberty, from time to time, to grant or allow extention of time or give other indulgence to the said Sellers or to modify the terms and conditions of the contract with the said Sellers without affecting or impairing this guarantee or our liability hereunder.

7. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the Sellers in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal. We also undertake to pay to the Government any money so demanded against the Purchaser's claims in any other contracts placed on (he said sellers).

The payment so made by us under this bond shall, be a valid discharge of our liability for payment **thereunder** and the Sellers shall have no claim against us for making such payment.

8. This bank guarantee comes into force when the balance ten percent of the value of the stores, shipped per Vessel.....vide Bill of Lading No..... dated..... or R/RNo..... dated..... (in the case of indigenous contracts) under the said contract, has been paid and will remain in full force and effect up to.....*i.e.* for.....months counted from the date of placing the stores in service, and shall continue to be enforceable for further five months *i.e.* up to.....(date), hereinafter called the said date.

9. This guarantee will not be discharged due to the change in the constitution of the Bank or the Sellers.

10. That no claim under this guarantee shall be entertained by us unless the same has been preferred by the Government within the said dale.

Date......

Signature.....

Place.....

Printed Name.....

x

Witness.....

(Designation)……..

Bank's Common Seal

ANNEXURE – 12

JOINT BIDDING AGREEMENT

(To be executed on stamp paper of appropriate value)

THIS JOINT BIDDING AGREEMENT is entered into on this the --- day of --- 20
AMONGST

1. {-----Limited, a company incorporated under the Companies Act, 1956 } and having its registered office at --- (hereinafter referred to as the "First Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2. {-------- Limited, a company incorporated under the Companies Act, 1956 } and having its registered office at ---- (hereinafter referred to as the "Second Part" which expression shall, unless repugnant to the contest include it successors and permitted assigns)

AND

3. { ------- Limited, a company incorporated under the Companies Act, 1956 and having its registered office at --- (hereinafter referred to as the "Third Part" which expression shall, unless repugnant to the context include its successors and permitted assigns) }

AND

4. { ------- Limited, a company incorporated under the Companies Act, 1956 and having its registered office at --- (hereinafter referred to as the "Fourth Part" which expression shall, unless repugnant to the context include its successors and permitted assigns) }#

The above mentioned parties of the FIRST, SECOND, {THIRD and FOURTH & FIFTH}

PART are collectively referred to as the "Parties" and each is individually referred to as a "Party"

The number of parties will be shown here, as applicable, subject however to a maximum of 5 (Five) WHEREAS

(A) Indian Railways, represented by Director Railway Electrification (Stores)/Railway Board and having its office in Room No. 114, Rail Bhavan, New Delhi (hereinafter referred to as the Authority" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited tender no. ----dt---- for procurement of … nos of self-propelled 8-wheeler inspection & maintenance car of diesel electric under slung type with measuring and recording instrumentation **(MRI)**.

(B) The parties are interested in jointly bidding as members of a Consortium and in accordance with the terms and conditions of the tender document and

(C) It is necessary condition under the tender document that the members of the Consortium shall enter into a Joint Bidding Agreement and furnish a copy thereof with the application.

NOW IT IS HEREBY AGREED as follows:

1. **Definition and Interpretations**

In this Agreement, the capitalized terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the tender document.

2. **Consortium**

2.1 The Parties do hereby irrevocably constitute a consortium (the "Consortium") for the purposes of jointly participating in the Bidding Process.

2.2 The Parties hereby undertake to participate in the Bidding Process only through this Consortium and not individually and/or through any other consortium constituted for this tender, either directly or indirectly or through any of their Associates.

3. Role of the parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

(a) Party of the First part shall be the Lead member of the Consortium essentially a car body builder or ***measuring and recording instrumentation manufacturer for railway application*** and shall have the power of attorney from all Parties for conducting all business for and on behalf of Consortium during the Bidding Process and until the expiry of contract.

(b) Party of second part shall be the other/technical member.

{(c) Party of third part shall be the other/ technical member of consortium; and**}**

{(d) Party of fourth part shall be the other/technical member of consortium.**}**

{(e) Party of fifth part shall be the other/technical member of consortium.**}**

4. Joint and Several Liabilities

The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to the contract and in accordance with the terms of tender condition till such time as the Financial Close for the contract is achieved under and in accordance with contract agreement.

5. Representation of the Parties

Each party represents to the other parties as of the date of this agreement that:

(a) Such Party is duly organized, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;

(b) The execution, delivery and performance by such Party of this Agreement has been authorized by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney

in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:

(i) require any consent or approval not already obtained;

(ii) violate any Applicable Law presently in effect and having applicability to it;

(iii) violate the memorandum and articles of association, by-laws or other applicable organizational documents thereof;

(iv) violate any clearance, permit, concession, grant, license or other governmental authorization, approval, judgment, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or

(v) create or impose any liens, mortgages, pledges, claims, security interests, charges of encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling it obligations under this agreement;

(c) this Agreement is the legal and binding obligations of such Party, enforceable in accordance with its terms against it; and

(d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Affiliates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such party in the fulfillment of its obligations under this Agreement.

6. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until the Financial Close of the contract is achieved under and in accordance with the contract Agreement, in case the contract is awarded to the Consortium. However, in case the Consortium is either not pre-qualified in this tender or does not get selected for award of the contract, the Agreement will stand terminated in case the Applicant is not pre-qualified or upon return of the Bid Security by the Authority to the Bidder, as the case may be.

7. **Miscellaneous**

7.1 This Joint Bidding Agreement shall be governed by laws of India.

7.2 The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the Authority.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED
AND DELIVERED

For and on behalf of

LEAD MEMBER by:

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED
AND DELIVERED

For and on behalf of

SECOND PART by:

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED
AND DELIVERED

For and on behalf of

THIRD PART by:

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED
AND DELIVERED

For and on behalf of

FOURTH PART by:

(Signature)

(Name)

(Designation)

(Address)

SIGNED, SEALED
AND DELIVERED

For and on behalf of

FIFTH PART BY:

(Signature)

(Name)

(Designation)

(Address)

In the presence of:

1. 2.

Notes:

1. The mode of the execution of the joint Bidding Agreement should be in accordance with the procedure, if any, laid down by the Applicable Leave and the charter document of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with required procedure.
2. Agreement should attach a copy of the extract of the charter documents and documents such as resolution/power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member.
3. For a joint bidding Agreement executed and issued overseas, the documents shall be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney has been executed.

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

सत्यमेव जयते

TECHNICAL SPECIFICATION FOR 8-WHEELER DIESEL ELECTRIC INSPECTION & MAINTENANCE OHE CAR UNDERSLUNG TYPE FOR OPERATION ON BROAD GAUGE (1676 mm)

(August' 2015)

Issued by
RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW-226011
(For Official use only)

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	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE			
DESIGNATION	SSE/TW	Dy. Director/TI	EDTI

COPY NUMBER

ISSUED BY ……. SIGNATURE…….. DATE……

ISSUED TO ……

……

Chapter - I

GENERAL CONDITIONS

1.1 Scope

1.1.1 This specification covers the design, manufacture, and supply, testing & commissioning of self-propelled 8-Wheeler Inspection & Maintenance OHE car for operation on broad gauge (1676mm) electrified (25 kV a.c.) routes of Indian Railways. The 8-Wheeler Inspection & Maintenance OHE car is a self-propelled 4-axle vehicle and is used for periodical inspection, patrolling and maintenance of traction overhead equipment (OHE). It shall also be used for attending to sites of break down, restoration and damaged OHE etc. It is also required to erect small lengths of catenary and contact wire by way of repairs of damaged OHE. The 8-Wheeler Inspection & Maintenance OHE car uses the power generated by the Diesel Alternator set provided in the OHE car for propulsion and not the power from live OHE.

1.1.2 In case of difference between the specification and / or exhibited drawings, the tenderer shall get an immediate clarification from RDSO which shall be final authority for clarification.

1.2 CLIMATIC CONDITIONS

1.2.1 The power pack & electrics of the OHE car shall be in continuous operation under the following atmospheric and climatic conditions: -

1	Atmospheric temperature	Metallic surface temperature under Sun: 75° C max. and in shade: 55 °C max. Minimum temperature: - 10°C (Also snow fall in certain areas during winter season).
2	Humidity	100% saturation during rainy season.
3	Reference site conditions	i) Ambient Temp. : 50° C ii) Humidity: 100% iii) Altitude: 1000m above mean sea level.
4	Rain fall	(i) Ranging from 1750 mm to 6250 mm. (ii) Number of rainy days/annum 120
5	Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach as high as of 1.6 mg/m^3. In many iron ore and coalmine areas, the dust concentration is very high affecting the filter and air ventilation system.
6	Coastal area	OHE car and its equipments shall be designed to work in coastal areas in humid and salt laden atmosphere with maximum pH value of 8.5, sulphate of 7mg per liter, max. concentration of chlorine 6 mg per liter and maximum conductivity of 130 micro siemens/cm.
7	Vibration	The equipment, sub-system and their mounting arrangement shall be designed to withstand satisfactorily the vibration and shocks encountered in service as specified in clause 1.2.2. High level of 50 g vibration and shocks. Accelerations over

		500 m/s² have been recorded at axle box levels for long periods during run. Vibrations during wheel slips are of even higher magnitude.
8	Wind speed	High wind speed in certain areas, with wind pressure reaching 200kg/m²

1.2.2 The equipments and their arrangement shall withstand satisfactorily, the vibration and shocks normally encountered in service which are as below:-

(a) Maximum Vertical Acceleration 3.0g
(b) Maximum Longitudinal Acceleration 5.0g
(c) Maximum Train Acceleration 2.0g
[Where 'g' is acceleration due to gravity]

1.2.3 The OHE car shall be able to negotiate water logged tracks at 10 kmph, with water level of 102 mm above the rail top, for which the Equipment shall be suitably designed.

1.2.4 The OHE car and its principal assemblies shall be designed and manufactured to give satisfactory performance in the tropical climate, having very dry & dusty regions in arid zones of the country, to humid coastal areas and extreme cold climate of the northern region..

1.3 **Examination of the Tender Offer**:

1.3.1 The tenderer is required to furnish clause by clause comments to this specification, either confirming acceptance of the clause or indicating deviation there from.

1.3.2 A comprehensive specification of the OHE car as offered shall be submitted separately.

1.3.3 In the event a tenderer is unable to comply, either partially or fully, to any of the stipulations made in this specification, it must be brought to the notice of purchaser with full particulars of the deviations, technical details, cost implications and past service performance, etc.

1.4 Design Development:

1.4.1 The successful tenderer (hereafter called as contractor) shall develop the design based on the details given in this specification and sound engineering practices. The entire design & technical data along with calculations shall be submitted to RDSO for approval before commencing construction of OHE car or placing orders on sub-contractors.

1.4.2 The design shall be based on S.I. Units.

1.4.3 From the information given in this specification and instructions of RDSO, the contractor shall prepare a full set of engineering drawings and submit the same to RDSO for approval.

1.4.4 When submitting drawings of a particular detail, other details depending on it shall be shown in juxtaposition.

1.4.5 Material specifications, manufacturing tolerances and other details, which are necessary for manufacture for each component shall be indicated on the drawings.

1.5 Approval of Drawings:

1.5.1 "Approval" to the drawing means the approval to the general adoptability of the design features. RDSO shall not be responsible for the correctness of dimensions on the drawings, materials used, strength or performance of the components. The contractor shall be wholly and completely responsible for all these variables. The contractor, when submitting proposals or designs for approval of the RDSO, shall draw attention to any deviation or departure from the specification involved in his proposals or drawings.

1.5.2 Drawing for approval shall be submitted in standard size (s) as per IS: 696 along with main calculation details in triplicate. List of drawings/calculations to be submitted to RDSO for approval before undertaking manufacture of prototype DETC are given in ANNEXURE-2. Any other drawings of which manufacturer desire to obtain approval of RDSO shall also be submitted to RDSO.

1.6 Prints:

1.6.1 One set of tracing, two sets of their prints &two DVD of the RDSO approved drawings/ calculations shall be supplied by the successful contractor with each tower wagon. The tracings shall be on RTF of durable quality. Drawings shall be made on Auto CAD. Two sets of tracing, two sets of prints and two copies of approved drawings & calculations along with 3 DVDs shall be supplied to RDSO.

1.6.2 Each set of tracings shall form a complete set of working drawings, the first sheet being the index and the following sheets being arranged properly to show the various assemblies, sub- assemblies and components of complete works in the following sequence:-

(a) Diagram sheets show the overall dimensions of the equipment, weights and the relation of overall dimensions to the space in the OHE car.
(b) Lists of all parts grouped in to major assembly with details of numbers per set, weight, specification material and drawing reference against each item.
(c) General arrangement drawings of complete equipment sets. Diagram of lubrication points indicating type of lubricant. Sub-assembly arrangement, drawing in proper and logical sequence.
(d) Detailed drawings:- On detailed drawing sheets, each part shall be identified by an alphabetic letter and the list of all parts forming the sub-assembly shall be tabulated just above the title block on the same sheet giving details against each alphabetic letter.

1.7 Contractor's responsibility:

1.7.1 The contractor shall be entirely responsible for the execution of the contract strictly in accordance with the terms of this specification and the conditions of contract, notwithstanding any approval which RDSO or the Inspecting officer may have given:

(a) Of the detailed drawing prepared by the contractor.
(b) Of the sub-contractors for materials.
(c) Of other parts of the work involved by the contractor.
(d) Of the tests OHE carried out either by the contractor or by the RDSO or the Inspecting Officer.

1.8 Warrantee:

Warranty shall be as per IRS standard conditions of contract.

1.9 Exhibited Drawings and standard Specifications:

1.9.1 "Exhibited Drawings" means the drawings which are exhibited or provided by RDSO for the guidance of the contractor.

1.9.2 The exhibited drawings, illustrative of a range of standardized dimensions and fittings, are listed in Annexure -1. The design of the OHE car must comply with the dimensions, and fittings included in the exhibited drawings as far as possible. Any deviation from there shall be clearly mentioned in the form of a table on the drawing.

1.9.3 The exhibited drawings are not guaranteed to be free from discrepancies. The contractor while preparing the engineering drawings shall ensure that these are free from discrepancies. He shall also incorporate all modifications desired by the RDSO, subsequently, without prejudice to the date of delivery or contracted price, except as provided for under the conditions of contract.

1.9.4 To improve upon the performance, modifications and corrections are made in the specification and drawings from time to time. The contractor must, therefore, satisfy himself that the drawings being used by him are of the latest version. In case of any doubt, he must get it clarified from RDSO.

1.9.5 The Contractor shall procure at his own expense all the drawings and specifications required for the manufacture of the OHE car.

1.9.6 Copies of drawings referred to in this specification and given in Annexure-1 may be obtained from RDSO/ICF on payment.

1.9.7 Indian Railways Standard (IRS) specifications and Schedules of Maximum Moving Dimensions may be obtained on payment from the Manager, Government of India Publications, Civil Lines, Delhi 110 006 (INDIA).

1.9.8 Indian Standard Specifications (ISS) are available from Bureau of Indian Standards, 9-Bahadur Shah Zafar Marg, Delhi 110 002.

1.10 **Materials:**

1.10.1 Materials used in the construction of the OHE car shall comply with the relevant IRS specifications or Indian Standard Specifications. Where IRS or ISS do not exist for specific components, the contractor shall submit proposed material specification for approval of RDSO.

1.11 **Service Engineering**:

1.11.1 The Contractor shall arrange for the supervision of commissioning of the OHE car immediately after their receipt at ultimate destination. He is also required carry out joint check of the receipt of components regarding short shipment or transit damages.

1.11.2 The contractor shall ensure commissioning of the OHE car within 30 days from the date of intimation by the consignee.

1.11.3 The performance of OHE Car shall be demonstrated by the contractor after its successful commissioning at the consignee's works.

1.11.4 The contractor shall provide and ensure servicing facilities in India throughout the warranty period. After the warranty period is over, he shall, on call, give service support for troubleshooting and for obtaining spare parts.

1.11.5 A well designed and informative electronic portal for lodging of complains and action taken by supplier shall made operative before dispatch of first prototype vehicle.

1.12 **Training:**

1.12.1 The Contractor shall arrange to provide training in operation & maintenance of the OHE car for two men for four days at their works and user's place respectively per tower wagon. The training material shall be supplied as per Annexure 8-D.~~The cost of training shall be included in the price of tower car.~~ The charges for travel, boarding and lodging of trainees shall be borne by the Railways.

(Note: The cost of training shall be quoted separately in Table G of the Offer Form and not to be included in the cost of Tower Car. The man days and training material mentioned in this para are for each Tower Car with MRI.)

1.12.1 Technical experts of the manufacturer, during commissioning of OHE car at consignee's premises, shall also adequately train operators/ maintenance staff nominated by the consignee for minimum period of 3 days.

1.13 **Service Manuals and Spare Parts Catalogues:**

1.13.1 Detailed Maintenance & Service Manuals including the manual for trouble shooting & operational requirement, spare parts catalogues for the driver and maintenance staff for the OHE car shall be prepared and three copies supplied free of charge, per OHE car, to the consignee. Before printing the final version of the manual, the draft of the Manuals shall be got approved from RDSO.

1.13.2 Three copies per OHE cars of Spare Parts Catalogues& list of must change items with periodicity & sources of supply shall also be supplied to the consignee.

1.13.3 In addition, three copies each of the Maintenance/Service and trouble shooting manual along with shall be supplied to RDSO.

1.14 **Electric Arc Welding:**

1.14.1 Indian Railways Standard Code of Practice for Electrical Arc Welding shall be followed. If the contractor desires to follow any other code of practice, it shall first be submitted for approval of RDSO.

1.14.2 Welding symbols shall be in accordance to IS:813. Drawings on which such symbols appear, are to bear a note on the bottom left hand corner, "WELDING SYMBOLS AS PER IS:813".

1.14.3 **Railway Initial Letters**: Where parts are required to be marked with Railway initial letters, they shall be 'I.R'

1.15 **Sublet Orders for Materials**: Any subletting of orders for materials/work shall have prior approval of RDSO.

1.16 **Spare Parts**:

~~1.16.1~~ Unit exchange spare parts shall be indicated. ~~However, final decision to buy these will rest with the purchaser.~~

1.16.2 The prices for these spares shall be quoted separately. These spares shall be for every set of 10 OHE cars or part thereof. The complete details such as part number and their quantity shall be clearly indicated against following items with the offer.

i)	Flexible coupling/ Engine connection (complete)	-	1 set
ii)	Traction Alternator alongwith Power Rectifier	-	1 set
iii)	Air compressor (complete)	-	1 unit
iv)	Motorised Bogie (complete with Traction Motors and Break Gear)	-	1 set
v)	Battery charger for charging of starter Batteries	-	1 unit
vi)	Auxiliary Alternator	-	1 set

1.16.1 The prices for these spares shall be quoted separately. These spares shall be for every set of 10 OHE cars or part thereof. ~~The prices shall not be used for tender evaluation purpose.~~

(Note: The cost of Unit exchange spare parts shall be quoted separately in Table D of the Offer Form and not to be included in the cost of Tower Car. The prices shall be used for tender evaluation purpose.)

1.16.2 The tenderer shall be responsible to ensure subsequent availability of the spare parts for the normal life of the respective equipment.

1.17 **Tools:**

List of tools & special tools for maintenance and overhaul of OHE Cars shall be supplied as per Annexure-8-A, 8-C by the Tenderer in accordance with Clause 6.1 of this specification. ~~The cost of tools shall be included in the price of tower car.~~ The successful Tenderer shall submit the drawings and specification of tools required for the maintenance of the OHE Car.

(Note: The cost of tools shall be quoted separately in Table E of the Offer Form and not to be included in the cost of Tower Car.)

1.18 **Testing Kit:**

1.18.1 The tenderer shall supply testing equipment with each tower car required for ensuring optimum performance and trouble-free service of the major equipments & accessories provided in the OHE car (e.g. Diesel Engine, Traction Alternator, Traction Motor and other Equipments with accessories). The testing Equipment shall be supplied as per annexure-8-B. ~~The cost of testing equipment shall be included in the price of tower car.~~

(Note: The cost of testing kit shall be quoted separately in Table F of the Offer Form and not to be included in the cost of Tower Car.)

1.18.2 The Tenderer shall also offer separately special jigs, tools and instruments, which shall essentially be required for maintenance of OHE Car body. Essential Equipments and facilities required for attending local damage to Stainless Steel structures, OHE Car interiors etc. in case of accidental damages should also be furnished.

1.18.3 The contractor shall demonstrate to the IR, the satisfactory functioning of the tools, jigs & instruments supplied by him. The Specification of testing equipments shall be provided by successful Tenderer.

1.19 **OHE Maintenance equipments :**

The tenderer shall supply the following maintenance equipment along with each tower car. The cost of maintenance equipment shall be included in the price of tower car.

a) The technical specification No. TI/SPC/OHE/TIPS/1031 with latest amendment for infra-red imaging system suitable for monitoring and measurement of hot spot temperature for different applications.
b) One Hydraulic Jack of 5 t capacity,
c) One tirfer 3t, Two tirfer 1.5 t, (As per RDSO's Specification No. TI/SPC/OHE/TOOLPL/0990).
d) Three pull-lift 0.75 t, Two pull-lift 1.5 t , One pull-lift 3t (As per RDSO's Specification No. TI/SPC/OHE/TOOLPL/1990.

1.20 **Quality Assurance Plan**

1.20.1 The contractor should posses valid ISO-9001:2000 certificate for his work's address, covering the items for which he is participating in the contract. The

contractor shall formulate Quality Assurance program (QAP) detailing the methodology proposed to be followed to ensure a quality product. QAP shall cover quality assurance procedures and procedures to be followed during all stages of design, manufacture, testing and commissioning of the equipment. The Contractor shall define the role of each functional group in the Organisation for achieving the required quality of the product and submit a comprehensive document " Quality assurance manual" in accordance with IS 10201-1982 as the basic guideline. The preparation of necessary charts and proforma shall be to IS: 7200 (Part- III)-82.

1.20.2 The Tenderer whose bid is accepted, shall be required to submit a "Quality Assurance Manual" by giving details as to how the quality of specific product is proposed to be assured. Supply of the equipment shall commence only after "Quality Assurance Plan" has been approved by RDSO.

The above shall apply to the main contractor as well as sub- contractors.

1.21 A*nnual Maintenance Contract (AMC) **

(*This clause 1.21 for AMC is not applicable for this tender)

1.21.1 ~~The tenderer shall quote for AMC comprehensive of all equipments including, traction motors, alternators, Diesel Engine complete with transmission & cooling system, Air Brake system with compressor unit and Control System etc.~~

~~The Annual Maintenance shall be applicable for the period for 5 years beyond expiry of warantee. The tenderer shall quote year wise rates of AMC detailing the various schedules to be undertaken by them as well as submitting the requirement of material/spare parts, consumables and services to be rendered by him after regular intervals. The AMC shall be comprehensive for all equipments for preventing as well as break down maintenance. The tenderer shall keep adequate spares in stock for regular schedule of AMC so that maintenance schedules are completed timely. AMC shall be all inclusive of parts required to be replaced during each schedule, if required, either due to brake down or wear. Average running of 8-Wheeler Tower Wagon shall be approx. 1200 Hrs per year.~~

~~The AMC cost shall be considered while evaluating the inter-se tender position. It shall be compulsory for the tenderer to quote for AMC. However, the decision to enter into AMC shall vest with Railway alone.~~

1.21.2 ~~In case of failure of any of the equipment covered under maintenance contract, it shall be repaired or replaced within reasonable time not exceeding 05 days from the day of reporting by the consignee. After this period of 05 days, penalty at the rate of Rs.5000 per day (flat) shall be imposed on the Contractor for each day or its part thereof.~~

1.21.3 ~~The AMC Agreement shall be entered with the Zonal Railways as per the accepted rate in the Contract.~~

DIMENSIONAL OPERATING AND OTHER REQUIREMENTS FOR OHE CAR

2.0 The OHE Car shall dimensionally conform to the following:

1.	Track gauge	1676 mm
2.	Minimum radius of curve	**Normally 175 meters, sharper curves with radius less than 175 meter are also available at isolated location. Regarding minimum radius of curvature for slip points, turnouts or crossover roads, para 17 of chapter II of Schedule-I of IRSOD (BG) Revised 2004 shall be applicable which provides for minimum of 175 m radius curves in case of 1 in 8.5 scissors cross over.**
3.	Maximum super elevation	165 mm
4.	Maximum Super -elevation deficiency	100mm
5.	Maximum wind pressure	200 kg/m^2
6.	Maximum moving Dimensions	Maximum moving dimensions shall conform to diagram 1D of Indian Railway Schedule of Dimension (SOD) 1676 mm gauge (BG) revised 2004 with the pantograph and platform in lock down condition. Infringements, if unavoidable and fully justified, may be considered, if within the limits shown in SOD 1676 mm gauge (BG) revised 2004.
7.	Maximum permissible wheel base length of the OHE car, over hang beyond bogie center, buffer height draw bar height	These shall conform to Indian railway, schedule of dimension 1676 mm gauge (BG) Revised 2004. Adequate clearance shall be allowed so that no component of the OHE car shall infringe a minimum of 102 mm above rail level with wheels in fully worn conditions, full deflection of springs and effect of dynamics.
8.	Maximum Axle load	20.32 t
9.	(a) Maximum Speed when coupled to a train (b) Max operating speed under its own power	110Km/h 110 km/h
10	Brakes	All wheels with clasp brakes.
11	Service Braking	Pneumatic

12	Performance capabilities:-	i) Pay load (excluding Power equipment and hydraulic platform)	12tonnes (Approximately)
		ii) Period of continuous running at 110 km/h on generally tangent track followed by frequent to and fro movement at walking pace for 1-1/2 h).	5-1/2h total (4h+1-1/2h)
		iii) Period of continuous running at 40 km/h up or down gradient of 1 in 60 to be followed by frequent to and fro movement up to 5 km/h for 1-1/2 h on same gradient with speed control.	5-1/2h total (4h+1-1/2h)
		iv) Performance in monsoon and squally conditions.	Un- restricted
		v) OHE Car shall be capable of running at a speed of 75kmph with 2-loaded flat wagons weighing 120t at tangent track.	
		vi) The OHE Car shall be capable of running at a speed of 25 km/h on 1 in 33 up gradient.	
		vii) The OHE car shall be capable of starting and hauling Two wagons weighing 60t each in gross load condition (Total 120 tonnes) on an up gradient of 1 in 33. Maximum operating speed of the OHE car for level and 1 in 33 up gradients shall be indicated with the offer.	
		viii) With the hydraulic platform in raised condition the OHE car shall run at a maximum speed of 10 km/h.	
		ix) The emergency braking distance (EBD) for fully loaded (20.32x4=81.28 t) OHE car from maximum speed of 110km/h to zero shall not be more than 800m on flat section. The contractor shall also submit calculation for EBD on 1 in 33 down gradient.	

2.1 The purchaser may at his option revise the layout so as to provide for an arrangement for front opening on one side to load and unload collapsible ladders from the trackside. Tenderer may offer alternative proposals with full details of the advantages of his system.

2.2 The OHE car shall be an 8-wheeler vehicle. The disposition of equipment storage space shall be such as to ensure equal axle loads. Design shall be such as to afford easy inspection and maintenance.

2.3 Provision shall be made for the following in the OHE Car:

2.3.1 **Driving Cabs**:

i) Two driving cabs shall be provided, one at each end, with complete operating & driving control with dash boards to facilitate operation from either cab. Driver's seat shall be on the left side. Adequate leg space shall be provided for the driver when

he is seated. The general layout and arrangement of equipment in Driver's cab shall follow UIC CODEX 651 with respect to dimensions, safety features, furnishing, lighting, ventilation, noise level, field of view, driver's desk, seats etc. Spot lights shall be provided at suitable locations. The cab shall be ergonomically designed for better view and comfort and also the various panels /equipments meant for Driver shall be so laid that they are easily readable and Driver is not required to move physically for any operation during run.

ii) Foldable cushion sheet shall be provided in each of the driving cabs for 4 persons in addition to the Driver.

iii) All controls, brake handle, hand brake, Dead Man's device for horn and indication lamps/meters shall be within easy access and view of the Driver.

iv) The OHE car shall be equipped with inter-communication equipment between cabs, Inspection compartment, working platform through hand free sets with their own battery.

v) Each driving cab shall be provided with one number 6 Inch TFT monitor connected with one number portable CCTV camera for viewing roof activities during OHE maintenance.

vi) 2 numbers, 110 V sockets for hand signals in each cab.

vii) Head Light, Flasher lights search lights and marker lights at both ends of the cab, refer para 4.5.

viii) Non-contact type OHE voltage sensing device in both the cabs.

ix) Full width single piece Stone proof lookout glass with Sun Screen shall be provided at the end wall of each Driver's compartment and these shall be glazed, clear, colourless polycarbonate to ICF Specification No.ICF/MD/SPEC-159 (latest revision).

x) Provision of wind screen Wiper arm and blade Assembly to be provided as per RDSO Specification no.C-K306 (Rev 01).

2.3.2 It is proposed to keep one drum each of contact and catenary wire, duly mounted on the stand, for erection during the restoration of breakdowns. Provision shall be made for rotating the contact wire drum by 180 degree for matching contact wire groove in either direction is possible so that it shall be possible to pay out the wire in either direction. Stands shall be provided with hand brakes to control the tension in the wires during the laying out process. It shall be possible to lay-out wires in either direction and therefore these drum shall preferably be in the middle of the OHE car. The drums be loaded from a sliding door of adequate size on both sides. The laying out of the wire shall be from two of the openings of suitable size in the roof vertically above each of the drums. These openings shall normally be covered so as to prevent water falling into the OHE car.

2.3.3 Successful tenderer shall submit mounting drawings for conductor drum as per principle details given below for approval of RDSO.

The principal details of the conductor drums are-

(a) Diameter 1900 mm
(b) Width- 950 mm
(c) Bore for mounting on the stand- 105 mm x 105mm
(d) Facility shall be provided to rotate the conductor drums to enable pay out the conductor in either direction

2.3.4 The facilities to be provided in the OHE Car shall be as described briefly in the following Clauses.

2.3.4.1 **Material Cabin**: A material cabin shall be provided adjoining one of the driving cabs having adequate space and proper locking arrangement for the storage of costly equipments and fittings. A reasonable number of cup-boards having sufficient number of pigeon holes shall be provided inside the material cabin for storage of fittings, tools and tackles, lighting equipment and other fragile spares. Suitable shelves/racks shall also be provided for storage of about 50 MS tubes of upto 47 mm dia and upto 4m long, hangers for insulators, apart from these two steel almirah (with five shelves) shall be provided for keeping costly items & essential records.

2.3.4.2 Workshop: A well-ventilated workshop shall be provided in the middle equipped with exhaust fans, ceiling fans and windows, with a room for 4 persons to stand and work. On one side a workbench of size 2500mm x 900mm shall be provided. It shall be fitted with two vices to under take minor repair work along with one drilling machine. On the side opposite the workbench, racks/cup board shall be provided for tools and plant. Design/ drawings of these equipments shall be submitted to RDSO for approval.

2.3.4.3 **Storage space**: Adequate space shall be provided for installation and storage of equipment such as emergency lighting equipment and other items supplied with the OHE Car.

2.3.4.4 Staff Cabins: One cabin for Officers with four cushioned Berths and one Cabin for staff (if possible) with two cushioned Berths shall be provided. The Cabins shall have separate entry and have windows on both sides. The Cabins shall preferably be not over the wheels as far as possible. An Indian style WC with separate over head Tank, Stainless Steel Sink and other accessory fitting and a folding cushioned seat including shower with flexible Hose shall be provided. The WC shall be provided with an exhaust Fan. Provision of two Mobile Charging points to be made in Officer and Staff's Cabin as well as in both the driving cab and working area. In addition two folding berths shall be provided at suitable location without cabin.

2.3.4.5 **Communicating doors**: Each driving cab shall have independent entry from both sides. The OHE car lobby shall have entry from both the cab. Through communication inside the OHE car shall be provided. It shall be possible to isolate the cabins using sliding doors with locking arrangements.

2.3.5 Facilities on roof:

i) The OHE car shall be provided with a pantograph similar to AM-12 type with foot insulators and its complete actuating mechanism on one bogie center. Pantograph shall be graduated to enable manual measurement of stagger on either side of track center.

ii) For illumination of roof for night inspection four water proof industrial plug points shall be provided for fixing portable lights.

iii) Two pneumatic points for connecting pneumatic operated/driven tools and fasteners shall be provided.

iv) **Observation dome**: An observation dome shall be provided in the roof near the pantograph so as to observe interaction between the contact wire of the OHE and the pantograph. Two to three persons shall be able to sit comfortably in the observation dome. The upper portion of the dome shall be of polycarbonate /FRP with reinforcement if required for adequate strength and shall also be insulated for 25 KV. The arrangement shall be such that an unobstructed view of the contact between contact wire and pantograph is obtained by the persons in the observation dome without any strain. For this it is essential to have suitable ergonomical design of sitting arrangement. The chair provided in the observation dome shall have adjustable height, back rest with back and front adjustment just like in an automobile OHE car.

v) **Lifting and swiveling platform**: A lifting and swiveling platform with hydraulically operated mechanized adjustment for height and rotation and capable of taking minimum 600 kg load with under-noted features shall be provided over the fixed platform:-

(a) Length	5700 mm
(b) Width	1500 mm
(c) Platform floor level above rail when elevated.	6150 mm
(d) Maxim lifting time to full height	45 s
(e) Rotation range of Platform towards sides.	90^0
(f) Side shifting reach of platform	4200 mm
(g) Full height of collapsible railing above platform floor	800 mm
(h) Maximum time of rotation from 0^0 position to 90^0	45 s

NOTE:

(i) Control for lifting, lowering and swiveling shall be provided on the platform. The raising and swiveling of the platform shall be gradual and without jerks. In addition two emergency stop switches shall be provided on each side of the platform to bring the OHE Car to an emergency halt.

(ii) Two search lights of 250 W metal halide lamps shall be provided on the platform for inspection of the overhead equipment while on the run. Searchlights shall be capable of swiveling on universal joints type support and swiveling control shall be from inside of the either cab.

(iii) Except space for pantograph and observation dome the remaining roof shall be covered with a 2325mm wide fixed working platform at maximum possible height but within the maximum moving dimensions. This fixed platform shall be provided with four approach ladders, two on each side to climb on to the platform from the ground.

2.3.6 Provision shall be made to OHE carry 3 OHE masts of 9.5 m and 1of 12 m lengths. The masts may either be rolled I beam of 150mm x 200mm size or fabricated structure of 250mm x 300mm.

2.3.7 Suitable safety measures including interlocks between various equipments, access doors and line equipment shall be provided to ensure.

(i) Safety of men and

(ii) Stability of the OHE Car while in operation.

The tenderer shall indicate the proposed interlocking and safety aspects.

2.3.8 The entire OHE Car including bogies, superstructure alongwith equipment is to be effectively earthed as per standard practice for rolling stock. Schematic and other detailed drawings for earthing shall be got approved by RDSO.

2.3.9 The equipment fixed to the underframe shall be secured properly by providing extra metallic chains of adequate strength to safeguard the equipment and to perform efficiently.

2.3.10 Fire prevention OHE Car shall suitably be provided as per RDSO's Specification No.RDSO/PE/CP/EMU/0001 Rev.0 of Aug.'2003 (Amendment No.1 of July'2006) and with latest revision

3.1 MECHANICAL DESIGN

3.2 **Superstructure**:

3.2.1 **General**: The OHE Car shall be of welded light weight construction, generally to maximum moving dimensions to diagram 1D of Indian Railways Schedule of Dimension 1676 mm gauge (BG) revised 2004 (SOD) with pantograph and platform in lowered condition. Infringements, if unavoidable and fully justified, may be considered, if within limits shown in the SOD. Weight of the OHE Car shall be kept as low as possible, without compromising with the strength. The structure shall withstand end load of 200 t (divided equally between the two buffers) applied in conjunction with full payload. Under such loading no permanent deformation should occur and stresses should remain below the yield point. The design shall be sufficiently rigid to withstand stresses imposed due to lifting with overhead or breakdown cranes or by jacks applied to the headstocks. The super-structure shall be designed as a tubular girder for the purpose of withstanding vertical loading, but the inner sheeting of the roof and walls shall not be stress- bearing members.

3.2.2 The under frame shall be designed to meet the following loads:

i. A vertical load of 4 t/meter run uniformly distributed. The weight of the various equipment mounted in the OHE car shall be considered as concentrated load and shall be simulated as such during load/strain testing.
ii. A horizontal squeeze load of 100 t applied at each buffers.
iii. A combination of loads specified at (i) & (ii).

3.2.3 The stresses estimated by an approved method shall not exceed 139.3 MPa (14.2 kgf /sq.mm) for members made from Steel to IS:2062 Fe 410CuWC and 221.7 Mpa (22.6Kgf/ sq.mm) for members made from corrosion resistant steel to IRS:M 41 for the uniformly distributed vertical load. Also for the squeeze load referred to above, the stress should not exceed 90% of the lower yield point or proportional limit of the material in the load OHE carrying member of the shell and 95% of the lower yield point or proportional limit of the material in the end construction. The estimated vertical deflection of the shell at the center of the OHE car shall also not exceed 10mm under any loading condition detailed at (i) to (iii) above.

Completed shell of prototype OHE car shall be strain gauged for stress analysis under tare and loaded conditions with squeeze load. OHE Car shall be tested for leakage through roof and body sides and ends at the works of the manufacturer. To OHE carry out this test, the manufacturer shall provide a test rig to the satisfaction of the inspecting authority.

3.2.4 **Side and End Wall**:

(i) Material: The frame work shall be of low alloy high tensile corrosion resistant steel to IRS M-41 with latest revision/amendment.

(ii) Side wall and pillars: The material of body pillar shall be IRS M-41. Pillars shall be continuous from sole bar to cant-rail, except below window openings, and shall be braced by longitudinal members between adjacent pillars. Bracing being designed to act as integral part of the exterior sheeting. Manufacturer can use better material than IRS: M-41 for body pillar but without cost implication and supplier shall provide proof of better material.

(iii) The frame work shall be of low allow high tensile corrosion resistant steel to IRS: M-41 with latest revision.

3.2.5 **Body shell Structure: The body shell including sheathing shall be of IRS: M 41 steel.**

3.2.6 **Underframe:** The underframe material shall be of corrosion resistant structural steel to IRS: M 41 or copper bearing quality steel to IS: 2062 Cu WC, of welded integral structure. The under frame design shall be developed by the successful Tenderer keeping in mind the layout of DETC. The successful Tenderer shall submit under frame design to RDSO for approval at the time of design approval stage. They shall be assembled in jigs and fabricated by welding. Trough floor of 2.0 mm thick of steel to IRS: M 41 steel shall be provided in covered area.

3.2.7 **Headstocks**: These shall be of robust design suitable for coupling and buffing gear arrangements as detailed in this specification. Head stock material shall be IRS:M 41 steel.

3.2.8 **Draw gear members**: The members provided for OHE carrying the trimmer casting shall be of strong and rigid construction capable of transmitting buffing forces specified in Clause - 3.1 under the most adverse operating conditions. They shall be braced together to the main sills in such a manner as to form, in conjunction with the flooring system between the transom and headstock a rigid assembly capable of withstanding all cross-racking forces, which may occur in service. The design shall, as far as possible, ensure that the load is applied symmetrically about the neutral axis of the longitudinal and is concentric to them.

3.2.9 **Draw & Buff Gear:** The OHE Car shall be provided with high tensile centre buffer transition coupler conforming to RDSO Specification No.56-BD-07 along with the side buffers arrangement to RDSO's Drawing No. SK-98145. The arrangement shall be such that OHE Car shall be able to couple with existing BG rolling stock of Indian Railways.

3.2.10 **Lifting Pads:** The OHE Car body shall lend itself to repeated lifting in workshop by overhead cranes or jacks without risk or damage. Suitable lifting pads shall be provided and marked in a readily distinguishable manner on the OHE car body.

3.2.11 **Solebar:** These shall be continuous members from headstock to headstock, adequately braced together to withstand the head on loading and cross racking forces and shall be capable to withstand jacking for the purpose of lifting the OHE Car. The sole bar shall be of corrosion resistant structural steel to IRS: M 41 Steel.

The successful Tenderer shall submit the design/drawing of Sole Bar to RDSO for approval at the time of Design/Drawing approval stage.

3.2.12 **Body bolster**: These may be fabricated from pressed section and shall have suitable pads on which lifting slings may be placed. Body bolster shall be of copper bearing quality steel to IS:2062 Cu WC of welded integral structure.

3.2.13 **Floor bearers:** The design of floor bearers shall include robust main floor bearers placed transversely between the main sills and an adequate numbers of racking panels between the main sills and diagonal braces. The transverse floor bearers shall be so designed to OHE carry the maximum super-imposed load under maximum load conditions as well as bracing between the main sills, and shall be flushed with the top faces of the main sills, and a suitable surface for the floor covering. The design shall generally ensure adequate drainage, so that corrosion is avoided, or is confined to parts, which can be readily renewed without affecting the main flooring members. Floor bearers shall be conforming to IRS: M 41 steel.

3.3 **Roof:**

3.3.1 The roof shall be designed to form a satisfactory chord to the superstructure considered as a girder, and to take a concentrated load of 6 men standing (450 kg), close together at any point. The structure shall consist generally of two main longitudinal members running from end to end of the OHE Car, braced at frequent intervals along their lower flanges, and rigidly connected to the arch bars, and to the grab pillars by rigid transverse members. At partition and semi bulkheads, the sills shall be attached to vertical pillars within or forming part of the partitions or semi-bulk-heads The roof top at both ends i.e. back & front ends shall be flat. Roof should be so designed that no water is accumulated in cavities to avoid the damage/rusting. Proper channels to be provided for easy exit of rain water. The construction through out shall be absolutely watertight and shall permit easy renewal of corroded sheets. The material of the roof shall be of IRS: M 41 steel sheet.

3.3.2 Two (02) openings shall be provided in the roof for erection of catenary and contact wires in either direction. The openings shall be of suitable size to permit paying out of the conductors in any direction, when the OHE car is moving slowly at 5-10 km/h speed, without any obstruction, rubbing or scrapping.

3.3.3 **Roof Ventilators**: Roof ventilators shall be provided as per the ICF Drawing No WL.RRM4-7-3-401 with latest alteration shall be used. The ventilator shall not violate the schedule of dimensions & drawings to be got approved from RDSO.

3.3.4 **Air Space**: The air space between the outer and inner sheeting of the roof shall be suitably ventilated as also the air space inside walls and end walls. Attachments may pass through the air space as required, but must be designed, so that they do not cause sections to form sealed chambers or lodgments for condensed moisture. The successful Tenderer shall submit the design/drawing to RDSO at the time of design/drawing approval stage.

3.4 **Windows**:

Lift type window made of powder coated aluminum to ICF drawing No EMU/4C/ASR-5-4-402 with latest alteration with fixed type poly carbonate louver on top and movable glass window at the bottom.

3.4.1 **All window and door glasses shall be of laminated plate glass set in sun heat resistant synthetic rubber section.**

3.4.2 All window openings shall be true to dimensions square and of uniform width. The window opening shall not at any point exceed 2mm over or under the specified dimensions and shall not be out of square by more than 2mm.

3.4.3 The windowsills of the body side windows shall have an outward slope of approximately $5^{0.}$

3.4.4 The body side windows shall have two shutters, one louver on the outside and a glass on the inside.

3.4.5 The glass used for windows/shutters shall be of safety laminated quality to IS: 2553, weighing not less than 9.76 kg/m^2. Gravity safety latches of approved design shall be provided at two intermediate positions to arrest the glass and louver shutters from falling down. The shutters should be balanced by balancers of suitable Design.

3.4.6 The louver shutters shall be provided with shoot bolt type safety latches to secure the shutters firmly in closed and open position.

3.5 **Doors:**

3.5.1 All door openings shall be true to specified dimensions and perfectly square. The openings shall be tested for size and squareness with templates so that doors open and close freely and when closed shall be reasonably weather proof and dust proof.

3.5.2 Hinged doors provided on the side walls for entry of drivers from outside of the OHE Car shall be of inward opening type and will give an opening of 750 mm approx.

3.5.3 Single leaf inward opening hinged or sliding doors with locking arrangement shall be provided in driver's compartment for entry in the corridor and shall have a clear opening of 550 mm.

3.5.4 Other doors on sidewalls shall preferably be of sliding type with a clear opening of 1300 mm. The door leaves shall slide on roller bearing OHE carriers suspended from top rail and shall work in retaining guides on the doorsills. Each leaf shall have a window opening. Since the tenderer is expected to develop layout, location of doors may be decided in the most suitable manner.

3.5.5 Latches shall be fitted on all doors so as to secure them from inside in the closed position.

3.5.6 **Door locks:** All doors shall be fitted with reliable locks to be operated from outside and inside. Hasps for external padlocking shall also be provided on all doors opening out of the OHE car.

3.5.7 **Door Footsteps:** The door footsteps assembly shall be of mild steel chequered plate of 6.0 mm thick edges shall be protected with metallic treads. Any other suitable arrangement shall also be considered.

3.5.8 **Door handholds**: Door hand holds of chromium plated steel tube, with malleable cast iron brackets shall be provided on either side of all body side doors and shall be so fitted as to clear the side walls sufficiently to prevent injury to knuckles. Hand holds shall also be within the OHE car profile.

3.6 **Roof Water Tank**: Roof water tank 4 mm thick of aluminum not less than 450 liters capacity shall be provided. The tank shall be mounted so as to be readily removable for repairs. Side filling arrangement only shall be provided for water filling. The water tank shall be tested to hydraulic pressure of 0.35 kg/cm$^{2.}$ The inside of all water tank shall be painted with bituminous , black lead free, acid, alkali, water and chlorine resisting paint to IS:9862-1981 and properly dried before assembly in the car.

3.7 **BOGIES**:

3.7.1 **General Design: OHE Car shall have two 4-Wheeled Bogies of robust welded design suitable for taking brake gear, suspension etc. and capable of withstanding the maximum static and dynamic stresses under its full load condition. The weight of the Bogie shall be as low as possible, consistent with strength and robustness. The bogie frame shall be of copper bearing steel plates to IS: 2062 Fe 410 Cu WC and shall be fabricated by welding.**

3.7.2 **Bogie suspension Design shall be coil steel suspension in primary and air spring suspension in secondary stage. The Bogie Design shall be as per ICF Drawing No AC/EMU/M/ASR-0-0-001 with latest Alteration.**

The manufacturer of diesel electric tower car shall purchase bogie frame alongwith its accessories from the approved Vendors of Indian Railways.

3.7.3 The design shall be capable of negotiating curves of 175 m radius, turnout of 1 in 8 and1/2and gradients of 1 in 100.

3.8 **WHEEL, AXLES AND AXLE BOXES**

3.8.1 Wheel and axle dimensions shall meet the requirements of Indian Railways Schedule of Dimensions 1676 mm gauge-(BG) revised 2004.

3.8.2 Wheel assembly shall be 952 mm diameter and shall be provided with roller bearing no.22328 C/C3. The wheels of tower car shall be solid forged wheels to RDSO drawing no.SK-K4004 with latest alteration. All wheel sets shall be machined to take a speedometer drive.

3.8.3 Axles shall be to IRS-R43/92 stress calculations /FEM of wheel and axles shall be submitted. The calculation shall be done as per ARR/UIC Specification.

3.8.4 The wheel profile shall be to RDSO sketch No. 91146 with latest alteration.

3.8.5 40% dynamic augmentation of the vertical journal in a load will be used in calculating the axle stress in addition to vertical and horizontal forces and movements.

3.8.6 All wheel and gear seats and traction motor suspension bearing journals are required to be cold rolled together with stress relieving groves machined in the axle, between wheel seat and gear seat and between the wheel and traction motor suspension bearing journal of the axles.

3.8.7 Facilities for oil injection for removal of wheel shall necessarily be provided.

3.8.8 Standard axle boxes shall be used. Roller bearings will be grease lubricated and of type which have given satisfactory performance/ service on railway stock. Special attention shall be paid to sealing arrangement of the ends of axle, to prevent ingress of water, dirt and loss of lubricants. This aspect requires special attention as the axle box may remain submerged in flood water during heavy rains. The sealing arrangement shall ensure that axle box will not need special maintenance even if it is submerged in water. The design of labyrinth will be such as to prevent the ingress of dust in to or outflow of grease from axle boxes.

3.8.9 One of the axle box and cover (not the leading one) shall house speedometer generator with suitable adopter. OHE care shall be taken to provide special protection arrangement for the generator and cable connection against flying ballast and any other extraneous objects. The connection shall preferable be taken from the top of the axle box.

3.8.10 Complete working drawing of the axle box , guide arrangement with bearing and its components shall be submitted for approval along with maintenance instructions.

3.8.11 The axle box body shall preferably be of cast steel.

3.8.12 The contractor will be required to provide recommended lubricants which should have been proven in similar railway service of the axle bearings.

3.8.13 An alternative lubricant, manufactured in India shall also be identified by the contractor in conjunction with the bearing manufacturer, and the lubricants manufacturing industry.

3.8.14 Design calculation for the powered axle shall be submitted for approval of RDSO.

3.9 **Brake System:**

3.9.1 The OHE Car shall be fitted with graduated release air brakes. The brake system shall be of UIC approved type and shall meet all UIC requirements. It shall have the following distinct positions.

i) Release Position
ii) Minimum reduction position.
iii) Full service position.
iv) Emergency position.

Note Panel mounted air brake system of approved make conforming to Specification. No. MP-0.01.00.19 (Rev-01), June'2010 as approved by RDSO should be provided in order to achieve high reliability, low weight, better sensitivity and easy maintainability.

3.8.2 **Brake Blocks:** The composition 'K' type non-asbestos brake blocks to RDSO Specification No. C-9508 with latest revision/amendment shall be used. Brake rigging shall be as per ICF drawing No. EMU/M-3-2-064 with latest alteration shall be provided to prevent the brake blocks riding down the wheel tapers.

3.8.3 The Emergency Braking Distance (EBD) for fully loaded (20.32x4=81.28 t) OHE car from maximum speed of 110 km/h to zero shall not be more than 800 meter on flat section. The Tenderer shall also submit calculation for EBD on 1 in 33 down gradient.

3.8.4 It is proposed to use the OHE Car for hauling two wagons weighing 60t each in gross load condition [see Item-11 (vii & ix) of table at Clause 2.12(vii). The manufacturer shall indicate the Emergency Braking Distance that can be obtained with above loaded wagons in the rear in un-braked state.

3.8.5 The OHE car shall be provided with the following additional brake requirements:

i) A D-1 Emergency Brake valve in both driving cab on extreme right hand side for emergency brake application.

ii) Stand-by brakes, in case of failure of distributor valve or any component in the main brake system. This shall be decided at the design approval stage.

iii) Parking brake to RDSO Specification No. CK 408 (latest revision) capable of holding fully loaded OHE Carwith 120 t trailing load of two loaded bogie Flat Wagons in un-Braked state on 1 in 33 down gradient under wet condition.

iv) Flexible Hose connection shall conform to SAE 100R1

3.8.6 Application of any type of brake provided on the OHE car shall result in simultaneous cutting of the power to the driving axles. Interlock for this arrangement may be included in governor system for safety precaution.

3.8.7 The brake rigging arrangements shall be light and as simple as possible with minimum number of levers and fulcrum points permitting easy access to brake

blocks and other wearing parts. Composite brake block shall only be used as per the standard approved drawing.

3.8.8 Brake system shall be provided with automatic slack adjuster built into the brake cylinder.

3.8.9 Adequate safety straps shall be provided below the moving components of the brake rigging and other components to prevent falling on the track in the event of failure of any component.

3.8.10 The supplier shall submit details of brake system covering brake schematic diagram, working principle, brake power diagram calculation for EBD, number, dimension and type of brake blocks and literature on brake equipments proposed along with offer and get the brake system approved from RDSO before manufacture of the prototype.

3.8.11 Air dryer of approved make conforming to Spec. No. MP-0.01.00.09 (Rev-05), March'2011 shall be provided. (In line with latest equipment on EMU/DEMU)

3.8.12 Main air reservoirs of adequate capacity shall be provided. In addition, a separate braking reservoir and a non-return valve be provided for braking only. Suitable drain valves/cocks shall be provided to drain off the condensate in the reservoir (s).Cut off cock may be provided at inlet of auto drain valve.

3.8.13 The tenderer shall be required to supply the detailed drawings, specifications and testing procedure for rubber components/parts of all the valves/cocks used in the brake system.

3.8.14 The supplier shall get the brake schematic approved by the RDSO.

3.8.15 Stand–alone VCD of approved make conforming to specification No. MP-0.34.00.04 (Rev.04) Dec 2008 shall be provided.

3.8.16 Brake system shall be such that in dead condition of 8WDETW can be hauled by another air brake stock.

3.9 **Piping & Pipe fittings**:

3.9.2 Seamless stainless steel pipe bright annealed to ASTM A 269 Gr. 304, which can be bent cold shall be used. The layout of piping shall be designed to keep all pipes, especially the brake cylinder pipes, as short and straight as possible Bends should be used throughout, but where elbows have to be used; they shall be of round type. Where the pipes itself are bent, their internal area shall be maintained uniformly.

3.9.3 Double ferule pipe fitting consisting of body, front ferrule, back ferrule and nut shall be provided. The body and nut shall be of carbon steel of ASTM:A-108 Grade –II with electro cobalt zinc plating with chromic passivation. The ferrule and back ferrule shall be made from stainless steel to ASTM A276 TP 316 SS and

conforming to ICF Specification No. ICF/MD/SPEC-166 with latest revision/amendment.

3.9.4 All pipes shall be adequately clamped to the frame assembly. Compreg to RDSO Specification No. C-9407- type II shall be used for clamp.

3.9.5 Pipes, ducts and conduits shall conform to an identification colour scheme with polyurethane paint as per RDSO's Specification, which shall be approved by RDSO.

3.9.6 Chart showing the colours for identification of pipes shall be displayed in cab at a prominent place where it is likely to be needed for reference.

3.10 **Interior furnishing**: The OHE Car shall be furnished with light weight fire retardant material. The material used for finishing and furnishing shall be suitable for use under Indian climatic conditions and shall be as for as possible fire proof, non-hygroscopic and vermin and rot proof. The furnishing shall be as agreed between the contractor and RDSO. It may be noted that Indian Railways are presently using 3 mm decorative/ resin bonded thermo-setting laminated plastic sheets of approved shades, possessing resistance to spread of flame as indicated in para 5.16 of IS:2046. With a view to retarding the spread of fire, the continuity of LP sheets shall be broken by the provision of suitable metal barriers. The laminated plastic sheets conforming to STR No. C-K-514 (Latest Revision) may be used for thermosetting resin bonded Laminated Sheet for OHE Car.

3.11 **Ceiling and paneling**: The ceiling in compartments shall be of minimum 2 mm thick NFTC to RDSO Specification No. C-K 511 (Latest Revision). The ceiling material shall be IRS M-41, wherever required.

3.12 **Flooring Construction:** Floor of the vehicle shall be as per ICF drg. No. EMU/MASR-41-001 with latest alteration. The opening in the flooring for passage of pipes and cables through the floor shall be so constructed as to prevent any seepage of the oil. In addition to give effective protection against the spread of fire originating beneath the body.

3.13 **Extra Fitting**:

(i) Door steps shall be provided at all body side doors.

(ii) Continuous water wriggles from one end of the OHE Car to the other shall be provided.

(iii) Tail lamp bracket to IRS Drawing No.C.BF-113 shall be fitted at each end of the shell.

(iv) Rain water channels of suitable design over the doors & windows way shall be provided.

(v) Tenderers may note that the OHE Car may be washed mechanically. Tenderers may also note that the exterior of the OHE Car may be washed in automatic OHE

car washing plants. Exterior of the OHE Car shall be designed keeping this in view.

3.14 **Cattle Guard:** Detachable type cattle guards shall be provided under each buffer beam. The cattle guard shall be fitted with adjustable rail guards so as to maintain the minimum free space above the rails under all conditions (see item 7 of clause 2.0).Cattle guard shall be as per RCF Drawing No. EM26108 with Latest Revision.

3.15 **Insulation:** An insulation layer of suitable thickness of non-asbestos material shall be provided inside the OHE car shell. End walls and sidewalls shall be provided with suitable anti-drumming and anti-corrosive compound. Underside of the under frame over the engine area shall be properly insulated to minimize heat transfer to the compartment. The material used for insulation shall be non-inflammable type. All other parts shall be provided with anti-corrosive compound.

3.16 **Noise Suppression**: The tenderers shall indicate noise suppression features incorporated in the design. Maximum noise level should not exceed 75 dB inside the cab.

3.17 **Trap Doors**: Suitable trap doors shall be provided on the flooring for attention of underslungequipments, during service. The design of trap door shall be such that it can be conveniently lifted when attention to equipment is required but strong enough to withstand normal passenger loading. The trap door shall remain in level to the floor of the OHE car.

3.18 **Anti–pilferage measures:** While securing compartment fittings, anti-pilferage measures shall be incorporated.

3.19 **Fire extinguishers and first aid equipment**: Four fire extinguishers CO_2 type of 5 kg capacity shall be provided, one each in both the cabs and two in workmen's lobby. Space shall be provided for keeping a first aid box and one stretcher.

3.20 **Corrosion protection:**

i) Sheets and plates (other than Stainless Steel) used for OHE Car construction shall be suitably treated against corrosion before fabrication.
ii) Sub- assemblies shall be treated against corrosion as per UIC Code 842-5 after they are manufactured.
iii) OHE Car shall be treated after fabrication as per UIC Code 842-5.
iv) In addition to above, the OHE Car design shall be such as to minimize the incidence of corrosion. Indian Railways experience is that most corrosion takes place due to seepage of water from the floor and window openings.
v) The Tenderer may suggest any better corrosion protection system that he may have adopted with success in OHE Cars manufactured by him.
vi) The Tenderer shall note that OHE car floors are washed regularly at certain time intervals. Hence the floor construction should be such that it does not permit water to seep through the floor and cause corrosion to trough floor and under frame members.
vii) Tenderers may note that Indian Railway have noticed heavy corrosion on OHE Car under the lavatories. As such, corrosion resistant steel shall be used for

construction of floor and adjacent members under lavatories and the neighboring bays.

3.21 **Information to be submitted by the tenderer**

(a) The following information shall be furnished by the tenderer alongwith the offer:

(i) Transverse cross section of the proposed OHE Car along with principal dimensions so as to illustrate the general construction of the shell. Also superimposed upon this should be the schedule of dimensions as embodied in the Indian Railways Schedule of dimensions –1676 mm gauge, revised 2004. Infringements, if any, should be accurately defined in the sketch.

(ii) A "Section" view of the plan of the OHE Car, showing the layout of the major equipments along with principal dimensions.

(iii) Side elevation of the proposed OHE car.

(iv) A "Sectional" side elevation of the OHE Car underframe showing the disposition of the major equipments on the underframe.

(v) To demonstrate his capability for designing OHE car body, the tenderer shall submit a set of actual calculations pertaining to OHE car structure for any bogie vehicle, designed by him in the past. These shall be submitted alongwith his tender offer.

(vi) The schematics of the brake pneumatic alongwith the internal schematics of the valves proposed to be used shall be furnished alongwith the tender. The schematics shall be accompanied with a write up on sequence of events during application, release and emergency.

(vii) Type of compressor and its capacity shall be indicated along with tender. This will be accompanied with a technical justification for the compressor capacity selected.

(viii) Estimated weight of the OHE car structure shall be furnished alongwith the tender. Also weights of principal assemblies mounted on the OHE car structure shall also be furnished.

(b) The other relevant information but not limited to following shall be furnished at design approval stage by the successful tenderer.

(i) A representative sectional view of the OHE car floor, illustrating the floor construction. The specifications of the materials used in its construction should be identified.

(ii) Furnishing material intended to be used by the tenderers-specifications should be identified.

(iii) Insulating material proposed by the manufacturer specifications should be identified.

(iv) Ceiling material proposed to be used by the manufacturer specifications should be identified.

(v) Principal features of noise suppression shall be identified and submitted.

(vi) Principal features showing adequate fire redundancy shall be identified and submitted.

(vii) Tentative brake rigging diagram alongwith details of brake cylinder and slack adjuster proposed to be used shall be submitted.

(viii) In case parking brakes are proposed the features of the proposed parking brake actuator, its type and the schematics shall be furnished.

3.22 The guaranteed technical particulars of the inspection OHE car shall be submitted as per Annexure-7.

ELECTRICAL EQUIPMENTS

4.0 **Illumination:** Driving Cabs, officers/Staff cabins, Workshop & Storage space shall be provided with level of Illumination of at least 30 Lux at the working plane level (1m above the floor level).OHE Car lighting shall be provided with 18 W, 600 mm x 26 mm double capped Fluorescent tube lights with wire mesh guard along with its fittings and Electronic Lamp ballast as per RDSO Specification No. RDSO/PE/ SPEC/TL/0011-2000 (Rev.1) with the latest revision shall be used.

4.1 Driving cabs, officers/staff cabins and workshop shall be provided with two, 110V, 300 mm sweep fans conforming to IS: 6680.

4.2 **BATTERY**: Lead Acid maintenance free storage battery of capacity as mentioned at Clause no.5.3.2.20 of Chapter-V, conforming to IS: 6848–1972 shall be provided in under slung Battery boxes. The Battery fuses shall be located close to the battery terminals.

4.2.1 Terminals for charging the batteries from external charging equipment shall also be provided. The location of the batteries shall be such that there is no danger of their getting damaged due to tools and equipment inadvertently falling on them. If the cells are packed in two rows in the battery box, a hylam sheet shall separate the two rows.

4.3 **Alternator for battery charger & DG sets:**

4.3.1 An engine mounted alternator with rectifier and regulating equipment of suitable capacity for charging of 24 V DC 290 Ah Battery shall be provided. The output of the generator shall cater for battery charging for diesel engine starting (battery voltage 24V). The maximum power demand will be required when the OHE car is stationary and with engine running at low idling speed.

4.3.2 An engine mounted alternator with Rectifier and regulating equipment of suitable capacity for charging of 24 V DC 290 Ah Battery shall be provided. The output of the Alternator shall cater for battery charging for diesel engine starting battery, 24V.

4.3.3 Battery charger for charging batteries of 110 V of 120 Ah capacity Lead acid maintenance free storage battery of capacity as mentioned at Clause No.5.3.2.20. The battery charger shall be from RDSO's approved vendors complying to the RDSO's Specification No. RDSO/ PE/SPEC/AC/0008 (Rev.2) with Latest alteration.

4.3.4 A 10 kVA, 3-phase, 415V, low noise Diesel Generating set for power supply to lifting platform and machines in workshop shall be provided with OHE Car. The Gen set shall be mounted on anti-vibration mounting to reduce the vibrations.

4.3.5 A skid mounted portable Diesel Generator similar to Honda make (petrol start kerosene run or petrol start petrol run) of 3kVA (minimum), 240V, 50 Hz along with transformer shall be provided to meet 150 Amps light weight IGBT based welding

machine load and other auxiliary load of search lights (2x250 watts), emergency light and for other such purposes. Design of Transformer shall be decided at design approval stage.

4.4 Circuitry

4.4.1 The load shall be suitably distributed based on standard practice.

4.4.2 Electrical equipment such as switches, lamp holders and other items shall conform to the following latest Specifications:

IS:6965: Switches for use in Railway stock.
IS:1258: Bayonet lamp holders.
IS:1293: Three pin plug and socket outlets.
IRS: EA-199: For ceiling light fittings like CFL within transparent enclosure.

4.5 Power for head lights, tail lights

4.5.1 Following lights shall be worked on the alternator/ rectifier provided with diesel engine. This is to ensure that failure in the other lighting system does not affect the mobility of the OHE car.

4.5.2 **Twin beam Head light**: Twin Beam head lights shall be provided at both ends. The head light shall confirm to RDSO's Specification No. ELRS/SPEC/PR/0024 (Rev-1) Oct. 2004. The operating voltage of head light shall be 24 V DC. 24 V DC, supply for twin beam head light shall be taken from 110/24 DC-DC convertor. DC-DC Convertor shall be as per RDSO's Specification No. ELRS/SPEC/DC-DC Convertor/0021 Rev.1.

4.5.3 **Tail light**: Tail lamp (Red aspect) of LED type 24 V 15 W as per RDSO's Specification No. RDSO/PE/SPEC/TL/0119-2000 (with latest revision) shall be provided at each end to comply with General & Subsidiary Rules of Indian Railways.

4.5.4 **Flasher light**: One flasher light each of LED type as per RDSO's Specification No ELRS/ SPEC/LFL/0017 (Rev-1) Sept, 2004 shall be provided on the roof at either end of the OHE car.

4.5.5 **Marker Light**: Marker light of LED type(Red aspect) as per RDSO's Specification No ELRS/SPEC/PR/0022 (Rev-1) Oct. 2004 shall be provided on either end of the OHE car.

4.5.6 **Search Light**: OHE car shall be provided with two 250 Watts searchlights with Metal Halide lamps, one on each end, for inspection of the OHE while on the run. Searchlights shall provide a high intensity illuminating beam and capable of swiveling on universal joint type supports. Design details shall be finalized at the time of design approval stage.

4.5.7 **Wiring**-All Electrical wiring in the tower wagon shall be done with e-beam cables conforming to RDSO's Specification No ELRS/SPEC/ ELC/0019 Rev.-1 dated 06.07.2010 with latest amendment.

4.5.8 **Horns:** The OHE car shall be fitted with two horns at the roof with different tones on both sides. Horns shall be operated on compressed air. These shall be operated by a hand switch provided within the access of the Driver. Horn cover to RDSO Drawing No. CG-K5056.

4.5.9 **SPEED INDICATOR / RECORDER:** Speed Indicator and Recording Equipment of 0 -160 km/h range shall conform to RDSO's Specification No.MP-0.3700-07 (Rev.03) of April'2003. One cab of OHE Car shall have one recorder-cum-indicator and the other cab shall have one speed indicator only.

4.5.10 **Mobile Charging:** Four mobile charging points one each in Staff Cabin and both the Driver's Cab shall be provided as per RDSO approved source.

4.5.11 **Cab Heaters:** Both the cabs shall be provided with electrical heaters to keep cab environment warm during winter season. The power supply to heater shall be given from the auxiliary alternators as specified in clause 5.9.1

4.5.12 **Flood lights:** Four flood lights giving diffused light of 75 watts shall be provided with each OHE car. Detailed design of it shall be finalized at the design approval stage.

4.5.13 **Emergency push-buttons (Mushroom Type):** Five emergency push-buttons shall be fitted on the chassis sides and one on the roof. When activated, they provoke:-

(i) Idling of the engine & removal of excitation of alternator.
(ii) Stop of elevating platform.
(iii) Braking of the vehicle.

4.5.14 **Earthing Arrangement of Tower OHE Car:**

All metallic parts of tower wagon including the working platform, shell structure & bogie shall be integrated electrically to ensure proper earthing of tower OHE car through wheels to Rail. The body of the lifting motor, control panels, swiveling motor at platform and other electrical equipment shall be connected to the earth. Traction motor
shall be provided with earth brush. The schematic diagram of earthing arrangement to be provided for the tower OHE car& equipment in it shall be submitted by the successful tenderer for approval of RDSO.

5.0 POWER EQUIPMENT & CONTROL

5.1 The different speeds of the twin-power pack from idle to maximum speed and the corresponding power developed should be so selected that all the conditions mentioned in Clause - 2.0 of Chapter-II can be satisfactorily met. However the number of speeds and power levels chosen should not be less than 8 (herein after referred to as notch positions) in addition to the idle position. The performance of the power pack shall be optimum in each notch position in addition to being able to meet the traction load and demand by the auxiliaries.

5.2 Detailed calculations shall be submitted along with tender indicating the power demand by the traction motors for different conditions and the demand on the power pack. These calculations shall indicate whether adequate reserve power has been provided. Characteristic curves for the Traction Alternator& Rectifier indicating the performance for different notch positions should be furnished. These curves, inter-alia, should indicate speed, BHP, power consumption by auxiliaries, excitation voltage and a.c. and d.c. currents. These characteristics should clearly indicate the extent of matching or mismatching of power.

5.3 DIESEL ENGINE AND TRANSMISSION SYSTEM

5.3.1 The OHE Car will have two independent diesel electric transmission systems, each comprising a diesel engine, an alternator along with its power rectifier, two traction motors mounted on one bogie, auxiliary alternators with their rectifier-cum regulator units, engine and traction controls, synchronised for operation from a common master controller from the driving cab(s). In case of failure of one of the transmission systems, provision shall be made so that the same can be isolated and the OHE car can still be worked at reduced power from the healthy transmission.

5.3.2 Diesel Engine

5.3.2.1 Two independent under-slung naturally aspirated, turbo-charged and after cooled Diesel Engines of proven design of Cummins make NTA-855R or similar other reputed make suitable for 8-Wheeler Diesel Electric Tower Car, complete with all accessories, suitable for traction service under the climatic and operating conditions obtained in India, shall be provided.

The continuous traction rating of each engine shall be 340 hp (approximately) or higher at 1800 rpm after due de-rating for environmental temperature of 55^0C. It shall be battery started. Specific Fuel Consumption (SFC) shall be low. Robust construction, low maintenance and satisfactory record of past performance are of paramount importance. Tenderer shall furnish full particulars of the engine with the offer. Adequate allowance shall be made in the power of the diesel engine for the de-rating under most adverse climatic conditions stated in Clause-1.2 of Chapter-I of this specification. Successful tender shall give detailed calculations for engine's suitability and its rating.

5.3.2.2 The supplier shall indicate the total horse power required for the auxiliaries with the break up power for each of the auxiliary machines at rated output.

5.3.2.3 The tenderer shall indicate the net horse power available for input to traction under the conditions mentioned under para-1.2 of Chapter - I of this specification.

5.3.2.4 The idling speed of the diesel engine shall be such so as to match the requirement of various auxiliary machines driven by the engine.

5.3.2.5 The Diesel Engine shall work satisfactorily with fuel oil to Indian Standard Specification No.1460-grade A, but shall also be able to function in a trouble free manner even with Grade B fuel oil to the same Specification.

5.3.2.6 Suitable hand priming pump shall be provided to avoid air lock in the fuel system.

5.3.2.7 The engine shall be provided with suitable end on mounting arrangement to SAE-O dimensions for coupling with and driving the traction alternator. The mounting and coupling arrangement shall be of adequate capacity to withstand high deflection and torque (at starting, stopping and due to misfiring of cylinders) so that no damage is caused to the alternator and engine components in service.

5.3.2.8 The drive gear for driving compressor, auxiliary alternator and electric fan drive for the radiator shall also be in the scope of supply of the tenderer.

5.3.2.9 Detailed torsional vibration analysis of the complete system under normal engine working as well as under conditions of one cylinder misfiring for the complete operating range including 10% over speed shall be furnished.

5.3.2.10 Air inlet to the engine shall be from inside the OHE car with proper ducting arrangement from the filters.

5.3.2.11 Piping from the air cleaner to the turbo-driven air handling unit shall be in the scope of supply.

5.3.2.12 The exhaust pipe shall not leave carbon soot on important assemblies like traction motors, axle drive etc. The exhaust pipe shall be taken horizontally and located under floor avoiding the position near footsteps of the vehicle with adequate insulation to with stand 700^0C.

5.3.2.13 Filters shall be of adequate air flow capacity/filtering efficiency to ensure satisfactory performance under dusty environment.

5.3.2.14 The tenderer shall submit graphs showing the BMEP/engine output torque and SFC at all notch positions from idling speed to rated speed.

5.3.2.15 Lube oil consumption at rated output as a percentage of the fuel oil consumption should also be indicated.

5.3.2.16 The tenderer shall furnish a copy of the Type Test report of the engine by a statutory body in support of their claim regarding performance, reliability and specific fuel consumption. In case the engine offered is not type tested earlier, the testing shall be done in the presence of RDSO's representative. In case engine is already type tested and found satisfactory then routine test report is to be submitted for all the engines by the firm to the purchaser. RDSO may like to conduct acceptance test, if required.

5.3.2.17 Fuel tank of at least 700 liters capacity indicating tower wagon's operating time with 700 liter fuel oil to be given.

5.3.2.18 The noise level in the driver's cabin with the doors and windows in closed condition shall be less than 75 db (A) and in the inside of the OHE car shall not exceed 80 db (A) at maximum output and speed of the engine.

5.3.2.19 The exhaust emission shall be below the limit laid down in UIC/ORE No. B13/RP22/E Clause-4 of the entire engine range of operation from idle to full power and shall be measured as per UIC/ORE/B13/RP21E. The exhaust opacity shall not exceed 20 as measured by Hartridge smoke Meter or equivalent scale under all conditions including acceleration of the engine. A suitable catalytic converter shall be connected in exhaust pipe to limit the emission.

5.3.2.20 The tenderer shall supply the complete system including engine starter and battery chargers. Batteries shall be of following ratings:-

(i) 24 V, 290 Ah batteries of RDSO's approved make for Engine cranking.
(ii) 110 V, 120Ah battery of RDSO's approved make for Control and auxiliary circuits.

5.3.2.21 Suitable anti-vibration mountings for the engine, alternator, auxiliary alternator, and compressor shall be used. The anti-vibration mountings (AVMs) shall be of approved make. The type and number of AVMs offered shall be specified. To meet the vibration limit, any increased numbers if required shall be to the contractors account. The deflection characteristics of the AVMs shall be submitted.

5.3.2.22 Drawings for the suspension brackets shall be got approved by RDSO before manufacture/ supply.

5.3.2.23 All threaded fasteners shall be of RDSO approved make.

5.3.2.24 The engine manufacturer shall provide necessary safety devices to protect the engine against hot engine, low lube oil pressure, engine over speed and low water levels etc. two high water temperature thermostats with 5^0C difference in setting shall be provided.

5.3.2.25 List of all accessories that are offered with the diesel engine, clearly indicating those mounted on the engine and those supplied loose shall be furnished by the tenderers.

5.3.2.26 Electrically operated gauges for the various indication requirements and fault indication lamps shall be provided in each driving cab.

5.3.2.27 The stopping of the engine shall be by de-energising a fuel solenoid valve.

5.3.2.28 The initial fill of lube oil for the engine as recommended by the engine manufacturer shall be in the tenderer's scope of supply.

5.3.2.29 The tenderer shall submit along with the offer, complete engine data as per Annexure - 3, as applicable to the Engine offered.

5.4 COOLING EQUIPMENT

5.4.1 The Cooling Equipment shall be guaranteed to work efficiently under the climatic conditions specified in para-1.2 of Chapter- I of the specification. The radiator and fan shall be of adequate capacity with 30% choked condition of the radiator used. Air flow required for the radiator fan shall be at least 15% more than that actually required to make up for any reduction in air flow due to train movement. The limiting ambient capability of the cooling system shall be minimum 55 ^{0} C with 30% chocked condition

5.4.2 The complete technical details of the radiator and its fan shall be furnished.

5.4.3 Two independent sets of cooling equipment (i.e roof mounted radiator, hydraulic tank, hydraulic oil cooler and water pipes) shall be provided. The individual radiator will take care of the cooling requirements of respective engines and the hydraulic cooler.

5.4.4 The maximum operating water temperature shall normally not exceed 95^{0}C.There should be provision of alarm and shut off at higher temperature.

5.4.5 The radiator shall be roof mounted either with proven electric fan drive system or hydraulic fan drive arrangement which shall have thermostatic control to regulate the fan speed depending upon the water temperature shall be provided. Complete technical details of the radiator and its type of fan& drive shall be furnished to RDSO. The most suitable and reliable design and type of fan & drive shall be selected at the design approval stage. If there is any cost differential for electric driven radiator cooling fan and hydraulic driven radiator cooling fan shall be clearly indicated by the tenderer.

5.4.6 Suitable water raising apparatus, using mono block pumps for topping up the water in the radiator shall be in the scope of supply. A stainless steel tank for the radiator of not less than 100 litres capacity shall also be provided.

5.4.7 The installation drawings of the radiator and fan with details of fan drive shall be supplied by the tenderer.

5.4.8 Cooling Proving trials shall be carried out in a test bed at the firm's premises (OEM) to prove the adequacy of the cooling system comprising of radiator and hydraulic oil cooler for the prototype in the presence of RDSO's representative. The procedure for such testing shall be submitted and got approved from RDSO.

5.4.9 The following calculations in support of offered cooling system shall be submitted:

- Cooling requirement for all sources of heat (with break up)
- Heat dissipation characteristics of the radiator and its resistance characteristics.
- Radiator fan characteristics showing the air flow Vs total heat at different speeds.
- Cooling system-matching calculations.
- Schematic cooling circuit diagram showing water, oil and air flow through each equipment.

5.4.10 The tenderer shall submit drawing for mounting details of radiator assembly, fan drive arrangement and ensure that these fit completely within the overall dimensions ofOHE car and shall be got approved by RDSO.

5.4.11 **Compressor**

5.4.11.1 Two engine driven air-cooled compressors (one with each engine) of adequate capacity and complete with all accessory suitable for continuous operation at a nominal maximum pressure of 8 kg/cm^2 shall be offered. The capacity of the air compressor shall not be less than 10 cfm at engine low idling speed. The essential accessories as under shall also be in the tenderer's scope of supply:

i) Suitable after cooler.
ii) The compressor shall be provided with suitable governor to cut in and cut out at 7 kg/cm^2 and 8 kg/cm^2 respectively and a safety valve set at 8.5 kg/cm^2.

Note: i) The compressor capacity and expected power consumption shall be specified at low idle and max operating speed of the engine.
ii) The compressor offered shall be of proven capability in Railway Rolling stock application.

5.5 **Engine Control**

5.5.1 The engine shall be electronically controlled using suitable and proven ECUs.
5.5.2 The engine control system should return the engine to idling (no traction load) position in case of emergency brake application.
5.5.3 Electronic Governing system for engine control (LCC) as well as main traction alternator excitation control shall be provided.
5.5.4 Tenderers shall indicate notch wise speed and power of the engine offered.
5.5 A **Tests on Diesel Engine**:

i) Type, Routine and acceptance Tests on the Diesel Engine shall be performed in accordance with International Union of Railway Code No. UIC-623 OR with latest Edition. Para nos 4.3.2, 4.3.3, 4.3.5 of UIC-623-2 OR should be followed for test on Diesel Engine.

ii) The type tests shall comprise of 12 hours running of Engine load cycle 100%, 110%, 75% and 50%.

iii) At the end of run, the parameters like high idle rpm, low idle rpm and lube oil pressure at high and low idle rpm shall be recorded.

iv) The Oil consumption test and Exhaust smoke shall be measured in accordance with BS standards.

v) All the performance parameters shall be recorded measured in accordance with UIC-623-2 OR with latest edition.

vi) The type test/routine test schedule shall be submitted and got approved from RDSO. The tests shall be carried out in presence of RDSO's representative.

5.6 TRANSMISSION SYSTEM

Three phase a.c./d.c. transmission system shall be used. The tenderer shall furnish full technical details as per Annexure-4 for the transmission system offered. Tenderer shall submit block diagram of power circuit for approval of RDSO.

5.7 Alternator

5.7.1 A three phase variable speed self-ventilated, self-excited, brushless and under slung traction alternator shall be provided (two Alternators per OHE Car). The Alternator shall either be end on mounted or connected to the engine through a flexible coupling. The alternator shall have a load regulation system that shall ensure optimum utilisation of the installed power of the diesel engine at all notch positions. Each Traction Alternator shall have power output of 230 KW (approximately).

5.7.2 The Alternators offered shall be with Single Bearing, which will be self locating type ball bearings.

5.7.3 The winding of the traction alternator for both stator and rotor shall be with Class H (180 ^{o}C). Insulation withstanding the dusty working conditions without deterioration of electrical and other properties. The tenderer shall give details of the insulation scheme, proposed to be used for approval by RDSO. Filters if felt necessary by the alternator manufacturer shall be provided at the alternator intake. The filter shall be of dry fire retardant type. Details shall be indicated in the tender. It is, however, preferable not to use filters. One hour rating of Traction Alternator shall be 10 percent higher of continuous rating. Field proven suitable to 8WDETC TA shall be offered by successful tenderer.

5.7.4 The alternator shall have minimum rating of 230 kW to meet the full specified traction load under the prescribed site conditions, besides capability to meet the higher starting load and sustained and momentary over loads.

NOTE: The tenderer shall clearly specify.

i) The VI characteristics of the Traction Alternator in d.c. at full load.
ii) The continuous rating near the top of the VI curve (higher voltage, low current) and near the bottom of the VI curve (higher current, low voltage) at 1800 rpm and the corresponding one hour ratings.
iii) Overload capability as a percentage of the full load and deviations.
iv) Short circuit capability and deviations thereof.

5.7.5 **External cables**

5.7.5.1 For connecting the alternator with the rest of the associated traction equipment, the thin walled e-beam cables as per RDSO approved specification No ELRS/SPEC/ELC/0019(Rev.1) with latest amendment shall be provided. However, the cable sizes and the voltage grade for the power and control cables shall be given by the manufacturer.

5.7.5.2 The Cables from traction alternator to power rectifier should be suitable for carrying out current of 800A (rms).

5.7.5.3 The location of terminal box shall be on the periphery of Traction Alternator. Suitable cutaway with a cover plate having cable entry holes with suitable cable glands/ grommets to permit entry of insulated cables as selected above, shall be provided. The internal and external cable terminations shall be on a terminal board made of fiber glass SMC or better material, suitably mounted inside the alternator terminal box. The galvanized/ cadmium coated MS terminal studs of adequate size shall be located across each other without criss-crossing and they shall be suitable for crimped terminations connected palm to palm. The head of the terminal studs (preferably hexagonal) shall be embedded on the rear side of the terminal board and shall be further secured on top by a nut. For securing cable lugs, nuts, locknuts, flat and spring washers shall be provided. Adequate number of crimping sockets suitable for recommended size and number of output cables shall be supplied along with the alternator. The Crimping sockets shall be of Dowell's make only.

NOTE: The Terminal box location, internal and overall arrangement and dimensions shall have prior approval of RDSO.

5.7.5.4 The alternator housing shall be of fabricated steel construction designed to withstand high torsional stresses, shocks and vibrations. The minimum ground clearance in half worn wheel wear condition under tare weight shall not be less than 230 mm.

5.7.5.5 The provisions shall be made for driving the auxiliary alternator and Air Compressor through a common shaft extension from Diesel Engine through V-Belts and pulley on the extended shaft of the Diesel Engine. Pulley of C-section to IS: 3142 shall have a suitable PCD to be approved during design approval stage. The material of pulley shall steel forged conforming to IS: 2004 Gr.III. The pulley shall be push-fit with suitable securing arrangement.

5.7.6 **TESTS:**

5.7.6.1 Type, routine and acceptance tests on the alternator if required, shall be performed in accordance with IEC 60-349.

5.7.6.2 The type test procedure for prototype power pack (engine plus alternator) testing shall be submitted and got approved from RDSO. Type testing of prototype power pack shall be carried out in the presence of RDSO's representative. If already type testing is done for the power pack, routine/acceptance tests shall be done in the presence of RDSO's representative after getting the procedure approved from RDSO by the contractor.

NOTE:-

(i) The temperature rise for the windings allowed by IEC:60-349 shall be reduced by 30 ^{0}C to allow for higher ambient temperatures.

(ii) The characteristics curves as applicable to the traction alternator shall be submitted, duly indicating therein, the selected locations corresponding to the different notch positions.

(iii) The successful Tenderer shall submit the bearing life and shaft calculations and get them approved before offering the alternator for inspection.

(iv) The Tenderer shall clearly indicate the rating, weight, current, voltage and power and also dimensional details.

(v) The excitation system adopted shall be explained in detail giving all relevant characteristics for different notch positions of the engine and their matching with engine characteristics.

(vi) The detailed calculations for arriving at the alternator rating to meet the specified requirements shall be furnished.

(vii) Any special item (for e.g. Screened cables) required for any signal/ control feed between engine, alternator and electronic governor shall be in the scope of supply.

5.7.6.3 **Auxiliary Drive:** An auxiliary drive of adequate capacity shall be provided to meet all the auxiliary loads of DETC. The drive shall be suitable for minimum of 8 kW auxiliary alternator.

5.7.6.4 **Power Rectifier:** Each alternator power output shall be rectified by a full wave 3 phase silicon diode bridge rectifier (two rectifiers per Intelligent OHE recording car). The rectifiers shall be suitable for under slung forced cooled and well protected. In case there is a space constraint in fitting under slung rectifier, the same shall be provided on board and this aspect shall be decided at design approval stage. The technical constructional requirements along with testing as given in Annexure-5 shall be complied with. The output of bridge shall be connected to suitable filter chock if considered necessary. The design should adequately to take care of the service conditions of the Traction Motors.

5.7.6.5 Power Rectifier should have power loss not more than 400 Watt. It should be able to work in N-1 condition. This indication "Rectifier fuse blown off" should be available on driver desk.

5.7.6.6 The OGA drawings shall be got approved prior to manufacture and supply against each contract.

5.8 TRACTION MOTOR

5.8.1 Four axle hung, nose suspended and self-ventilated DC series Traction Motors of proven design and approved by RDSO two on each Bogie, shall be provided on the OHE car. The Armature coils shall be formed of polyimide (kapton) covered copper conductors and suitably impregnated. TIG/MIG welding shall be used for the commutator. The technical/ constructional requirements as given in Annexure – 6 shall be complied with the traction motor of similar design and construction with proven performance in traction application on IR will be preferred. Traction motors shall be 4601 BX type of M/s. BHEL or TM 2141 A of M/s CGL type or similar proven design with taper roller suspension bearings. Class of insulation of TM shall be "H class" (180 ^{0}C Class). Output of each Traction Motor shall be 115 KW (Approximately).

5.8.2 **Motor rating:** The one hour rating of traction motor shall be of 97% excitation and continuous rating shall be adequate to give the required performance. The motor will be provided with 3% permanent ohmic field shunting.

5.8.3 The temperature rise for the windings allowed by IEC-60349 shall be reduced by 30^{0}C to allow for higher ambient temperatures.

5.8.4 **Motor Suspension & Axle Drive**: The Traction Motor shall be nose suspended with tapper roller bearing arrangement. Each traction motor shall drive one axle of its motor bogie through a single reduction gear drive enclosed in a rigid and water tight gear case firmly secured to prevent damage by movement and vibration under the most severe operating condition but easily removable for attention to the gear.

5.8.5 The Traction Motor shall be designed to comply with the operating requirements stipulated in chapter-II without exceeding the temperature rise limit.

5.8.6 The lubricants to be used for the suspension bearings and the gear case shall be specified by the manufacturer.

5.8.7 The gear wheels and pinion shall be as per RDSO's Specification No. C-K-303 with latest revision.

5.8.8 The single reduction gear with gear ratio 20:91 shall be provided.

5.8.9 The traction motor should be a complete assembly including gears, pinions, gear case, nose suspension rubber sandwich, tapper roller suspension bearings, dust guard and axle shield, earth brush etc. Adequate length of the Traction Motor cables shall be brought out from the motor for termination in the under frame mounted cable connection box with provision for connecting the cables from the coach. Provision of a well covered terminal box on the traction motor such that the connection between the traction motors and the junction box is made through separate cables shall be preferred. The design of suspension shall ensure no leakage or ingress of gear case compound in the roller bearing under any circumstances.

5.8.10 Motor Contactor

Motor contactor of BHEL make or similar proven make, duly type tested and approved by RDSO/ICF/CLW, one contactor for each motor, suitable for operation in combination with overload relays, for opening the traction motor circuit in overload and under fault conditions shall be provided. These contactors shall be located in dust-proof cubicle mounted on the underframe in such a way as to prevent all risk and damage to other apparatus from arcs formed by their operation.

5.8.11 Traction motor contactors, reversers, protective relays and other control gears shall be as specified in Annexure-6 They shall be housed in box and dust proof enclosures to be mounted in the underframe, however, alternate location may also be considered subject to clearance of the offered layout by RDSO.

5.8.12 The Motor contactor shall open the circuit, they protect automatically on overload and shall be capable of clearing the resultant arcs under all conditions of overload.

5.8.13 Bearings: The Armature shall be mounted on anti-friction roller bearing of RDSO approved make. The inner race shall have adequate interference for the duty.

5.8.14 All motor contactor on OHE car shall be suitable for remote operation from any driving cab through the traction motor overload 'reset' switch. The motor contactors shall be of electro-pneumatic type of RDSO/ ICF/CLW approved make or similar proven make duly type tested and approved by RDSO/ICF/CLW shall be provided with blow out coils and arcing horns, etc to brake the current without detriment to their working parts or adjacent equipment. All contact trip, interlocks, pins and plungers etc. shall be easily accessible for maintenance.

5.8.15 The Tenderer shall submit the following characteristic and performance curves:

i) Speed Vs Tractive Effort
ii) Current Vs Speed
iii) Tractive Effort Vs Current

5.8.16 Suspension Bearing: taper roller suspension Bearings from RDSO's approved source shall be provided. Material composition and properties of plain sleeve bearings shall be as laid down in RDSO's Drawing No. RDSO/PE/SK/EMU/0052-2003 Rev.0.

5.8.17 First four (04) Traction Motors of first prototype 8 wheeler DETC shall be type tested by RDSO accordance with IEC-60349. Routine and acceptance tests if required on the traction motors, shall also be performed in accordance with IEC-60349.

5.8.18 The Traction Motor's thermal capability shall be adequate to meet the operational requirement of lowest road speed (i.e. 5 kmph) for 90 minutes. A special test shall be carried out at the time of type test to establish/confirm this aspect. For this purpose, at an output equal to one fourth of the calculated power required for the lowest road speed and the corresponding cooling available, the temperature rise shall not exceed the limit prescribed above.

5.9 AUXILIARY ALTERNATORWITH RECTIFIER-REGULATOR

Two auxiliary self-cooled, brushless pulley driven alternators of RDSO's approved make, one with each engine shall be provided in the inspection OHE Car with suitable regulating equipment and Battery Charger to supply 122 V d.c.± 5% regulated voltage from idle speed to max. Speed of the engine for meeting the following loads:-

i. Battery charging (110 volts, 120 Ah batteries) provided on the OHE car- 10 amps.
ii. Lights and fans load of the OHE Car-25 amps.
iii. Flood Lights
iv. Search lights
v. Control system 10 amps.
vi. Twin beam head light of 250 watts, 110 V d.c. as specified in Chapter-IV of this specification.
vii. Power required for forced cooling motor for rectifier shall be of 1 kW approximately.
viii. Cab Heater load one each of 1 kW in both the cab.
ix. The alternator shall have a rating of minimum 8 kW (Electrical load requirement shall be got approved from RDSO)

5.9.1 The insulation of the alternator shall be class "F" or better and the same shall not be affected by the Engine area environment, which may have traces of Diesel and Lube oil fumes.

5.9.2 Mounting**:** Suitable base frame and mounting arrangement shall be supplied alongwith the auxiliary alternator. The base frame shall have suitable belt tensioning provision. The base frame drawing shall be got approved by RDSO before manufacture. Driving and driven pulley dimensions, pulley groove details, material specification, box dimensions etc. Shall be furnished in a drawing and got approved.

NOTE: Alternatively, companion alternator made as an integral part of the main alternator may also be offered.

5.10 **Rectifier-Regulator:**

5.10.1 The rectifier-regulating equipment will be under frame mounted. The crimping sockets shall be of Dowell's make only. The rectifier regulator box shall have an openable front cover, which shall be capable of being closed and locked in position by suitable hinged bolts of M12 size and wing nuts.

5.10.2 The Rectifier-Regulator box shall be of protection level IP: 65 (Completely protected against dust and jet of water from all directions).

5.10.3 The Rectifier–Regulator box shall be Electro-galvanised and painted gray.

5.10.4 The Regulator shall have provision of potentiometers for current and voltage setting for adjustment depending upon the service conditions.

5.10.5 The overall efficiency of the alternator alongwith its Rectifier-Regulator shall not be less than 70%.

5.10.6 The Rectifier-Regulator shall conform to IEC: 60-571.

5.10.7 Details of the equipment shall be as per Annexure- 5.

5.11 **TESTING:**

The following tests shall constitute type tests which are to be carried out at the manufacturer's works to ensure compliance of the specifications.

5.11.1 **Type Test:**

i. Verification of dimensions of assemblies of alternator, rectifier and regulating equipment.
ii. Temperature rise test at minimum speed for full output as well as the maximum speed without Air over the auxiliary Alternator and the rectifier regulator box.
iii. Insulation resistance test.
iv. High voltage test
v. Load test
vi. Mechanical over speed and induced voltage test.
vii. Drooping voltage characteristics test.
viii. Current limiting characteristics test.
ix. Surge protection test.
x. Measurement of stator and field resistance.
xi. Water tightness test for rectifier – regulator.

5.11.2 **ROUTINE TESTS:** All tests other than those indicated at serial nos. ii, vii and ix of type tests mentioned above, shall be OHE carried out.

5.12 **CONTROL AND INSTRUMENTATION:** The basic control scheme shall ensure matching of traction load with that of the diesel engine output preventing any overloading. The two power packs will independently feed two motors each (the motors fed from one power pack being on the same bogie). In case of failure of one power pack, it shall be possible to isolate the same, on line, by the driver, and the OHE car shall continue to be worked with the healthy power pack, at reduced power.

5.12.1 Motor speed will be controlled by varying the applied voltage. The two Traction Motors fed from one power pack shall be connected in parallel.

5.12.2 The tenderer shall furnish, along with schematic circuit diagrams, the power, auxiliary and control scheme proposed to be followed.

5.13 **Traction Control Gear**: General Design Consideration: Control gear for the motors and other switch gear shall comply with IEC:60-77 and shall be suitable for 110V D.C. supply.

5.13.1 The winding of all magnet coils shall be properly dried, impregnated, baked and moulded with epoxy resins.

5.13.2 All auxiliary machines operated on 110V D.C. supply shall be provided with adequately rated dc contactors.

5.13.3 All the contactors used for breaking dc current of value 10 A and above shall have properly designed arc chutes and blow out coils.

5.13.4 DC contactors shall be operated for one million operation during endurance test for an electrical endurance capability of 1 million operations at the rated voltage and current.

5.14 SCOPE OF CONTROL GEARS: Control gears which are in the scope of supply of the contractor shall comprise of all apparatus and connections necessary for the safe and efficient operation of the equipment and shall include the following.

5.14.1 The Control Gears shall include:

i) Driver Desk
ii) Control Cubicle-1
iii) Control Cubicle-2
iv) Motor Switch group cubicle
v) Resistor Panel

5.14.2 Energizing and controlling Traction Alternator and main motor circuits and protecting these circuits from overload or short circuits.

5.14.3 Operating traction motor contactors, reversers, etc. By means of low voltage control circuits through any master controller and automatically regulating the same as required for operation.

5.14.4 Providing means for annunciation of different healthy and fault conditions, through necessary auxiliary contacts and LED indication lamps, for traction and brake circuits at the driving cab.

5.14.5 Providing low tension supply of the main lighting circuits, ventilation equipments, charging the 120 Ah, 110 V battery and driving of the auxiliary machines.

5.14.6 Earthing in an approved manner, all equipment boxes and cases supporting or containing live parts and of the main traction motor and auxiliary machine circuits.

5.14.7 Protecting and isolating all auxiliary circuits by means of circuit breakers and by manually operated isolating switches or links and fuses.

5.15 CONTACTOR BOX(S)

5.15.1 All the power contactors of a power pack shall be housed and inter-connected through bus bar in a separate cubicle called “CONTACTOR BOX”, which shall preferably be under slung however, alternate location may also be considered subject to clearance of the offered layout by RDSO and designed for IP-55 (hose proof) protection. For each OHE car, two such boxes shall be supplied (one per power pack).

5.15.2 **REVERSER**: Electro pneumatically operated reverser of proven design of reputed make duly tested and approved by RDSO/ICF/CLW for changing the direction of rotation shall be provided in each motor circuit. These shall be mounted in cubicle on the underframe and shall be of robust design, remote controlled and suitably interlocked to ensure that no movement can take place while they carry current. Provision shall be made for hand operation, in emergency. The reverser contact shall have self-wiping action.

5.15.3 Mounting arrangement shall be finalized at design approval stage.

5.15.4 Motor Cut out Switch: Two four position rotary switches, of RDSO/ ICF/CLW approved make one for motor 1&3 and other for motor 2 & 4 shall be provided. The first switch will have position marked as 'normal','1 out', '1 & 3 out' and '3 out'. The second switch shall have markings 'normal', '2 out', '2 and 4 out' and '4 out'. The switches shall have sufficient contacts to provide various facilities for control as required including the following.

(i) To energise the shunt coils of the current limit Relay to reduce the drop out power current value suitably, if any motor is cut out.
(ii) To prevent operation of 'motor switches trip' lights when motor have been deliberately cut out.
(iii) To permit operation of the unit while CABR is tripped provided that a pair of motors has been cut out.
(iv) To control feeds to the individual motor contactors, to isolate the contactors and cut the motors out of the circuit.
(v) All pneumatic equipments used in the power circuit shall be able to perform satisfactorily at minimum pressure of 5.0 kg/cm^2.

5.15.5 RELAY PANEL:

5.15.6 Alternators:

Earth fault relay – for earth faults in the traction circuit.

5.15.7 **Traction motor:**

(i) Overload relay/ over current protection-resetting type with reset in the Driver's cab -Contactor Box
(ii) Earth fault relay -Control Panel-1
(iii) Scheme for isolation of faulty motor: A scheme of isolation shall be provided individually for all the four traction motors to facilitate their isolation by the driver quickly. –Control Panel-1

5.15.8 All the control relays required for the system shall be supplied duly mounted on a panel, name-tagged, wired and properly terminated.

5.15.9 **INSTRUMENTS AND SAFETY DEVICES:**

5.15.9.1 The following instruments & safety devices shall be part of supply for safe and satisfactory operation of the OHE car. The equipment and controls shall be arranged in both the driving cabs of the OHE car so that the OHE car can be worked from any one of the driving cabs. Interlocks shall be provided such that OHE car can be operated from one cab only at a time. The driver should be able to start or shut down the engine from his cab.

5.15.9.2 **Instruments**:

5.15.9.3 Diesel Engines.

5.15.9.4 Switches, meters and gauges

(i) Engine starting switch/ push buttons
(ii) Lube oil pressure gauges
(iii) Lube oil temperature gauges
(iv) Cooling water temperature gauges
(v) Battery charge/ discharge ammeter for 24 V battery.
(vi) Engine hour meter and engine speed indicators
(vii) Engine stop switch/push buttons
(viii) Low cooling water level indicators
(ix) Over speed devices
(x) Emergency stop for engine by Borden wire

5.16 Safety Devices:

a) Water temperature too high- engine to idle. However, driver shall be able to raise the engine speed during the operation of the hot water temperature switch.
b) Low lube oil pressure - engine to shut down
c) Engine over speed - engine to shut down
d) Radiator water level low - engine to shut down
e) Low Hydraulic oil level - engine to shut down

A. Traction Alternator:

a) Control battery (110 V) Voltmeters.
b) Control battery (110 V) Ammeter
c) For protecting the source, earth fault relay shall be provided.
d) Earth fault relay – for earth faults in the traction circuit

B. Rectifiers:

a) Traction Ammeter - To indicate the current drawn from rectifiers.
b) Voltmeters reading phase to phase voltage

C. Traction motor:

(i) Overload relay/ over current protection-resetting type with reset in the Driver's cab.
(ii) Earth fault relay.
(iii) Scheme for isolation of faulty motor: A scheme of isolation shall be provided individually for all the four traction motors to facilitate their isolation by the driver quickly.

NOTE: Recommended settings for all the aforementioned relays shall be specified by the tenderer.

5.17 **Control and Auxiliary Circuits:** All circuits shall be protected by MCBs of appropriate ratings and type. Ratings of the MCBs to be provided shall be furnished by the tenderer.

5.17.1 All coils of contactors and relays shall be provided with suitably rated freewheeling diodes.

5.18 **DRIVER'S CONTROL DESK**.

5.18.1 The Driver's Desk complete in all respect with all the control gear items duly fitted, wired and terminated on a terminal board shall form the scope of supply of contractor.

5.18.2 **DRIVER'S CONTROL SWITCH**: The driver's control circuit shall be energized through the driver's control key. The interchangeability provided shall be such that the key can be removed from the lock only when the switch is turned to off position and when the key has been removed, the switch cannot be turned to the ON position. The key shall be common for both drivers' key switches.

5.18.3 **MASTER CONTROLLER :**

i) The number and arrangement of step shall be marked on the master controller.

ii) Contacts and operating mechanism shall be easily accessible and of suitable design for railway service. All live portions and contacts, cables and terminal mountings within the master controller shall be kept well clear of exhaust from all pipe unions to, any pneumatic equipment.

iii) The reversing drum operating boss shall be fenced in such a manner that the key can only be inserted and withdrawn when the drum is in the neutral/off position and the drum shall be mechanically interlocked so that it can only be placed in this position when the master controller handle is in the OFF position.

iv) The master controller shall be fitted with a Dead Man's handle (depression type) designed to switch OFF power and apply brakes automatically whenever the driver releases his pressure on the handle, if it is in any but the OFF position and in the OFF position if the reverser key is in FORWARD or REVERSE positions. The Dead Man's handle mechanism shall be suitably enclosed to prevent interference with it or the insertion of any form of packing to wedge the handle down.

v) Spare contacts provided to be paralleled to prevent the tower wagon from not responding in case of any bad contacts on any of the interlocks.

5.19 **INDICATION LIGHTS :**

5.19.1 The indications of LED type shall be provided in both driving cabs of the OHE Car as given in Clause – 5.20. Built in redundancy (with spare LED) should be there so that in case of failure of one LED the indication is available.

5.19.2 The "LED" indication provided in the OHE Car shall have illumination level of minimum 30 mcd High intensity type LED, capable of being seen even against Direct Sunlight. The arrangement of LED indication panel with LEDs connected with series resistor is NOT preferred.

5.19.3 The Driver's desk shall be fabricated preferably in single unit, however two parts can be considered at the time design drawing approval for ease of loading.

5.20 CONTROL PANEL

5.20.1 A suitably designed control panel shall be provided in the OHE car for housing all the control accessories. The panel shall be so situated so as to provide easy access to all the components for their maintenance /service.

5.20.2 Adequate Control Equipment including gauges, instruments and cab safety devices shall be provided for safe and satisfactory operation of the DETC. The controls shall be so arranged in the driver's cab that it will be within easy reach of the driver from all drivers' position. All gauges shall be of proven, reliable design and of LED lit type. Gradations of all gauges shall be in metric unit. Following gauges shall be provided in the cab:-

i) Diesel Engine lube oil pressure gauge.
ii) Cooling water temperature gauge (Electronic)
iii) Traction Motor load ammeter.
iv) Air brake gauges.
v) Battery charge and discharge ammeter.
vi) Water level indicator (Electronic)
vii) Speedo Meter.

The following audio-visual signals or reference panel lights shall be provided in the cab for operation of the inspection OHE Car:

i) Low lubricating oil pressure
ii) Lube oil temperature too high
iii) Radiator water temperature too high
iv) Engine 1 ON
v) Engine 2 ON
vi) Engine shut-down
vii) Wheel slip indication
viii) Battery discharge indication
ix) Aux Gen failure indication
x) Low idle rpm indication
xi) Power ground
xii) Cranking contactor welding indication
xiii) Traction control supply ON
xiv) Alternator 1 Excitation ON
xv) Alternator 2 Excitation ON
xvi) Alternator overload

xvii) Alternator winding temp
xviii) Alternator bearing temp
xix) Engine 1 Trip
xx) Engine 2 Trip
xxi) Rectifier 1 fuse failure
xxii) Rectifier 2 fuse failure
xxiii) Rectifier 1 fan failure
xxiv) Rectifier 2 fan failure
xxv) Aux . Alternator failure.
xxvi) Motor over load.
xxvii) Motor Earth fault.
xxviii) Parking Brake applied.
xxix) Emergency Brake applied
xxx) Drive function released.
xxxi) Common annunciation.

The following safety devices, inter alia, shall be provided:

i) Water temperature too high - Transmission cut off and engine returned to idle.
ii) Low water in radiator-Power to transmission cut-off and engine shut down.
iii) Low lube oil pressure- Power to transmission cut-off and engine shut down.
iv) Engine speed too high (over speed trip)- Power to transmission cut-off and engine shut down

Adequate protection of an approved design shall be provided against electrical over loads and grounding.

5.21 **Surge suppression capacitors:**

Capacitors of suitable rating shall be wired in the control circuits to reduce the arcing at contacts of the relays to a minimum.

5.22 **Operating Keys and Locks :**

One set of operating keys of the approved design and dimensions having the following function shall be provided with each unit:-

(i) Door lock key.
(ii) Driver's control Switch key.
(iii) Master controller locking key, (Reverser key)
(iv) Any other control key offered as necessary.
(v) Brake controller key.

MISCELLANEOUS:

6.0 Tools

6.1 Each OHE Car shall be supplied with a complete kit of tools and testing equipment required by a driver in an emergency and for normal working of the OHE Car. These will be arranged in a tool box provided in a cab. These tools are listed in annexure 8-A & 8-B.

6.2 A list of tools to be provided for use in Maintenance Depot shall include tools necessary for maintenance and repair of the entire OHE car including specified equipment for auxiliary and ancillary equipment. The tenderer should list and quote for these tools. The rate shall however not be used for tender evaluation purpose. It shall not be mandatory for railways to buy these tools.

6.3 All special tools shall be listed and catalogued illustrating the method of application.

6.4 Maker's test certificate -Copies of maker's test certificates guaranteeing the performance of the equipment/accessories shall be supplied in duplicate alongwith the delivery of each OHE Car.

6.6 **Weighment**:

6.6.1 Each completed OHE car shall be weighed 4 times successively and vertical load exerted by each wheel on the track shall be measured, with due regard as to the accuracy of the measuring equipment. The pre-weighment run shall be over a section of track containing difference of levels. No alteration or adjustment shall be made to the OHE car after passing or adjustment shall be made to the OHE car after passing over this section of track and before weighment. The arithmetic mean of the values taken during 4 successive weighment shall be the value of measurements.

6.6.2 After weighment, a check shall be made to ensure the following:

i) Total weight is within the nominal weight.

ii) Axle load is within +/- 2 % of the nominal axle load.

iii) The difference between the two wheel loads of any axle is not more than 4% of the axle load. First completed prototype OHE car shall be subjected to squeeze test to ensure that it shall withstand a maximum end load of 200 t without any signs or permanent distortion. The test conditions is specified in Clause-3.1.1.

INSPECTION

7.1 The whole of the materials or fittings used for works covered by this specification shall be subjected for inspection by the Inspecting officer to be nominated by the purchaser and shall be to his entire satisfaction.

7.2 The Inspecting officer shall have the power to: -

a. Adopt any means he may think advisable to satisfy himself that the materials for fittings specified are actually used throughout the construction.
b. Take samples for such tests as he may consider necessary by an approved Metallurgist selected by him, whose report shall be final and binding on the contractors.
c. Visit at any reasonable time and without previous notice the contractor's works to inspect the progress and quality of the work and the contractor shall provide free of charge all equipment and labour required by him for this purpose.
d. Reject any material or fittings that do not conform to the relevant specification or good practice, which shall be marked in a distinguishable manner, and shall be disposed off in such a manner as the Inspecting Officer directs. Such rejected parts shall be replaced by the contractor without extra charge.

7.3 Tests of materials and fittings shall as far as possible be OHE carried out at the works of the maker's of the materials or fittings. The contractor shall provide such additional materials or fittings as may be required or arrange for test pieces to be incorporated in forgings and castings as required by the Inspecting Officer and for their removal in his presence for test purposes. All tests in the works of the contractors and their sub-Contractors shall be at the cost of the contractors.

7.4 No material shall be dispatched or packed until it has been passed by the Inspecting Officer. Such passing shall in no way exonerate the contractor from their obligation in respect of quality and performance of the OHE car.

7.5 In the event of dispute between the Inspecting Officer and the Contractor, the decision of the purchaser shall be final and binding.

7.6 **Radiographic testing of steel castings**.

7.6.1 All steel castings wherever used and welding joints shall be subjected to radiographic testing after manufacture / repair, to a suitable scheme/ standard suggested/approved by RDSO.

7.7 One of the power bogies shall be subjected to exhaustive stationary tests at Contractor's works in the presence or RDSO representative. The tests on bogies shall include dynamic fatigue testing and strain measurement. The test shall be under simulated loading conditions to represent the service load. The body shell shall also be subjected to loads for validating the design calculations of shell. The contractor shall afford all facilities for conducting these tests at his cost.

7.8 **Acceptance tests**.

Besides the checking and testing OHE carried out during manufacture and before dispatch of the OHE car to India it shall be subjected to the following tests before final acceptance.

7.8.1 **Performance capability tests**.

The OHE car shall be subjected to tests to establish its performance based on the supply by the tenderer against the specification. The contractor shall at his own expense provide the services of competent Engineers/Supervisors and supporting staff during the performance capability tests of the prototype.

7.8.2 **Riding quality tests**.

The riding quality tests shall be based on detailed oscillation trial conducted at a speed 10% higher than the maximum specified operating speed on a section of mainline track conforming to test stretch as mentioned in 3rd criteria committee report to establish the performance at the specified maximum operating speed.

7.8.3 Emergency Braking Distance (EBD) and haulage capability Test shall be conducted.

7.8.4 The following shall be the track standards of the test section:

(i) **Track structure**:

The track shall be to a minimum standard of 90 R rail on sleepers with M+ 4 densities and minimum depth of ballast cushion below sleeper of 200 mm, which may consists of at least of 75 mm clean and the rest in caked up condition on compact and stable formation. However speed will depend on the axle load, Axle spacing, dynamic augment value the rolling stock etc.

(ii) Permitted irregularities:

The track is maintained as per Indian Permanent Way Manual and para 607 (i) gives details of track category for various parameters. Third report of criteria committee shall be considered for number of peaks per kilometer, if specified any.

ANNEXURE - 1

LIST OF EXHIBITED DRAWINGS

Sl.No	Drawing No.	Description	Clause Ref.
1.	Diagram ID 1676 mm gauge (BG) of IR schedule of dimension	Maximum moving dimension.	2.2.6
2.	RDSO/SK.No.99003	Draw gear arrangement	3.8.4
3.	RDSO/SK.No.98145	Side buffer arrangement	3.8.4
4.	RDSO/SK.No.99001	Screw coupling assembly.	3.8.4
5.	C/BF/113	Tail lamp bracket.	3.14 (iii)
6.	W/WL-1660	Wheel	3.21.2
7.	RDSO STR No.56-BD-07	For CBC	3.19
8.	ICF Drg No WL.RRM4-7-3-401 with latest alteration	Roof Ventilators	3.2.3
9.	**ICF Drawing No ICF Drawing No.AC/EMU /M/ASR-0-0-001 with latest Alteration.**	Bogie design	3.6.2
10.	**RDSO Drawing No. SK-K4004**	Wheels	3.7.2
11.	**ICF Drawing No. EMU/M-3-2-064 (Latest)**	**Brake Rigging**	3.8.2
12.	ICF EMU/4C/ASR-5-4-402 with latest alteration	Lift type window made of powder coated aluminum	3.3
13.	RCF Drawing No.EM.26108 (Latest)	Cattle Guard	3.15
14.	ICF Drawing No. EMU/M.ASR-41-001 with latest alteration.	Flooring construction of the vehicle	3.13
15.	RDSO sketch No 91146 with latest alteration	The wheel profile.	3.7.4
16.	RDSO's approved source	Tapper Roller Suspension Bearing	5.8.16

ANNEXURE - 2

List of Drawings/calculations to be submitted to RDSO for approval before undertaking manufacture of prototype inspection OHE car

Sl.N.	Drawing/Documents to be submitted to RDSO for approval
1	Layout of OHE car
2	Suspension arrangement.
3	Helical coil spring
4	Load vs deflection diagram of helical coil spring
5	Suspension calculation
6	Enlarged View of Driver's window
7	Normal Visibility diagram of Driver
8	Cooling circuit diagram
9	Axle Box Guide arrangement
10	Brake rigging assembly
11	Schematic Diagram of Brake system
12	Braking effort and Emergency Braking Distance calculation on plane section with maximum load and without load.
13	Wheel and axle (non powered)
14	Wheel Diameter 952 (machined)
15	Shell arrangement
16	Side wall assembly (Right)
17	End wall (Right)
18	Roof Assembly
19	Transverse cross section
20	Vogel Diagram
21	Alignment of OHE car
22	Power pack arrangement
23	Under frame arrangement
24	Trammeling diagram
25	OHE Car lifting arrangement
26	Details of weight transfer calculation.
27	Loading Diagram
28	Roof Equipment layout
29	Estimated weight of the OHE Car structure and weight of principal assembly mounted on the OHE Car
30	FEM calculation of body shell and bogie.
31	Un sprung mass OHE car
32	Calculation of centre gravity from rail level and Balancing calculation under tare and loaded condition.
33	Power pack arrangement
34	Axle (powered)/ Motorised Bogie.

35	Axle drive Gear box assembly
36	Fuel Tank
37	Enlarged view of drivers window
38	Ant pilferage measure
39	Checking of squareness of door and end wall
40	Measurement of deflection of underframe.
41	Measurement of distortions of doorways along the length of OHE car
42	Measurement of distortions of shell across width at door way
43	Drawing showing location of strain gauges on the under frame.
44	Speed v/s Tractive Effort characteristics of OHE Car
45	The block diagram showing power circuit.
46	Calculation for safety against derailment. Calculation for stability of the OHE car against wind force.
47	Details of weight transfer calculation.
48	Electrical wiring diagram for electrical gadgets.

ANNEXURE-3

The following details pertaining to electrical equipment shall be submitted by the tenderer :

I. Diesel Engine

1. Exact description and model of the engine
2. Rated output under UIC site conditions
3. Site Conditions
   - Ambient Temperature 55 ^{o}C
   - Altitude above mean sea level 1000 m
   - Relative humidity above 40%

4. Rated speed at continuous rating
5. Type of cycle (two/four stroke)
6. Method of pressure charging
   - Pressure ratio of compressor at the rated output
   - Single stage/two stage
   - No. of turbochargers used
   - Make and model of turbocharger

7 Type of exhaust system
Constant pressure/pulse type/multi pulse type

8 Method of cooling the charge air
9 Type of combustion chamber
10 Fuel injection equipment
   - Type of injection system
   - Diameter of pump plunger
   - Nozzle opening pressure
   - Maximum duration of injection in degrees of crank

11. Number, arrangement and angle of cylinder.
12. Cylinder bore
13. Piston stroke
14. Cubic capacity/cylinder
15. Compression ratio
16. Firing order
17. Mean piston speed at rated speed
18. Brake mean effective pressure
19. Maximum combustion pressure at no load at minimum idling speed
20. Compression pressure at rated output
21. Minimum no-load idling speed – whether a low idle feature is provided on the engine
22. Minimum no load speed under steady conditions
23. Speed ranges which should not be used continuously
24. Break away torque when the cooling water temperature is 5 ^{o}C
25. Minimum firing speed when the cooling water temperature is 5^{0}C or at the lowest possible temperature of air intake air in rev/minute.

26. Torque resistance to the firing speed required to turn the engine when the cooling water temperature is 5 ^{0}C at the lowest temperature of intake air.
27. Piston
    i. Type of Piston used – whether single piece or composite
    ii. No. of piston rings used.
    iii. configuration of the rings
    iv. whether all the rings are located above the gudgeon pin
    v. method of cooling required for the piston
    vi. oil flow rate and temperature of oil at the piston oulet
28. Cooling system
    i. Single/double cooling circuit
    ii. Whether cooling system is pressurized
    iii. Coolant temperature at outlet from the engine
    iv. Heat absorbed by the cooling water at the rated output
    v. Rate of flow of water
    vi. Inter cooler coolant temperature at entry to the cooler
    vii. Treatment recommended for water
29. Lube Oil System
    i. Temperature of cooling oil with the indication of the point of measurement
    ii. Maximum permissible temperature of cooling oil
    iii. Heat absorbed by the cooling oil at rated output
    iv. Swamp capacity
    v. Quantity required to commission
    vi. Brand of oil recommended

30. Consumption of lubricating oil at the rated output in litres/hour and as a percentage of fuel consumption.
31. Total capacity of lubricating oil pump (s) at the rated output speed in litres/min
32. Lubricating oil pressure at rated speed on entering the engine and at the normal operating temperature
33. Maximum pressure of charge air in the intake manifold at the rated output.
34. Maximum pressure of gases at the turbo inlet at the rated output
35. Maximum speed of the turbocharger at rated output
36. Maximum permissible speed of the turbocharger.
37. Temperature of exhaust gases at turbo inlet at the rated output under UIC and site conditions.
38. Maximum permissible temperature for which the turbocharger components have been designed
39. Heat balance of the engine
40. Weight of the engine complete with all items excluding water and lubricating oil.
41. Weight of water contained in the engine
42. Weight of oil contained in the engine
43. Weight of major components to be handled during maintenance
    i. Turbocharger
    ii. Inlet cooler
    iii. Crank case bare
    iv. Crank shaft
    v. Piston and connecting rod

vi. Cylinder liner
vii. Cylinder head

44. Specific fuel consumption with the tolerance band under UIC and site conditions – indicate the lower heating value of the fuel used in arriving at the specific fuel consumption figures
45. Fuel oil consumption at idle in litres/hour
46. Requirement of fuel specification or any other restriction on the use of duel with different sulphur contents
47. Number of such engines used in rail traction and the period since the engines have been in service and their performance
48. Safety devices provided on the engine
    i. Over speed
    ii. low lube oil pressure
    iii. overload
    iv. high exhaust temperature
    v. high intake temperature
    vi. any other
49. Specification of lube oil suitable for engine
50. Method of starting
51. Governor
    i. Make and type
    ii. Full load speed and drop characteristics
    iii. Torque required at the output shaft
52. Estimated period between top and major overhauls
53. periodicity of overhauling the following critical components
    i. Turbocharger
    ii. Piston and piston rings
    iii. Cylinder liner
    iv. Air and exhaust valves
    v. Fuel pump
    vi. Injector/Nozzle assembly
    vii. Main bearings
    viii. Connecting rod bearings
54. Whether the diesel engine is suitable for satisfactory sustained operation under :
    i. Site conditions mentioned in para 2
    ii. Dusty environment
    iii. Frequent starting and stopping of diesel engine
    iv. Average load factor 60%
55. Inlet and exhaust valve timings
56. Special design features of diesel engine highlighting the measures which have been taken to achieve :
    i. Low specific fuel oil consumption
    ii. Low lubricating oil consumption
    iii. Low idling fuel oil consumption
    iv. High reliability

- Maximum availability

- Reduced level of thermal and mechanical loading of critical components

57. General arrangement and dimensional details.

58. Characteristic curves of diesel engine under UIC and site conditions-

i) Curves for torque, output and specific fuel consumption expressed and guaranteed without upper tolerance for different settings of the injector pump, i.e.

- Setting at which the engine develops the rated output at its rated speed.
- Setting at which the engine develops ¾ of the rated output at its rated speed.
- Setting at which the engine develops ½ of the rated output at its rated speed.
- Setting at which the engine develops ¼ of the rated output at its rated speed.

rated speed.

ii) The torque speed curve which the manufacturer considers to be the maximum torque that should be used for rail traction. This should cover the range from idling speed to the point corresponding to the international rated output at the rated speed.

iii) The curve of fuel consumption for no-load running, commencing from the minimum idling speed, expressed in litre/h

ANNEXURE -4

TRANSMISSION SYSTEM PARTICULAR

I Alternator

1. Description Make & type
2. Drive – Details of arrangement of bearings and coupling
3. Classification – No. poles, number of phases and phase connections
4. Maximum permissible speed –
   Max. voltage a.c.
   D.C. (i.e. rectified)
   Max. current a.c..
5. Rating -
   i) One hour rating – Voltage, current, output & speed
   ii) Continuous rating –
   (a) High voltage
   (b) Low voltage
6. Class and type of insulation
   a) Stator
   b) Rotor
7. Temperature rise
   a) Rotor winding
   b) Stator winding
8. Resistance at 25 ^{o}C
   a) Rotor winding
   b) Stator winding
9. Synchronous impedance at max. frequency and load
10. Stator details
    a) Overall dimensions
    b) No. and size of slots
    c) Winding
       i) Type
       ii) Conductor size and material
       iii) Turns per coil
       iv) Pitch
11. a) Rotor-type, No. of poles, length, bore, size and air gap
    b) Details of rotating armature exciter and rectifier assembly
12. Bearing:
    a) Single or double
    b) Type-sealed or open
    c) Grease-type, capacity and time interval for regreasing
    d) Bearing life and shaft size calculations.
13. Mountings – Details of mounting arrangement.
14. Coupling-Type and details
15. Cooling
    Calculations of cooling capacity
16. Weight
    a) Complete unit with accessories

b) Alternator only
c) Rotor (with fan if any)

17. Characteristic curves
    a) Natural curves
    b) V-I curves (Notch wise)
    c) Efficiency vs. current

18. Tests : Results of –
    a) Type test
        i) Temp. rise test and its calculation
        ii) Rating
        iii) Characteristic curves
    b) Routine test
        i) Temperature Rise Test
        ii) Over speed Test
        iii) Dielectric Test

19. Tractive Efforts vs. Road Speed curve along with Alternator Rectifier Current vs. Voltage curve showing method of calculations.

II Auxiliary Alternator with Rectifier – Regulator

1. Make
2. Model
3. Continuous & short time rating and details of voltage and current regulation
4. Bearing life and shaft size calculations.
5. Weight

III Traction Motor

1.1 Type

1. V - volts
2. I - Amps
3. N – rpm
4. S – km/h
5. N max/N
6. N shaft
7. N max

1.2 Armature

1. Diameter.
2. Length
3. Air ducts – surface
   - section
4. No. of slots.
5. Conductor size.
6. Conductor area.
7. A) Continuous..... for ..... amps
   1 Hour .... for ..... amps

8. Continuous ..... A/sq.mm for ..... A
   1 Hour..... A/sq. mm for ..... A
9. A) Continuous .....
   1 Hour .....

10. ADNL 10^{-9} ..... at cont FF
   ..... at 1 hr rating
   ..... at S max.

11. B (B/A) ..... at cont FF
   ..... at 1 hr rating
   ..... at S max.
12. S max .....km/h
13. N max ..... rpm
14. Wheel dia (half worn)
15. Gear Ratio (New)
16. Suspension
17. Armature bearing – commutator end
   - pinion end
18. Turns/coil
19. Type of winding
20. Coil Throw
21. Length mean turn
22. Resistance at 110°C
23. Inductance at 30 cps.
24. Weight of copper (kg)
25. Tooth volume
26. Core volume
27. Arm. Turns/pole
28. Arm. At/pole - FF
29. Arm. Core int.dia
30. Net core depth
31. Arm. Steel tech. spec.
32. Banding material
33. No. of bands cc
34. Band width.
35. S (cont) ..... M/s ..... rpm ..... km/h

1.3 Main poles

1. Insulation
2. Number
3. External ..... D Internal ..... D

4. Number of turns per pole.
   Frame end
   Arm end
5. Conductor dimension – Frame end

- Arm. end

6. Current density - Frame end
- Armature end.

7. Length of mean turn - Frame end
- Armature End

8. Resistance at 110°C
9. Inductance at 50 cps
10. Radial gap length - Tip
Centre
Mean
Eff

11. Field At
---------- @ FF
Arm. AT

12. Pole Arc.
13. Total fringe
14. Eff. Pole arc
15. Eff gap area
16. Pole flux density.
17. Pole copper weight.
18. Pole steel tech spec.
19. Yoke steel tech. spec.

1.4 Commutation poles

1. Insulation
2. Number
3. External ..... D Internal ..... D
4. Number of turns per pole – Frame end
- Arm end
5. Conductor dimensions - Frame end
- Arm end
6. Current density - Frame end
- Arm end
7. Length of mean turn - Frame end
- Arm end
8. Resistance at 110° c
9. Inductance a t 50 cps
10. Radial gap length - Tip
- Centre
- Mean
- Eff
11. Int. Pole flux density
12. Copper weight
13. Pole steel tech. spec.

1.5 Equalisers (commutator end)

1. Total number
2. Copper weight

1.6 Ventilation

1. Number of fans
2. Flow ..... m^3/min (at continuous speed)
3. N ..... rpm ..... 1.35 N max (overspeed)

1.7 Commutator and brushes

1. Useful diameter
2. Useful length
3. No. Of commutator bars.
4. Bar pitch
5. Average bar/brush
6. Voltage between segments
7. Reactance voltage
8. Insulation thickness between bars.
9. Number of brush arms
10. Brush/arm
11. Brush/size
12. Quality
13. Current density
    For ..... Amps (cont)
    For ..... Amps (1Hr.)
    For ..... Amps (start)
14. S (cont) ..... m/s ..... rpms
15. S (1hr) ..... m/s ..... rmps
16. S (max) ..... m/s ..... km/h
17. Type of commutator construction

1.8 Weight

1. Motor without gearing ..... kg ..... N
2. Armature without pinion .....kg ..... N

CONT		1 Hr	
kg	N	kg	N

3. Wt/kw
4. Wt/hp
5. Pinion (kg)
6. Gear wheel (kg)
7. Gear case (kg)
8. Frame (kg)
9. Total weight (kg)

1.9 Losses and Efficiency

1 Hour Continuos

1. $I^2 R$ (ARM)
2. $I^2 F$ (Series)
3. Core
4. Brush drop
5. Brush friction
6. Bearing F and W

1.10 Magnetic Circuit

1. 1 hr rating values

	Magnetic Area	length	FF Leakage B	AT
Tooth				
Core				
Pole				
Yoke				
Gap				
Total AT				

2.0 Gears and pinions

1. Type of gearing
2. Module
3. Grade of steel used for pinions and gears
4. Particulars of heat treatment
5. Kilometerage guarantee for bull gears
6. Kilometerage guarantee for pinions
7. Material and type of construction for gear case.

IV. Power Rectifier

1. Diode – Make & type
2. No. of parallel paths & no. Of diodes /path
3. Overall dimensions of rectifier unit
4. Ratings
   a) Current Rating
      - max. Cont. (direct) forward current
   b) Thermal Rating
      - Max. & Min. Operating junction temp
      - Max. & Min. Storage temperature
5. Resistance
   a) Forward
   b) Reverse
6. Details of damping circuit
   a) Resistance value & circuit

b) Capacitance value & connection

7. Bus bar arrangement
8. Weight
9. Mounting arrangement
10. Characteristic curves
    a) Voltage vs. Current
    b) Power dissipation as a function of reference point temperature
11. Semi-conductor fuses
    a) Make
    b) Fusing characteristics
    c) I^2 t characteristic

ANNEXURE-5

POWER RECTIFIER SPECFICATION

1.0 Technical requirements including the design features.

1.1 The rectifier unit shall comprise of three phase full wave bridges using silicon diodes. It shall prefer-ably consist of three separate bridges connected in parallel on the input and output side.

1.2 Device Rating

1.2.1 The current rating of the devices shall be such that even under one bridge (n-1) failure condition the rectifier, with two remaining effective three phase bridges shall be capable of meeting the full Tractive power duty/duty cycles and abnormal conditions including short circuit.

1.2.2 An unbalance of 20% shall be considered in the sharing of the load between the bridges, for design purposes, though, in actual testing the unbalance shall be limited to 10% only.

1.2.3 The diodes shall have a PIV rating of not less than 3000 V or not less than 2.8 times the maximum crest working voltage whichever is higher.

1.2.4 Characteristics curves of the diodes indicating power loss, forward voltage drop, slope resistance, thermal resistance characteristics and characteristics curves of the fuse shall be submitted in A4 size.

1.2.5 The permissible junction and case temperature for the device shall be declared.

1.2.6 Diodes in the cubicle shall belong to one FVD group while they shall be in three consecutive FVD groups for all the units to be supplied. FVD shall have a band width of 50 milli-volts at the full rated diode current.

1.2.7 The semiconductor device junction temperature shall be calculated for (n-1) condition operation at rated permissible current for three duty cycles after temperature stabilisation in heat run test at a current value equal to the one hour rating of the traction motors.

For this purpose, RMS value of the starting current over the notching up duration for 1 minute followed by RMS value of the steady state one hour rating current for eight minutes, followed by zero current for thirty seconds will form one cycle. At the end of three such successive cycles the junction temperature shall be computed. There shall be enough margin.

1.2.8 The devices shall meet all the requirements as per IS:7788.

1.2.9 The use of capsule type diodes are acceptable.

1.3 <u>Snubber and Damping Networks</u>

1.3.1 Each diode shall be provided with RC network to overcome the hole storage effect.

1.3.2 RC damping networks shall be provided to protect against switching surges expected. Supporting calculations shall be furnished.

1.3.3 The resistors and capacitors for the RC network shall be respectively of silicon coated, non-bursting type suitable for traction duty duly approved by RDSO.

1.3.4 Resistances – Silicon coated, non-inductive, wire wound resistors and stud mounting type with lug terminals shall be used. The wattage ratings shall be three times the calculated maximum wattage in the circuit under worst loading and high ambient conditions.

1.3.4 Capacitors – shall be of non- bursting type. The clearance and creepage distance between the live terminals and also the body shall comply with table 5 of IS-7788. The maximum working voltage across any capacitor shall not exceed 50% of the rated repetitive voltage. In the case of hole storage capacitors the voltage rating shall not to be less than PIV rating of the semiconductor device. The capacitors shall be designed for operation at 85 ^{o}C. The capacitors will be of IOHE CAR of GE make. Use of indigenous make shall have the prior approval of RDSO.

1.4 **Fuses**

1.4.1 The diodes shall be protected by semi-conductor fuses whose selection shall be supported by the calculation to ensure their matching with the diodes. $I^2 t$ values for the diode shall be more than the $I^2 t$ for the fuse. Diode and fuse characteristics shall be furnished along with the tender. The fuse selection shall withstand the short circuit current expected.

Note: The expected short circuit current/impedance with duration shall be specified.

1.4.2 The semiconductor fuses used for the diode protection shall be of approved makes. Fuses of la Ferraz, Bussman or English Electric make only are approved at present.

1.3.4 Since the rectifier unit consists of multi-bridges connected in parallel, signaling fuses, associated suitable relays and micro switches shall be provided to given an indication in case of single bridge failure and to trip the load on the alternator in case of double bridge failure.

1.5 **Constructional Features**

1.5.1 The tenderer shall submit details of the overall dimensions of the rectifier along with the offer.

1.5.2 The cubicle as well as internal sub-assemblies shall be interchangeable from one unit to the other.

1.5.2.1 The cubicle shall be of cold rolled steel metal sheet with strong frame work suitable for underframe mounting to withstand shocks and vibrations encountered in service run with a maximum speed of 105 kmph. This shall be protected against damages due to ballast hitting. The minimum thickness of panels shall be 12.0mm and may be increased as panel width increases as mentioned below.

Maximum Panel Widht	**Thickness**
Upto 750 mm	2.0 mm
> 750mm but < 1500 mm	2.5 mm
>1500 mm but < 2000 mm	3.2 mm

1.5.2.3 The cubicle shall be provided with two numbers of earthing bosses with M12x20 tapped hole on each side. The bosses shall have 5 mm thick copper/brass plate brazed.

1.5.3 Easily interchangeable inspection doors with locking arrangement shall be provided to facilitate easy access to vital parts like fuses, diodes etc.

1.5.4 Withdrawable bridge racks consisting of diodes, fuses and associated components shall be provided on rails for withdrawing during maintenance.

1.5.5 The equipment layout shall provide easy accessibility for maintenance.

1.5.6 Suitable ventilating louvers shall be provided for air outlet.

1.5.7 The devices with heat sink shall be mounted of FRP (SMC)/ Epoxy panels of adequate thickness (not less than 10mm) with hand holds for easy removal and insertion in position.

1.5.7.1 Heat sinks shall be of extruded constructions. The sand casted or gravity die casted are not acceptable. OHE care shall be taken to have proper surface finish and surface flatness. Current collection through heat sink shall be avoided. In case it is not possible, the heat sink device mounting surface and the current collection contact area shall be treated to prevent electro corrosion and bimetallic action.

1.5.7.2 Recommended optimum pressures for mounting the devices on the heat sink shall be furnished. Suitable thermal compound having low thermal resistance shall be used to fill up the void between the mating surfaces of heat sink and device. The same shall seal the joint against moisture.

Note : Transient thermal impedance characteristics curves of the heat sink at different cooling air rate shall be submitted for approval.

1.5.8 Blower shall be mounted as an independent unit connected suitably to the duct with adequate resistance to reduce vibrations. Blower Motor shall be easily accessible for maintenance.

1.5.9 The unit shall be painted with two coats of red oxide followed by two coats of white stove enamel on inside and aircraft grey on outside to IS-5:1961.

1.5.10 Fasteners used in the cubicle shall be of minimum M6 and screws of M10 and above shall be of high tensile strength.

1.5.10.1 Studs of the terminal board shall have adequate current rating with minimum size not less than M6 and shall be coated with cadmium plating. The method of connections shall be such that the current should not pass through the studs. Number of connections per stud shall be limited to two. The insulating boards shall be fire retarding FRP sheet moulding type. They shall pass the fire retardant test as per specification IS – 2046. Separate terminal board shall be provided for different voltages. Positive and negative terminals shall be separately located. All the terminal studs shall be legibly identified with their circuit numbers.

1.5.11 The bus sizes on the a.c. & d.c. sides shall be such that the final temperature when corrected to 47 ^{o}C ambient is not more than 100 ^{o}C copper bus bar must be tin plated after bending/drilling the required holes, with thickness of plating not less than 8 microns.

1.5.11.1 The bus bars used shall be of high conductivity electrolytic copper as per IS:613 with current density not exceeding 4 A/mm^2. The bus bar shall have colour code with red, yellow and blue on the a.c. side and brown and black respectively for positives and negatives on the d.c. side. Bus bars supports shall be made with insulators and be identified by engraving the respective circuit numbers with contrast colour paint applied on the engraved marking.

1.5.12 All the cable wire ends shall be terminated with suitable sockets using proper dies and tools.

1.5.13 Cables – All the cables/wires shall be multi-strand flexible insulated cables conforming to E/14-01/parts I,II and III. PTFE insulated cables of adequate voltage rating and size shall be used for inter-connection snubber circuits and signaling fuses.

1.5.14 All the wires shall be numbered with cables ferrules of approved design on both ends of the cables.

1.5.15 Wiring layout- The quality of workmanship and layout of wiring shall be of high standard to ensure long life. The following guidelines shall be kept in view.

a) Complete separation of low, medium and high voltages.
b) Separation temporarily and permanently energised cables with separate bunching.
c) Avoiding of sharp bends.
d) Provision of grommets for cables entries.
e) Supporting of cable bunches with insulated supports using nylon ties.

2.0 **Tests :**

2.1 Type tests on silicone diodes – At least ten diodes shall be subjected to type tests as per IS-7788 in the presence of RDSO Inspecting Official sufficiently in advance to avoid delay of prototype testing of the rectifier unit.

2.2 Routine tests on each diode shall be conducted as per IS-7788 and the results recorded by the manufacturer. 10% of the lot offered selected at random shall be subjected to routine tests in the presence of inspecting official of RDSO.

2.3 Type test on Rectifier assembly:

2.3.1 Temperature rise test – with normal ventilation, the rectifier shall be subjected to the duty cycle expected on the traction motors with the temperature maintained at $47^{o}C$ and until steady temperature is obtained. The temperature stabilisation can be deemed when three successive readings taken at 15 minutes intervals do not vary by more than 0.5 ^{o}C. The maximum diode junction temperature arrived shall be less than the permissible junction temperature as declared by the diode manufacturer after the duty cycles as described in clause1.2.7 of Annexure-5. The temperature rise test shall be conducted both for n and (n-1) bridge conditions.

2.3.2 Heat run test with (n-1) parallel paths will be conducted on first prototype and afterwards the test may be conducted corresponding to normal duty cycle with all bridges in operation.

2.3.3 Fuse blade temperature and bus temperature shall not exceed 100 deg. C for (n-1) parallel paths.

2.3.4 Instruments used for type testing shall be of 0.5 clause accuracy and shall have been calibrated within 6 months from the date of testing.

2.3.5 Power losses measured for the diodes shall not exceed 10% of the declared value.

3. **Guarantee**:

The diodes of the main Rectifier shall be guaranteed for satisfactory working for a period of five years from the date of commissioning.

ANNEXURE - 6

DESIGN OF TRACTION MOTORS AND SWITCH GEARS

1.0 Number and arrangement of motors

1.1 Each OHE car shall be fitted with four numbers of DC series traction motors, two on each bogie. The motors shall be axle hung nose suspended type and shall be series wound, working on the pulsating current. The motors shall be designed to comply with the conditions stipulated in IEC-60349. The temperature rise allowed by IEC shall be reduced by 30 Deg. C, to allow for higher ambient temperatures. All motors shall be permanently connected in parallel.

1.2 The motor shall be designed to comply with the operating requirements specified with exceeding the temperature-rise limits.

1.3 The motors shall be so designed that severe damage will be avoided in case of transients such as fluctuations of the voltage, switching surges. The traction motor circuit shall comprise all the protective devices which will prevent any damage to them due to transients. The general design and maintenance of the motors shall be of the highest standard in accordance with the modern traction practices. The particulars of the motors shall be furnished as per Annexure 4.

1.4 The motor contactor shall be of Electro-pneumatic type with blow out coils and arcing horns etc. to break the current without detriment to their working parts or adjacent equipment. All contact tips, interlocks, pins and plungers shall be easily assessable for maintenance. The motor contactor shall be capable to open the circuit on overload and under fault condition.

ANNEXURE -7

PARTICULARS TO BE SUPPLIED FOR THE INSPECTION OHE CAR

The following data shall be supplied for the OHE car along with the tender offer:

1 Length of the OHE car over head stock. …mm

2 Total wheel rigid base …mm

3 Height of OHE car floor (under tare) …mm

4 Distance between bogie centers.

5 Distance between side buffers …mm

6 Height of buffers when wheels are:

(i) New ....mm

(ii) Fully worn out .... mm

7 Maximum height of the OHE car with wheels in new condition. …mm

8 Maximum height of the cab at corners with wheels in new condition. …mm

9 Maximum width of the OHE car. …mm

10 Minimum height above rail level of any component with the OHE car wheels in maximum worn conditions. …mm

11 Reduction in the above height in the event of spring rigging failure. …mm

12 Diameter of wheels over tread …mm (new)

...mm (worn out)

13 Axle load …t (max.)

....t (min.)

14 Total weight of the OHE car.

- in fully loaded condition …t
- in empty condition …t

15 Maximum speed of the OHE car.

- attached to a train …km/h
- Self-propelled …km/h

16 Maximum Tractive effort at rail …kg

17 Maximum continuous Tractive effort …kg

18 Maximum speed of operation at maximum continuous Tractive effort. …km/h

19 (a) Fuel oil consumption at 75% of rated output of the diesel engine. …litre/h

(b) Lubricating oil consumption at 75% of rated output of the diesel engine. …litre/h

Annexure-8-A

List of tools for maintenance work and repair of minor fault.

Sl.No.	Tool description	Make	Quantity
1	Box spanner set 10-34 mm		1 set
2	Ring Spanner 6-33 mm		1 set
3	Double end spanner set 6-36 mm		1 set
4	Grease gun		1
5	Torque wrench EVT 2000@		1
6	Pipe wrench 18”		1
7	Hammer 2 Lbs		1
8	Screw Driver 6”		1
9	Screw Driver 12”		1
10	Chisel 6”		1
11	Cutting plier		1
12	L N key set 3 to 17		1 set
13*	Emergency Spares		1 Kit
*Emergency Spares: consists of Fuses, Control Panel lamps, MCBs and Critical Hoses.			
	Make to be indicated in the colum		

Annexure-8-B

Testing Kit for 8-wheeler Diesel electric Inspection & Maintenance Car.

Sl.No.	Tool desription	Make	Quantity(Nos)
1	Injector adjustment Kit		1
2	Vacuum gauge 90-30 inch of Hg)		1
3	Pressure Gauge(0-30 PSI)		1
4	Hand tacho Meter(0-3000 RPM)		1
5	Dial gauge (Least Count=0.001”)		1
6	Magnetic gauge		1
7	Megger 500 V		1
8	Multi-Meter (DC Range: 400 mV AC Range: 400mV-750 V) Resistance: 400 ohm to 40 Mega ohms)		1
Make to be indicated in the column			

Annexure-8-C

Special tools.

Sl.No.	Tool desription	Make	Quantity
1	Axle Box Hydraulic Bearing puller		1

Annexure-8-D

Training material in Hindi and English with each 8-wheeler Diesel Electric Inspection & Maintenance Car.

Sl.No.	Tool description	Quantity
1	Training notes/ Write up with diagrams	2 Nos
2	Slides/Wall charts	2 Nos

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

TECHNICAL SPECIFICATION
FOR
MEASURING AND RECORDING INSTRUMENTATION TO BE RETROFITTED ON 8-WHEELER TOWER CARS

(November, 2015)

Issued by
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SIGNATURE			
DATE			
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INDEX

GENERAL CONDITIONS

1.2 SCOPE

1.2.1 This specification covers the Design, manufacture, supply, testing & retrofitment/commissioning of OHE Parameter Measuring & Recording instrumentation on existing self-propelled 8-Wheeler Diesel Electric Tower Car and self-propelled 8-Wheeler Diesel Hydraulic Tower Car operating on broad gauge (1676mm) electrified (25 kV A.C.) routes of Indian Railways.The work involve is to design & development of instrumentation and retrofitment of these instruments on 8-Wheeler Diesel Electric and Diesel Hydraulic Tower Cars. The Retrofitment work for existing Tower Car shall be done during periodical overhauling (POH). Supply of new 8-Wheeler Tower Car shall be made duly fitted with measuring & recording system as per Specification; wherever specified.

1.2 CLIMATIC CONDITIONS

1.2.1 The instrumentation shall be in continuous operation under the following atmospheric and climatic conditions: -

1	Atmospheric temperature	Metallic surface temperature under Sun: 75°C maximum and in shade: 55°C max. Minimum temperature: -10°C (Also snow fall in certain areas during winter season).
2	Humidity	100% saturation during rainy season.
3	Reference site conditions	v) Ambient Temp. : 50°C vi) Humidity: 100% vii) Altitude:1000m above mean sea level.
4	Rain fall	(iii) Ranging from 1750 mm to 6250 mm. (iv) Number of rainy days/annum 120
5	Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach as high as of 1.6 mg/m³. In many iron ore and coalmine areas, the dust concentration is very high affecting the filter and air ventilation system.
6	Coastal Area	Instrumentation shall be designed to work in coastal areas in humid and salt laden atmosphere with maximum pH value of 8.5, sulphate of 7mg per liter, max. concentration of chlorine 6 mg per liter and maximum conductivity of 130 micro siemens/cm.
7	Vibration	The equipment, sub-system and their mounting arrangement shall be designed to withstand satisfactorily the vibration and shocks encountered in service as specified in clause 1.2.2. High level of 50 g vibration and shocks. Accelerations over 500 m/s² have been recorded at axle box levels for long periods during run. Vibrations during wheel slips are of even higher magnitude.
8	Wind Speed	High wind speed in certain areas, with wind pressure reaching 200kg/m²

1.2.2 The equipment and their arrangement shall withstand satisfactorily, the vibration and shocks normally encountered in service which are as below:-

(a) Maximum Vertical Acceleration 3.0g
(b) Maximum Longitudinal Acceleration 5.0g
(c) Maximum Train Acceleration 2.0g
Where g= Acceleration due to gravity

1.3 EXAMINATION OF THE TENDER OFFER:

1.3.4 The tenderer is required to furnish clause by clause comments to this specification, either confirming acceptance of the clause or indicating deviation therefrom.

1.3.5 Details of all Measuring Instruments, covering all technical and functional requirements, given in the Specification, shall be brought out by the Tenderer, while quoting. List of Measuring Instruments shall be furnished along with the offer by the tenderer for scrutiny.

1.3.6 In the event a tenderer is unable to comply, either partially or fully, to any of the stipulations made in this specification, it must be brought to the notice of purchaser with full particulars of the deviations, technical details, cost implications and past service performance, etc.

1.4 DESIGN DEVELOPMENT:

1.4.6 The successful tenderer (hereafter called as contractor) shall develop the design based on the details given in this specification and sound engineering practices. The entire design shall be submitted to RDSO for approval before commencing retrofitment of instrumentation system.

1.4.7 The design shall be based on S.I. Units.

1.4.8 From the information given in this specification and instructions of RDSO, the contractor shall prepare a full set of engineering drawings for retrofitment of instruments for monitoring vital OHE parameters and submit the same to RDSO for approval.

1.4.9 Material specifications, manufacturing tolerances and other details, such as jigs & fixtures which are necessary for retrofitment of instruments shall be indicated in the drawings.

1.4.10 Tenderer shall inspect the existing self-propelled 8-Wheeler Diesel Electric & Diesel Hydraulic Tower Cars available on Indian railways for space availability, locations for fixing instruments/equipment and to develop the suitable instrumentation for retrofitment and also control cubicle for recording and monitoring.

1.6 APPROVAL OF DRAWINGS:

1.5.3 “Approval” to the drawing means the approval to the general adoptability of the design features. RDSO shall not be responsible for the correctness of dimensions on the drawings, materials used, strength or performance of the components. The contractor shall be wholly and completely responsible for all these variables. The contractor, when submitting proposals or designs for approval of the RDSO, shall draw attention to any deviation or departure from the specification involved in his proposals or drawings.

1.5.4 Drawing for approval shall be submitted in standard size (s) as per IS: 696 along with main calculation details in triplicate.

1.10 PRINTS:

1.10.1 One set of tracing, two sets of their prints & two DVD of the RDSO approved drawings/ calculations shall be supplied by the successful contractor with each system supplied for tower car. The tracings shall be on RTF of durable quality. Drawings shall be made on Auto CAD. Two sets of tracing, two sets of prints and two copies of approved drawings& calculations along with 3 DVDs shall be supplied to RDSO.

1.10.2 Diagram sheets showing the overall dimensions of the instrumentation, weights and the relation of overall dimensions to the space in the Tower Car.

1.11 CONTRACTOR’S RESPONSIBILITY:

1.7.1 The contractor shall be entirely responsible for the execution of the contract strictly in accordance with the terms of this specification and the conditions of contract, notwithstanding any approval which RDSO or the Inspecting officer may have given:

(e) Of the detailed drawing prepared by the contractor.
(f) Of the sub-contractors for materials.
(g) Of other parts of the work involved by the contractor.
(h) Of the tests on instrumentation either by the contractor or by the RDSO or the Inspecting Officer.

1.12 WARRANTY

Warranty shall be as per IRS standard conditions of contract.

1.10 DRAWINGS AND STANDARD SPECIFICATION

1.10.1 The Contractor shall prepare all the drawings for installation of instrumentation on Diesel Electric /Diesel Hydraulic Tower Car for approval.

1.10.2 Indian Railways Standard (IRS) Specifications and Schedules of Maximum Moving Dimensions may be obtained on payment from the Manager, Government of India Publications, Civil Lines, Delhi 110 006 (INDIA).

1.10.3 Indian Standard Specifications (ISS) are available from Bureau of Indian Standards, 9-Bahadur Shah ZafarMarg, Delhi 110 002.

1.11 SERVICE ENGINEERING:

1.10.1 The Contractor shall arrange for the supervision of commissioning of the instrumentation immediately after their receipt at ultimate destination. He is also required to carry out joint check of the receipt ofcomponents regarding short shipment or transit damages.

1.10.2 The contractor shall ensure commissioning of the instrumentation within 30 days from the date of intimation by the consignee.

1.10.3 The performance of instrumentation shall be demonstrated by the contractor after its successful commissioning at the consignee's works.

1.10.4 The contractor shall provide and ensure servicing facilities in India throughout the warranty period. After the warranty period is over, he shall, on call, give service support for troubleshooting and for obtaining spare parts.

1.11 TRAINING

1.11.1 The Contractor shall arrange to provide training in operation & maintenance of the instrumentation at their manufacturing works for two men for four days and two men for four days at user place for each set of instrumentation supplied for each Tower Car. The training material shall be supplied by the contractor. ~~The charges for training shall be included in the price of instrumentation supplied.~~ The charges for travel, boarding and lodging of trainees shall be borne by the Railways.

(Note: training cost is to be quoted separately as per Table 'G' of Schedule of requirements.)

1.15 SERVICE MANUALS AND SPARE PARTS CATELOGUE:

1.12.1 Detailed Maintenance & Service Manuals including the manual for trouble shooting & operational requirement, spare parts catalogues for the operator and maintenance staff with each set of instrumentation supplied with each Diesel Electric or Diesel Hydraulic Tower Car shall be prepared and three copies supplied free of cost.

1.15.1 In addition, three copies each of the Maintenance/Service and troubleshooting manual shall be supplied to RDSO.

1.13 SUBLET ORDERS FOR MATERIALS: Any subletting of orders for materials/work shall have prior approval of RDSO.

1.17 SPARE PARTS:

1.17.1 Unit exchange of spare parts shall be indicated. However, final decision to buy these will rest with the purchaser.

1.17.2 The prices for these spares shall be quoted separately. These spares shall be for each set of instrumentation supplied.

(Note: These spares shall be other than the maintenance spares required for Warranty Period, and shall be quoted by the bidder only if these are considered essential over and above the spares required during warranty/ AMC requirements. The cost of these spares shall not be included in the cost of Warranty spares or in AMC cost.)

1.17.3 The tenderer shall be responsible to ensure subsequent availability of the spare parts for the normal life of the respective instrument.

1.18 QUALITY ASSURANCE PLAN

1.18.1 The contractor should possess valid ISO-9001:2000 certificate for his work's address. The contractor shall formulate Quality Assurance Plan (QAP) detailing the methodology proposed to be followed for retrofitment, testing & commissioning of instrumentation on Tower Car.

1.19 ANNUAL MAINTENANCE CONTRACT (AMC)
(The instructions given below in the paras are indicative. Please refer tender conditions in the tender document for details.)

1.16.1 The Tenderer shall quote for AMC of all Equipments/Components of Measuring& Recording System such as Transducers, Load Cells, Strain Gauges, High Resolution Camera, On Board Computers/Laptop, Laser Printers, UPS and other Interface Equipment. The Annual Maintenance shall be for 5 years after warranty period is over. The Tenderer shall quote year wise rates of AMC detailing the various maintenance schedules enlisting the requirement of material/ spare parts, consumables, and services to be rendered by him in regular intervals. All these materials, spare parts, consumables and labour requirement shall be arranged by the successful Tenderer during the course of AMC. The AMC shall be comprehensive for all Equipment of Measuring & Recording System covering scheduled as well as break down maintenance. The Tenderer shall keep adequate spares in stock accordingly. AMC shall be inclusive of replacement of parts, if required, either due to breakdown or due to regular wear and tear.

1.16.2 The cost of AMC cost of Measuring System shall be considered while evaluating the inter-se tender position. It shall be compulsory for the Tenderer to quote for AMC without which the offer shall be summarily rejected.

1.16.3 Tenderer shall submit various maintenance schedules such as Daily/Weekly, Monthly, Quarterly, Half yearly and Yearly schedules of all Equipments along with the offer.

1.16.4 During warranty period, scheduled maintenance of Measuring Equipment/ Components shall be done by the successful contractor for which no extra cost shall be paid by the Railways. After expiry of Warranty period, the successful Tenderer shall have to maintain all the instrument/ Components of the Measuring System during AMC period of 5 years. The Equipment, other than measuring instrumentation/ Components, shall be maintained by the Railways.

1.16.5 In case of failure of any Equipment, during Warranty as well as AMC period, it shall be repaired or replaced within reasonable time not exceeding 05 days from the day of reporting by the consignee. ~~After this period of 05 days, penalty at the rate of Rs. 5000 (Rupees Five Thousand) per day (flat) shall be imposed on the contractor for each day, or its part thereof.~~ Penalties for delay in attending complaints under maintenance contract (AMC) shall be governed by the clause 6.8 of Additional Special conditions of bid document.

1.16.6 The AMC agreement shall be entered separately with each Zonal Railway as per the accepted rate of the Contract.

CHAPTER – II

MEASURING & RECORDING SYSTEM

2.1 The instrumentation shall be able to measure and record the required parameters in the speed range 0-110 kmph, when running in self-propelled mode/coupled to a train.

2.2 The system requirement shall be on line recording, storing and online processing. In this setup, video recording of the OHE shall be carried out and shall process on line with on board computer kept in the Tower Car to process the necessary information of the OHE geometry parameter as mentioned in the clause 2.7.1 (a) to (e). The hot spot on the OHE shall be detected using Infra-Red camera and this shall also be processed online on on-board computer.Processed report of OHE geometry from the on-board computer to the nominated Railway Official sitting at the Remote Control Centre through internet shall be transmitted. The type and details in Report shall be finalized at the designs approval stage.

2.3 The tender shall give offer with complete technical details including processing software for analysis of OHE Geometry and report generation.The software shall be capable of exporting data to MS office for analysis.

2.4 The measurements shall be made under live or non-live condition of the OHE, during day and night.

2.5 The pantograph of Tower Car may be fitted with instrumentation such as transducers, accelerometer, load cells and strain gauges etc. as required but such fitment shall not materially affect the static/dynamic performance of the Tower Car pantograph. The sensors are preferably to be installed on the roof of car and non-contact measurement shall be preferred. The transducers shall be properly protected against mechanical, environmental and electrical interferences. The cameras shall have high resolution high frequency suitable for capturing of images at the specified speeds. The cameras and other equipment shall be protected for ingress of dust and water with IP -65 Protection.

For parameters like contact wire height, stagger, loss of contact, setting distance (implantation) and thickness/diameter of contact wire, contact-less measurement system employing state of the art technology shall be acceptable conforming to environmental standards. The system shall be designed according to electromagnetic compatibility, Shocks vibrations and shall have no moving parts, completely sealed and rugged construction.

The communication between exterior/roof mounted and interior instruments on board computer/laptop shall be made by an Ethernet Network and physical connection is made by optical fiber. All cables on the roof of tower car which are connected to ground level shall be put in a metallic grounded protection pipe.

The system shall be precise and needs less frequent calibrations.

The tendered shall submit a detailed scheme of the proposed system with technical details including dimensional requirement and performance report of the system supplied and commissioned over worldwide Railways.

2.6 RETROFITMENT OF MEASURING SYSTEM

2.6.1 All processed information shall be made available in the Laptop/Desktop at the suitable location in the Dome Area or Staff Cabin of Tower Car. The connections from instrumentation on the roof of the car to the place inside the Tower Car shall be rigid enough to avoid any failure due to poor connectivity during movement of Tower Car due to vibrations. Necessary minor modification work for keeping Laptop/ Desktop, UPS, Printer and power supply arrangement for Laptop/ Desktop, Printer shall be in the scope of supply.

2.6.2 The electric supply shall be made available from 7.5 kVA DG set, 440V, 3 phase supply. The tenderer shall draw single phase supply from DG Set for supply to UPS. The UPS shall have a backup of at least 3 hours in the event of failure of DG Set. The capacity of battery with UPS shall be furnished while submitting the design for approval of RDSO.

2.7 PARAMETERS TO BE MEASURED.

2.7.1 Principles/methods used for the measurements as indicated in each of the following clauses are only suggestive and the successful tenderer should employ state-of-art technology capable of high accuracy and precision in measurement and recording. All corrections/ compensations due to bogie, body and pantograph oscillations shall be built into the measurement methods for giving better accuracy/precision in measurement and recording. The parameters that the tower car is required to measure and monitor are detailed as follows:

a) HEIGHT OF CONTACT WIRE

The height of the Contact Wire is vertical distance of its underside from the rail level and it varies from 4500 mm to 6500 mm. The height measurement should be corrected for car-body movement. Height of contact wire may be measured using any non-contact measurement methodology. The Car shall be able to measure heights of two contact wire of main line OHE and of Turnout OHE to ensure a gap of 50 mm at support points at obligatory structures(out of run OHE to be higher than main line OHE). This is essential to avoid pantograph entanglement with OHE. Continuous measurement of main line and Turnout OHE is required at such locations. The accuracy of height measurement shall be minimum $\pm$ 10 mm. Sampling distance shall be 1000 mm.

b) STAGGER OF CONTACT WIRE.

Stagger is defined as the distance of the contact wire from the center-line of pantograph, measured transverse to the track. (Suitable cant compensation shall be made for transverse oscillations of the locomotive/OHE car which affect the center line of the pantograph from the vertical). The system employed should enable measurement of stagger of two contact wires simultaneously (at overlaps and turnouts) upto a limit of ± 500 mm. The stagger of contact wire may be measured using any non-contact measurement method. The accuracy of stagger measurement

should be minimum ±10 mm. Sampling distance for Stagger measurement shall be 500 mm.

c) MEASUREMENT OF CONTACT WIRE THICKNESS (CONTACT WIRE DIAMETER)

Thickness implies the diameter of Contact Wire. There are three sizes of contact wire i.e 107 mm^2 , 150 mm^2 and 193 mm^2 and their diameters are 12.24 mm ,14.50 mm and 16.40 mm respectively. The condemning limits of their diameters are 8.25 mm, 8.25 and 9.75 mm respectively.The measurement of diameter of contact wire may be made using any non-contact measurement method. The accuracy of contact wire thickness measurement shall be minimum ± 0.2 mm. Sampling distance shall be 500 mm.

d) LOSS OF CONTACT

Loss of contact with pantograph and contact wire is required to be continuously monitored. For this continuous recording/measurement of the contact force between the pantograph and the contact wire, which may differ from the upward force of the pantograph, due to oscillations of the contact wire, shall be made by suitable transducers installed on the pan of the pantograph. Force sensors shall be small and lightweight so as not to affect the aerodynamic uplift and current collection property of the pantograph.

e) MEASUREMENT OF SETTING DISTANCE (IMPLANTATION)

Setting Distance is distance measured from centre line of track to the inner face of traction mast. This varies in the range of 2100 mm to 5000 mm. System should be able to measure the setting distance in accuracy level of ± 10 mm. System should be able to have Data storage of at least 10 lakh masts and transfer it for printing of reports.

Note: Tenderer may propose any other method, which is superior, more accurate and suitable to measure at higher speed of tower car, may be offered for items at para-2.7 above. For this tenderer have to submit the detailed procedure and justification for acceptance of the purchaser. Contractors' design shall have earlier given satisfactory performance for a minimum period of two years on railway networks elsewhere.

2.7.2 MAST IDENTIFICATION SYSTEM

The GPS receiver shall identify the location of OHE masts co-relating with measured data. Geographical positioning system shall be utilized for the mast identification along the track. The GPS/optical mapped data is in text file and shall be required to be correlated with the software of measuring instrument system so that the location of the measured data is automatically displayed/ printed along with the event recorded. Accordingly, chart recorder/ report output shall indicate the exact location of recorded event, giving the mast number. Alternatively optical identification system can also be employed to detect the Catenary Wire support (Mast) along the track continuously. The Optical Mast Identification system shall be active where GPS is not visible such as through tunnels and other critical locations. GPS data shall be transferable to PC/Laptop using suitable software and accessories. The GPS data

shall be provided by the Railways. Antenna of sufficient cable length shall also be provided. The accuracy required for mast location shall be minimum ± 4 meter.

2.8 RECORDING AND PRESENTATION OF TEST RESULTS:

2.8.1 All processed results shall be presented with reference to the specific mast location on the track and kilometerage. It should be possible to initialize the reference kilometers by the operator at any stage. All distance measurements after initializing the kilometer shall be with reference to kilometer so entered till the next initializing by operator.

2.8.2 The exact format for presentation of reports over computer monitor and plotter/printer shall be mutually decided after award of the tender. Such presentation may take the form of continuous display correlated with the mast location and recorded parameters and kilometric progressive over a suitable scale or may take the form of reports generated on the basis of exceedance of certain threshold values. The processing software shall take care of the requirement of IR gauge and OHE for the purpose.

2.9 RECORDING FACILITY

2.9.1 All parameters shall be recorded and archived on a suitable multi-channel recorder. The storage space shall be adequate for storing information for a cumulative run of 1000 kms or 90 days whichever is less.

2.9.2 All measured and recorded data shall be converted from analog to digital form, classified, analysed and stored on an On-Board computer based data acquisition and analyzer system. It shall be possible to generate suitable reports involving simple logic from the database.

2.9.3 It shall be possible to print out all or any of the parameters in juxtaposition as a function of distance or mast location without any classification, if desired. Normally the data shall be required to be printed after classification and analysis as specified.

2.9.4 Suitable recorder is to be provided for recording all parameters in juxtaposition for off-line processing. The resolution of the parameters recorded shall be commensurate with the variation of the recorded value.

2.10 EMI REQUIREMENTS

2.10.1 The instrumentation shall be work under 25 kV, 50 Hz, OHE System environment. Electronic signals generated inside the measuring equipments, inverters shall work without any adverse performance.

2.10.2 The tracks over which the offered system will work may be equipped with DC track circuits, 83-1/3 Hz track circuits as well as track circuits at higher frequencies. Harmonics generated by the measuring equipment should not affect signaling gears like audio frequency track circuits and axle counters which work in the range 0-5 kHz with a limit of 400 mA. On the communication network, control

circuits, tele-printer circuits, as well as VHF/UHF and microwave circuits are employed. The Psophometric voltage induced on communication circuit running by the side of track should not exceed 1 mV.

2.10.3 The electric and electronic equipment used in the measuring & recording instrumentation System shall comply emission and immunity aspects of EMC to CENELEC standard EN-50121-3-2. The internal EMC shall cover a combination of earthing, shielding and isolation of interference sources so that conducted and radiated noises are properly segregated or suppressed and no other equipment is affected due to operation of measuring equipment. The following interference current in the output current waveform shall not be exceeded at any point in the operating envelope of the Car:

Psophometric Current <=5 A
100 Hz - 400 mA
1700 $\pm$ 50 Hz - 300 mA
2000 $\pm$ 50 Hz - 300 mA
2300 $\pm$ 50 Hz - 300 mA
2600 $\pm$ 50 Hz - 300 mA
5100 $\pm$ 50 Hz - 100 mA

2.10.4 Emission from Tower Car to outside world shall be limited to level specified under CENELEC standard 50121-2. The tenderer shall submit the simulated values of these interference currents in their offer.

2.11 INSPECTION & TESTING OF MEASURING & RECORDING INSTRUMENTS

2.11.1 Successful tenderer shall arrange all facilities to conduct performance tests of the measuring instruments as per the required features of the instrument.

2.11.2 Tenderer shall give complete details of tests schedule for conducting tests to assess the capability of all measuring equipment. The test shall preferably be conducted in 25 kV. Traction or similar environment to establish compliance of the measuring capability of OHE parameters.

2.11.3 The tests related to design & other physical parameters shall be witnessed by the authorised representative of purchaser at supplier's premises.

2.11.4 The cost of inspection and testing charges shall be borne by successful tenderer. However, for lodging and boarding charges shall be borne by purchaser.

2.11.5 CALIBRATION OF MEASURING EQUIPMENT

The measuring equipment shall be calibrated by the supplier at the time of commissioning in presence of the Railway Engineers. The calibration of measuring devices shall also be carried out periodically during the Annual maintenance.

Lajpat Nagar-1, New Delhi

STR No.TI/STR/030 Rev.“0”

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

SCHEDULE OF TECHNICAL REQUIREMENT TO MANUFACTURE THE SELF PROPELLED 8 WHEELER INSPECTION & MAINTENANCE CAR OF DIESEL ELECTRIC UNDER SLUNG TYPE FOR OPERATION ON BROAD GAUGE (1676 MM)

August’ 2011

Issued by

Traction Installation Directorate
Research, Designs and Standards Organisation
Manak Nagar, Lucknow-226011

SCHEDULE OF TECHNICAL REQUIREMENT TO MANUFACTURE THE SELF PROPELLED 8 WHEELER INSPECTION & MAINTENANCE CAR OF DIESEL ELECTRIC UNDER SLUNG TYPE FOR OPERATION ON BROAD GAUGE (1676 MM)

1. SCOPE

1.1 The 8-Wheeler Inspection & Maintenance car is a self-propelled 4-axle vehicle and is used for periodical inspection, patrolling and maintenance of traction overhead equipment (OHE). It shall also be used for attending to sites of break down, restoration and damaged OHE etc. It is also required to erect small lengths of catenary and contact wire by way of repairs of damaged OHE. The 8-Wheeler Inspection & Maintenance car uses the power generated by the Diesel Alternator set provided in the car for propulsion and not the power from live OHE.

1.2 The Schedule of Technical Requirement (STR) mentioned hereunder is issued to serve as a guide to manufacturers (called the “firm” hereafter) of tower wagons and

should be read in conjunction with the Spec No. TI/SPC/OHE/8WDEIC/0090(02/09) and different latest national & International standards. The firm should satisfy themselves having complied with the requirements of the specification and STR.

The technical requirements are meant to serve as guidelines only and are not exhaustive. This is also meant for judging the capability of the firm to manufacture and supply the tower wagon. If the firm is not having any of the equipment or machinery; it may give reasons or alternate method to complete the job.

2. GENERAL REQUIREMENTS

2.1 The firm should have currently valid ISO-9000 certification issued by an approved agency with the activity desired clearly mentioned in the scope of certification.
The firm shall have a Quality Manual indicating the extent of control over production.

2.2 A system of regular submission of rejection details of material giving rejection rate, cause of rejection, corrective action taken etc. on quarterly basis should be followed by the firm.

2.3 The firm shall have a system of documentation in respect of rejection at customer end, warranty replacement and failure of item supplied by them during service.

2.4 The firm shall have a system of recording the plant, machinery and control equipments remaining out of service, nature of repairs done etc.

2.5 The testing and measuring equipment shall be duly calibrated and the validity of calibration should be current and verified by physically checking the calibration certificate issued by the Calibration Agency from whom it was calibrated.

2.6 The firm shall have a system of easy traceability of the product from manufacturing stage to finished product stage. Stamped identification marking with serial number of beam should be used for this purpose.

2.7 The firm should have a system of monitoring the supplied product complaints. The complaints made by the customer should be identifiable to the various manufacturing stages of the product and linking the complaint for the corrective and preventive action of the product.

3.0 QUALITY ASSURANCE PLAN (QAP)

The firm shall prepare a Quality Assurance Plan (QAP) for all items for which approval is sought and submit the same as part of compliance of this STR. The QAP shall be a comprehensive document covering the following aspects:

i) Details of Quality Control Organisation of the firm along with key personnel engaged in the QC function.
ii) Quality Assurance Process of incoming materials used for the subject items.

iii) Process Flow Chart indicating process of manufacture for an individual product or for a family of products if the process is same.
iv) Quality Assurance System – Inspection & Testing Plan including the stage inspection.
v) Calibration scheme and status of calibration of equipments used in the quality process.

Details of the above aspects are described in the following paragraphs. The QAP shall be approved by RDSO and shall form basis of approval process.

4.0 QUALITY CONTROL ORGANISATION

4.1 The complete organizational setup of the Quality control key personnel and officials along with their qualification and experience should be furnished.

4.2 The Quality Control organization should be headed by a senior level official having adequate technical qualification who shall directly report to plant in-charge.

5.0 INCOMING MATERIAL

5.1 A complete Bill of Material indicating all input material items required for manufacturing of the product, governing specification and their sources of supplies as approved by the firm in accordance with Clause 7.4.1 of ISO-9001 (2000) should be furnished.

5.2 Test results of incoming raw material with reference to Test Certificate issued by the supplier and the results of internal tests carried out by the firm for verification may be submitted as part of QAP.

6.0 PROCESS OF MANUFACTURE

6.1 Complete Process Flow Chart covering all steps of process of manufacture for an individual product (or for a family of products if the process is same) shall be clearly enlisted as a part of QAP.

6.2 The following details of machines used for all the steps of machining operations should be included :

- Make and model of the machine
- Accuracy
- Details of machining operations

6.3 Machining process should be such that all critical dimensions are final machined on CNC machining centers, preferably in a single setting.

6.4 Details of Jigs and fixtures to be used during manufacture should be furnished alongwith the manufacturing process wherever used.

6.5 List of typical M & P required for manufacture is furnished in **Annexure- I.** The list is for general guidance only and actual manufacturing operations shall be submitted and got approved by the firm as a part of QAP.

7.0 QUALITY ASSURANCE PROCESS- INSPECTION AND TESTING PLAN

7.1 Complete Inspection and testing Chart covering all steps of process of manufacture for an individual product including final inspection should be clearly enlisted as a part of QAP.

7.2 The following details of measuring instruments/equipments/jigs/fixtures used for all the steps of measurement operations should be included:

- Make and model of the measuring equipment
- Accuracy
- Quantity to be measured and acceptable value range.

7.3 Stage inspection detailing inspection procedure, inspection parameters, and method of testing/test procedure should be available and furnished.

7.4 The list of Testing and Measuring instruments are furnished in **Annexure-II & III** respectively for general guidance only. However the specific Testing & measuring instruments, gauges used by the firm will also form part of QAP which shall be submitted and got approved by the firm.

ANNEXURE-I

MACHINERY & PLANT (M& P)FOR MANUFACTURING for 8WTW (DETC)

S.N.	Description of Machine	Capacity	Quantity
1.	CNC Profile cutting machine/Plasma Cutting Machine/Laser Cutting Machine		01
2.	Edge preparation milling machine		01
3.	Shearing machines		01
4.	Hydraulic press	50 tonne	01
5.	Milling Machine		01
6.	Press brakes	100t-450t	01
7.	Welding Sets	300-450A	05
8.	Metal Inert Gas (MIG) welding equipments sets	400-600A	04
9.	Brake testing rig		01
10.	Induction heating/oil bath heating equipment		01
11.	Drilling and boring machines		01
12.	Engraving Machine		01
13.	Laser Cutting or plasma cutting Machine		01
14.	EOT Cranes/Movable Cranes	15 tonnes	02
15.	EOT Cranes or Synchronised lifting/shifting screw jacks	30 tonnes 15tonnes	02 05
16.	Compressor with free air discharge	Suitable capacity	02
17.	Forklifts of capacity and Diesel or Battery driven tow truck	2-3t 1-3t	
18.	Facilities for carrying out radiographic tests of welds or Out sourcing with a reputed agency for carrying out radiographic testing.		01
19.	Facilities for carrying out submerged arc welding		01
20.	Paint Booth/Painting facility or before offering prototype		01
21.	Level Track (To be set up within 6	1676 mm gauge	02

	months after awarding of contract) or before offering prototype	100 meters length (min)	
22.	Pit facility under track or before offering prototype	25 meters	01
23.	Dust proof room for Cable Harnessing		01
24.	Angle Grinder for surface cleaning etc.		02

ANNEXURE-II

TESTING FACILITIES:

- Calibration of testing equipments should be done at least once in a year unless stated otherwise.
- Following testing facilities should be available with the firm; alternatively can be outsourced from NABL accredited Laboratories.

	Description of testing Facility	Capacity	Quantity
1.	Meggars	500V	02
2.	Meggars	1000V	02
3.	Testing facilities for Aux. Machines before mounting		01
4.	Testing facilities for light running of traction motors with suspension unit		01
5.	Testing and charging facilities for batteries before mounting		01
6.	Fan & Electrical Fittings Test facility		01
7.	Facilities for checking MMD of the unit		01
8.	Harness Tester		01
9.	Digital Coating Thickness Meter		01
10	Impact Testing Machine		01
11	Tensile Testing Machine		01
12	Torque Meter		01
13	Weighing Facility	100 tonnes	01
14	Magnetic Particle Inspection (MPI) facilities for checking sub-surface flaws.		01

PHYSICAL LABORATORY:

1. Universal Testing Machine of 40 tonne capacity with graphical recording facilities for conducting tensile tests.
2. Direct reading Hardness Tester of capacity 95-500 BHN.
3. Impact Testing Machine (Charpy V-Notch) of 0-300 Joules capacity for conducting impact test with facilities for notch cutting & undertaking this test at sub-zero temperatures as per the specified standard.
4. Shadowgraph facilities for assuring correct notch profile and dimension for impact test specimen.

ANNEXURE-III

Jigs, Fixtures & gauges as required should be available or be procured within 6 months of awarding of contract. Some of these as required are as below:

Jigs, Fixtures and Gauges

S.N.	Description of Fixture/Gauge	Quantity
1.	Jigs for marking and drilling operations	Adequate
2.	Fixtures to ensure fitting accuracy of under frame	Adequate
3.	Fixture for Body side wall assembly	Adequate
4.	Fixture for Body shell assembly	Adequate
5.	Fixture for roof assembly	Adequate
6.	Fixture for endwall	Adequate
7.	Fixture for bogie fabrication	Adequate
8.	Fixtures for sub-assembly of components	Adequate
9.	Fixture for cambering under frame& subsequent welding with sidewall.	Adequate