

# TECHNICAL SPECIFICATIONS

## PROCUREMENT OF ELECTRIC BUSES (02 Nos.) for MSTPP - NTPC LTD. (Located about 40KMs from NAGPUR City)

### PART-A

#### 1.0 Scope of Supply & Services:

Mouda Super Thermal Power Project –(MSTPP NTPC Ltd) , intends to purchase 02 Nos. fully built Air-conditioned; fully battery operated Passenger Transport buses (hereafter referred to as “Electric Bus/Bus”) including their chargers; as per Urban Bus Specifications-II, issued in April’2013 (including subsequent revisions, if any) by Ministry of Urban Development, Government of India through an outright purchase.

The broad specification of electric buses to be procured are as follows:

| S.No. | Broad Specification of electric bus as per UBS-II   | No. of e-Buses |
|-------|---|----------------|
| 1.    | Midi segment, 900 mm Floor Height, AC Bus, including DC Fast chargers as per the specification given at s. no: 22 | 02 nos.        |

The scope of the proposal includes Design, Supply, Manufacturing, testing (at manufacturer’s works and trial run at NTPC Mouda) and its approval from NTPC, conducting all routine and acceptance tests, obtaining requisite regulatory approval from statutory authorities, providing necessary training to the drivers, undertaking traction battery replacement after expiry of the warranty of traction battery and providing maintenance services for a period of five (05) years from the date of operationalization of electric buses being supplied under the subject contract. The scope also includes providing technical inputs related to the Traction Battery and the Traction Battery Management System (BMS) data required for design of electric vehicle chargers and providing support in works related to BMS interfaces etc. during commissioning of electric vehicle chargers or charging of electric buses.

The scope of the contractor shall be deemed to include all such items which although are not specifically mentioned in the bid documents and/or in contractor’s proposal but are needed to make the system complete in all respects for its safe, reliable, efficient and

trouble free operation and the same shall be furnished and supplied without any additional cost implications to the Owner unless otherwise specifically excluded as per **Clause 5.0 Exclusions** of this chapter.

It is not the intent to specify herein all aspects of design and construction nevertheless, the equipment shall be conforming all aspects to high standard of engineering, design and workmanship and shall be capable of performing in continuous operation in a manner acceptable to NTPC, who will interpret the meaning of the specification and drawings and shall have a right to reject or accept any work or material which in their assessment is not complete to meet the requirements of this specification and/or applicable Indian / International standards mentioned elsewhere in this specification. Failure of any equipment to meet the specified requirements of tests carried out at works shall be sufficient cause for rejection of the equipment. Rejection of any equipment will not be held as a valid reason for delay in completion of the works as per schedule. Contractor shall be responsible for removing all deficiencies and supplying the equipment that meet the requirement.

## **2.0 DIFFERENTIAL BID EVALUATION FACTOR**

The Differential Bid Evaluation Factor, based on the electric energy consumption per kilometer of run under standard test condition shall be calculated as per the following methodology:

The bidder shall provide the electric energy consumption per kilometer run, as per the AIS-039, (referred hereafter as Specific Energy Consumption), in relevant schedule of Forms & Procedures (Attachment 10). The best of the parameter for Specific Energy Consumption quoted by any of the bidder in shall be taken as Base Specific Energy Consumption for the Package and the difference between this “Base” and those quoted by other bidders multiplied by Bid Evaluation Factor (BEF) and the Number of buses in the Package shall be used to arrive at Differential Price Evaluation to be applied for the bid.

**Since these figures are for comparative analysis only, figures of Specific Energy Consumption for AC buses shall be taken as 20% higher than the figures certified by ARAI as per AIS-039.**

### **2.1 The Bid Evaluation Factor for each excess 0.1 kWh/Km or fractional part thereof, of the Specific Energy Consumption shall be Rs.3,60,000/- per Bus.**

Typical Sample Calculation for Bid Evaluation for Three (3) Bidders is shown below:

| S.No. | Bidder | Quoted Price | Bus Electric Energy | Differential Price Evaluation | Evaluated Price |
|-------|--------|--------------|---------------------|-------------------------------|-----------------|
|-------|--------|--------------|---------------------|-------------------------------|-----------------|

|    |          |    | Consumption (*)<br>(KWh/Km.) | (Number of bus=say 1)<br>(*)                                |                              |
|----|----------|----|------------------------------|---|------------------------------|
| 1. | Bidder-1 | Q1 | 0.75 KWh/Km.                 | Rs.3,60,000/- X<br>(0.1/0.1) X 1 =<br><b>Rs.3,60,000/-</b>  | Q1 +<br><b>Rs.3,60,000/-</b> |
| 2. | Bidder-2 | Q2 | 0.65 KWh/Km.<br>(Base)       | Zero  | Q2                           |
| 3. | Bidder-3 | Q3 | 0.80 KWh/Km                  | Rs.3,60,000/- X<br>(0.15/0.1) X 1 =<br><b>Rs.5,40,000/-</b> | Q3+<br><b>Rs.5,40,000/-</b>  |

(\*) The above indicated figures are for illustration only.

- 2.2 The Specific Energy Consumption, as measured during the testing and certification of the offered product at ARAI or any other designated test centers, shall be used for assessment of specific energy consumption and acceptance of the offered product. The bidder to compulsory submit the same at the time of bidding.

**In case the Specific Energy Consumption of the Bus intended to be supplied under the contract, as tested and certified by ARAI or any other designated test centers, is more than that quoted by the Bidder in the Bid, the Owner at his discretion may reject the equipment or accept the equipment after assessment and levy of liquidated damages for shortfall in performance.**

In case the Specific energy consumption, as tested and certified by ARAI or any other designated test centers, is lower than that indicated in the Bid, no compensation shall be payable to be bidder.

- 2.3 The liquidated damages for shortfall in performance, for each excess 0.1 kWh/Km of the Specific Energy Consumption, shall be 1.5 times the Bid Evaluation Factor i.e. Rs.5,40,000/- per Bus.**

### 3 Warranty

The fully built bus along with all the assemblies, sub-assemblies, fitments, components, accessories etc. installed in the bus at the time of delivery shall be under comprehensive warranty for a period of one year from the date of final acceptance (**Refer Chapter 2 Part B**) of the bus.

The electric drive motor, traction battery & power transmission (powertrain components) shall be covered under warranty for upto 4,00,000 kms or 5 years whichever is earlier from the date of final acceptance of the bus (**Refer Chapter 2 Part B**).The replacement of defective cells in the traction battery packs(if required) shall be undertaken only with the consent and under the supervision of the traction battery manufacturer. All defective cells shall be sole property of OEM/bidder and can be taken back without any financial consideration.

#### **4 Training**

The bidder shall provide training (free of cost) to the personnel of NTPC's Bus Operator @ **4 mandays for each electric bus at NTPC Mouda**, familiarizing them regarding the basic operations, fault diagnostics, configuration, downloading/transfer of data, settings etc. of the electric buses and other associated equipment(s)/accessories. Detailed topics for training shall be mutually decided by the contractor and the NTPC. Expenses towards travel, lodging, and boarding and other expenses for the instructors/trainers shall be borne by the contractor.

#### **5 Exclusions**

5.1 Operation of Buses

5.2 For exclusion under Maintenance activities, please refer to Chapter 3.0 Part-B.

#### **6 Performance bank guarantee and Security deposit;**

Performance bank gurantee (supply part) of 25% to be provided and be released after the period of five years from day of commercial operation. Remaining terms and conditions as per GCC.

Security deposit (for AMC part) @10 percent to be deducted in every RA bill of month maintenance bill and provision for repayment of Security deposit to vendor after every one year. Remaining terms and conditions as per GCC.

## **PART-B**

### **CHAPTER 1.0: BUS SPECIFICATION**

#### **SUB SECTION – 1**

##### **Codes & Standards**

- 1.1 All works shall be carried out as per the standards/codes referred in the specification. All standards, specifications and codes of practice referred to shall be the latest editions including all applicable amendments and revisions as on date of opening of techno-commercial bid. Wherever Indian standards are not available, internationally acceptable standards may be referred. In such case the Bidder shall clearly indicate the standards adopted, furnish a copy in the English of the latest revisions in force as on date of opening of techno-commercial bid and shall clearly bring out salient features for comparison.
- 1.2 The bidder shall comply with all applicable Central, State and local laws (including Acts, & Regulations) like Central Motor Vehicles Rules-1989 (CMVR) along with AIS-049, 'Code of Practice for Bus Body Design and Approval' (AIS 052)- Bus Code as applicable to buses in India and other state/city norms as applicable on the date of as on date of opening of techno-commercial bid. In the event of any conflict between the requirements emanating from these specifications and those as per any statutory/legal requirement, etc. in force, the statutory/legal requirement shall prevail.

##### **2.0 General Design Features**

- 2.1 The Urban Bus Specifications-II issued by Ministry of Urban Development, Government of India issued in April'2013 forms the basic specification which shall be utilized for this tender. All parameters, unless specifically modified under the Clause 24.0 of this Chapter, shall be as UBS-II requirements. The specification indicated in the bidding documents provides the basic minimum requirements to be met by the bidder. Bidder may offer better or higher specifications than those indicated however no cost compensation for these specifications/features will be provided by Owner.
- 2.2 The bus complying to all Acts/rules/regulations shall be designed for transportation of passengers as per good engineering practices and to meet the following requirements:
  - a. Passenger comfort
  - b. Passenger safety
  - c. Durability for design life
  - d. Reliability of the product providing high standards of availability for safe and reliable operation
  - e. Ease of repair and maintenance
  - f. Aesthetically designed interiors and exteriors

- g. Ease of boarding and alighting for all passengers
  - h. Ergonomically designed driver's work area
- 2.3 All the buses shall be new Electric Buses which were not put into commercial use earlier (New buses means the buses newly built on the brand new chassis procured for this specific contract).
- 2.4 The material used in the construction of buses shall be as per latest Bureau of Indian Standards (BIS) / Automotive Industry Standards (AIS) / specifications and/or other international specifications meeting/surpassing the performance & other requirements as given in the Bus Body Code(AIS-052).
- 2.5 The Bus design and the manufactured buses under this contract shall meet all the statutory requirements and type approval certificate of compliance from the approved test agency for the complete bus as per the specifications/regulations will be submitted to the Owner by the manufacturer.
- 2.6 The bus body design shall be a proven design duly evaluated by the agencies authorized as per CMVR / Central Institute of Road Transport, Pune (CIRT). Body should be as per specifications given in tender, Ministry of Urban Development, Government of India guidelines and Bus Body code (AIS-052). The bus shall be so designed to maintain operational stability requirement as per Bus Code. The bus shall be driven by heavy duty axle at the rear with adequate capacity to take care of maximum GVW & crush loading expected during life span of the bus.
- 2.7 The complete bus along with Motor, Battery, Transmission System along with Air-conditioning system should be able to operate efficiently at ambient temperatures of - 5 degree to 50 degree, humidity level from 5% to 100%.
- 2.8 The bus shall be suitable to provide reliable daily operation for 16-18 hours in the climatic conditions, infrastructure and road conditions as available in the Indian cities and with average daily run in the range of 150-200 Kms.  
The electric buses shall be charged in the night time as well as suitable timeslots shall be provided for opportunity charging during the day.
- 2.9 Besides meeting the statutory requirements, the bus shall be designed with respect to its body and different aggregates/systems/subsystems (excluding batteries) to operate satisfactorily in urban transport service for at least 12 years or 10,00,000 kms whichever is earlier.
- 2.10 Electric bus shall have adequate horse power to obtain desired performance with respect to its adequacy of power, acceleration levels etc. as per UBS-II with fully loaded bus (including standing and seating passengers) and Air-conditioning system in service and sufficient to pull these loads over a minimum gradient of 17%. Bidder shall submit calculations in support of the adopted KW ratings of the drives.

### **3.0 Power Train (Transmission System)**

The full forward control urban pure Electric bus shall have right hand drive. The drive shall have Regenerative Braking feature.

#### **4.0 Suspension**

Front and Rear: Air suspension

The suspension system shall be designed so as to provide comfortable ride to the passengers considering the Gross Vehicle weight.

#### **5.0 Braking System:**

A reliable Pneumatic Braking System with suitable redundancies shall be provided. Suitable coordination of Regenerative braking with Pneumatic Braking shall be provided so as to provide smooth braking. Only non-asbestos type friction material shall be used. The Bus shall be fitted with Anti-Lock Braking System conforming to CMVR requirements.

Parking Brakes shall be provided.

**6.0** Bus Electric Energy Consumption shall be less than 1.75 KWh/KM.

#### **7.0 Traction Battery and Battery Capacity**

The electric bus shall be provided with "Advance Battery". **An Advance Battery means Battery made up of Li-ion cells (can be of any chemistry like NMC, LFP etc.) which can be charged, discharged into a load, and recharged many times.** The capacity of the Battery provided shall be sufficient so that a fully loaded Bus is able to cover minimum 120 kms with single full charge of battery over its complete lifetime, with the designed depth of discharge of battery, meeting all requirements of various auxiliaries required for providing safe and comfortable ride to the passengers in city traffic conditions. The Battery shall have sufficient margins in capacity so as to take care of degradation in performance over its guaranteed lifetime and also to take care of city traffic including traffic congestions etc. Suitable protections and interlocks shall be provided in the Battery Management System and/or Vehicle Control Unit so that batteries get charged and discharged within the designed operational limits of the Battery.

The battery shall be suitable for charging at 1.0 C or higher rates (between 20 % to 70% State of Charge) without affecting its guaranteed life.

The battery shall have a warranty as described in the relevant clause of the specification. The manufacturer shall undertake type testing of Traction Batteries fitted on the bus as AIS-048 standard or an equivalent international standard and submit copy of Approved certificate to NTPC. The battery pack(s) shall be suitably placed so as to protect it from ingress of rain water or from the water logged roads. Suitable ventilation/air-conditioning system may be provided so as to maintain designed temperature of these battery pack(s) during charging and discharging of the battery packs.

The Battery shall be suitable to be charged by conductive Off-Board DC Chargers, working on CCS Combo-2 protocol. The charging characteristics/requirements of the battery shall be provided by the Battery/Bus manufacturer.

The Traction Battery voltages and currents shall be continuously monitored, measured and recorded in the Vehicle Health Monitoring and Diagnostic System(VHMDS). These data should be stored and shall be retrievable through suitable software and/or hardware devices for future reference.

#### **8.0 Traction Battery Management System**

The electric bus shall be provided with Battery Management System so as to ensure safe and efficient charging and discharging of the batteries. It shall be capable of communicating with the Off-Board DC Chargers which are to be supplied in this package. The details of the chargers are provided in the **Clause 22.0**. In addition to management of battery, it shall be possible to get the data regarding charging and discharging of the battery along with the other bus operation parameters through an external interface/device. All such interfaces devices and softwares (licensed versions) for acquisition/retrieval of data from BMS to Owner's external MIS system operating on Windows platform shall be supplied and their prices are deemed to be included in the bid price.

#### **9.0 Interiors**

Should be easily washable with proper drainage and adequately sealed to prevent ingress of dust, gases, water.

#### **10.0 Seating Layout**

The seating layout shall be 2 X 2 as per Bus Code.

#### **11.0 Paints**

All the structural members of the bus shall be treated for corrosion prevention internally as well as externally and painted wherever required. Polyurethane (PU) paint conforming to BIS: 13213-1991 or latest/ international standards as applicable shall be used for exteriors painting of the bus including interiors wherever required. Colour shade shall match the shades as per BIS: 5-1978 or latest. Details of paints used, surface treatment & preparation, corrosion prevention treatment, base primer coatings, number of paint coats to be applied etc. shall be submitted for NTPC's approval.

#### **12.0 Color Scheme**

Exterior, interior colour schemes including floor colour, seat colors, seat upholstery and logo/graphics shall be painted as directed by the NTPC. This will be finalized at the time of body building. The successful bidder will be required to provide the colour schemes for approval by NTPC.

#### **13.0 Windows**

- a) The window shall be in two-piece design with flat and fixed top and bottom window glasses for air-conditioned buses. The intermediate supporting frame member shall be of adequate size to bear the load of top fixed glass without bending during the life span of the bus. The top & bottom window glasses shall be aesthetically installed.



Alternative arrangements proposed by OEM can also be discussed during engineering stage.

- b) Windows shall have provision of suitable sealing to avoid ingress of dust and water and shall have proper/ efficient drainage system.
- c) Windows shall have appropriate beading to minimize vibration. Window frame should be of aluminum with powder coating and sealing with EPDM.
- d) Visual light transmittance should be 50% Minimum (CMVR 11(2)).
- e) The size and shape of the glasses shall enable even the standees to have maximum outside view without kneeling.
- f) The general requirements of windows beyond those mentioned above shall be as per the provisions of Bus Code/UBS-II specifications.

#### **14.0 Air Conditioning System**

- a) Air Conditioning unit shall be supplied as part of the fully built bus. Ventilation and air conditioning system is to be roof mounted.
- b) AC unit must maintain a temperature inside the bus which shall be in the range of 20 degrees Celsius as a minimum and 28 degrees Celsius as the maximum temperature permitted under continuous operation of vehicle for 16 hrs in a day with doors closed and loaded etc.
- c) Ducting for air conditioning shall be so placed such that there is even cooling along the entire length and width of the bus interior.
- d) The noise levels of AC system shall be as required under the Central Motor Vehicle Rules (CMVR)/AIS/any other Indian standards.
- e) Cooling system: To be provided as per the CMVR norms & ARAI/ CIRT.
- f) Performance Testing of the AC System shall be carried out as the UBS Specification Annexure-4.
- g) In case of AC failure, proper air ventilation will be provided through roof hatch and cabin fans provided in the bus. These cabin fans shall be provided on all sides of each pillar (except passenger door pillar) on both sides of the bus and one fan in driver's cabin.

#### **15.0 First Aid Kit**

First aid kit complete with items, medicines, bandages etc. shall be provided as per the provisions of CMVR fitted near driver seat at appropriate position and level on side with proper reinforcement.

#### **16.0 Fire Detection and Protection System**

Suitable fire detection system must be installed to detect fires in the traction battery compartment.

Suitable fire protection devices (fire extinguishers), emergency doors/exits will be provided as per statutory requirements along with flammability requirements as per IS 15061.

#### **17.0 Instrument Panel for Driver**

The instrument panel for driver shall be designed as so as to meet the operational requirements of control/monitoring of the vehicle by the driver as well as provide suitable alarms/indications in audio/visual form so as to intimate the driver of the unsafe operating condition. These indications shall be self-lighted type symbols with sufficient illumination so be visible in daylight also. The Vehicle Health Monitoring and Diagnostic System shall be capable of recording all such alarms along with time stamping for retrieval at a later time.

Some of the such controls, alarms/indications in the Instrument panel are listed hereunder:

- (a) State of Charge of Battery/ Indication of Estimated Balance Range with current charge of Battery
- (b) Current Speed
- (c) Speed Limiter In-operation
- (d) Malfunction in Speed-Limiter
- (e) Failure/faults in Braking System
- (f) Fire Alarm in Passenger/Battery compartments
- (g) Illumination Control
- (h) Side Indicators/Head Light control
- (i) Electrical faults in traction system
- (j) Service Door Controls

The above list is only indicative in nature and Owner and Bus manufacturer may decide to add other indications, controls etc. based on mutual discussions.

### **18.0 General requirements**

The buses will be provided with fitments indicated in the Bus Code. In addition, other following general requirements shall also be met:

- (a) Provisions for replaceable PVC panels for advertisements. These suitably sized panels shall be provided above the window frame along the length of the Bus on both sides.
- (b) The exterior surface of the Bus shall have suitable provisions for providing advertisement space on both sides and rear side of the Bus.

Retro-reflective tapes complying to AIS-90 specification shall be pasted on the vehicle for conspicuity.

- (c) Proper pictorial signages will be provided for information to passengers regarding emergency exits, seats reserved for persons with disabilities, ladies or senior citizens etc. These pictorial signages shall be self-explanatory meeting the statutory requirements or as finalized between Owner and Bus manufacturer.
- (d) All footsteps and exits (both service and emergency) shall be provided with anti-skid yellow nosing.
- (e) Stanchions, Handrails and Handholds suitably designed for passenger safety during entry, exit and travelling shall be provided in sufficient numbers. The painting/color

scheme for all such devices shall be subject to Owner's approval. Similarly adjustable sun visor for driver shall be provided.

- (f) All the electrical accessories like cables, converters, batteries etc. shall be provided with equipment's rated suitably to meet the requirements of adopted voltage and current ratings. The manufacturer shall provide details of the such equipment's and the adopted standards for Owner's reference.
- (g) Suitable number of Isolation/Disconnection and protection devices (like circuit breakers/isolators etc.) shall be provided so as to isolate/disconnect the batteries and the associated system safely for carrying out maintenance or in case of electrical faults and emergencies. These devices shall be suitably located to provide easy access/control to driver.
- (h) Electric buzzer in driver's cabin to be provided. This shall be operated through switches provided on service doors.

#### **19.0 Miscellaneous**

Any other provisions/fitments even though not explicitly mentioned but required for safe and efficient operation and/or for fulfilling statutory requirements must be provided in the offered bus

#### **20.0 Tool Kit**

- a) The manufacturer shall provide a suitable tool kit and other mandatory items as per CMVR (4)/other applicable rules, comprising common tools and other essential items required. The complete list of tools in the tool kit to be supplied with every bus shall be supplied by the manufacturer. One Hydraulic Jack per bus of a capacity of at least 10 Ton as per design of the bus shall also be supplied.
- b) One Diagnostic Tool i.e. Handy Scanner or Software with Interface, if any for maintenance of Electric Bus shall be supplied. All tools, tackles, interface devices along with diagnostic softwares (if required) for troubleshooting, maintenance, interfacing with the bus and transfer of data from bus are deemed to be included in one such set, to be supplied.

#### **21.0 Additional Intelligent Features:**

- i. Passenger information system (PIS)
- ii. IP enabled Security camera network system (SCN) comprising of 4 Nos. cameras per bus (3 Nos. for passenger area + 1 No. Rear Camera which will be operational during reversing of the vehicle)
- iii. Vehicle health monitoring and diagnostics (VHMD)
- iv. Automatic vehicle location system (AVL)

Further, the bidder shall also provide training to NTPC's Operator or other manpower authorized by NTPC for operation/configuration of various ITS components, including but not limited to configuration of destination boards and inside PIS display, uploading route/bus stop details, uploading audio files, download of data from video recorder etc.

## 22. Electric Vehicle Battery Chargers

The Electric Vehicle Battery Chargers suitable for charging the batteries are in the scope of the bidder. The bidder shall submit the technical details of the battery along with the charging requirements as per the enclosed Bid Data Sheet.

The bidder shall provide necessary support for commissioning for electric vehicle chargers including sharing of the technical parameters/requirements of batteries for design/operation of the chargers is included in bidder's scope.

The broad technical details of the electric vehicle chargers which shall be installed are indicated hereunder for bidder's reference:

DC Fast Charger (Nominal Rating -120 KW or above)

Type of Charger: Off-Board DC Charger

Charging protocol: CCS Combo-2

### 22.0 Additional Information

List of Wall charts, Parts Catalogue, Drawings, Seat Layout, etc.

| S. No | Details of Literature/Drawings   | Quantity per Bus |
|-------|--|------------------|
| 1.    | Service Manual(s)  | 1                |
| 2.    | Part Catalogue   | 1                |
| 3.    | Coloured wall charts of main aggregates  | 1 set            |
| 4.    | Lubricating chart along with specifications of oils/greases  | 1 set            |
| 5.    | Drawing of bus electrical wiring   | 1 set            |
| 6.    | Drawing of bus body showing exploded view of all body parts such as body panels, windows, seats, show grill, engine bonnet etc as well as body structure of all sides including under frame & roof                             | 1 set            |
| 7.    | Drawing of chassis frame of Electric Bus showing the locations of major assemblies including electric power-train, battery power pack, ground clearance, wheel base, height and length of chassis, front and rear track width, | 1 set            |

### 23.0 Following Clauses of the Urban Bus Specifications –II have been modified and shall be applicable for this contract:

| Clause No | Item | Modification |
|-----------|------|--------------|
|-----------|------|--------------|

| <b>Clause No</b> | <b>Item</b>   | <b>Modification</b>  |
|------------------|---|--|
| 1                | Propulsion system   | Electrical, Battery operated   |
| 3.2              | Emission norms  | Not applicable   |
| 4                | Operational safety  | <p>(a) Power train to be fitted with a mechanism which makes it possible to engage reverse gear only when vehicle is stationary</p> <p>(b) Suitable interlocks to be provided so that Bus is not able to start when any of the passenger service doors are OPEN. Similarly operation of Service Doors shall not be possible when the Bus is in motion.</p> |
| 5                | Clutch  | Not Applicable   |
| 7.3              | Kneeling  | Not Applicable   |
| 12               | Fuel tank   | Not Applicable<br>Battery Capacity as indicated in Clause 7.0 Chapter 1.0 Part-B   |
| 15.2             | Bus Structure – Materials specifications etc.   | As per manufacturer with compliance to Bus Code  |
| 15.3             | Insulation for Roof structure and Engine Compartment  | As per manufacturer  |
| 15.7.1g & k      | Seat material & Seat back pad material  | Polypropylene Low density(PP-LD)/LDPE moulded seat with moulded Polyurethane cushion for seat and back rest. The seats shall be provided with waterproof expanded vinyl coated fabric to match the seat and the interior décor.  |
| 18.14            | Front/rear door, step well lights, door open sign and Illumination in passenger compartment | LED fixtures   |

## CHAPTER 1.0: BUS SPECIFICATION

### SUB SECTION – 2 (PARAMETERS APPLICABLE FOR INDIVIDUAL PACKAGES)

**1.0** Following parameters/specifications are applicable for the specific type of Electric-bus package only :

| <b>Package</b>   | <b>Package-A</b>  |
|--|---|
| Type of Bus  | Midi Bus  |
| Reference Specification  | UBS-II<br>(Chapter 3)   |
| No. of Buses   | 02  |
| Length of Bus  | 9 m ( $\leq 9400$ mm & $\geq 7000$ mm.)   |
| Floor Height at Service doors  | 400 mm with tolerance of $\pm 20$ mm(Preferebly)  |
| Minimum Seating Capacity   | 32 + 1 (Driver)   |
| No. of Electro-pneumatically controlled Service Doors and their location | (a) Right Hand Side -Driver (01 No.)<br>(b) Left Hand Side – 02 Nos.<br>(One on front side and one between front and rear axle) |

## **PART-B**

### **CHAPTER 2.0: INSPECTION, TESTING, FIELD TRIAL & ACCEPTANCE**

1. NTPC reserves the right to inspect and/or check the production methods, quality control measures and testing of all materials/ parts manufactured or used by the bus manufacturer.
2. Contractor shall offer time-to-time Inspection Calls to NTPC as per the duly approved Quality Plan. The bidder has to submit the Quality Plan after the award of Contract and get it approved by NTPC.
3. The buses are to be delivered to NTPC only after final inspection and clearance from NTPC. The cost of entire inspection of all buses are deemed included in the bid price quoted by the bidder.
4. The buses will also be checked after delivery to the NTPC Mouda site and defects pointed out by NTPC on each bus; are to be attended by the Contractor within maximum 3 working days.
5. **Final Acceptance and Commissioning at site:** The date of final acceptance of the buses, shall be reckoned only after successful completion of trial run (in actual service) of buses for 05 days. During this trial run period, the bus operation shall be tested. The operational and testing methodology for trial runs shall be decided between the bus manufacturer and NTPC. These trials shall be undertaken under the supervision of the bus manufacturer.
6. During all the above stages of inspection, trial runs and acceptance tests, Contractor should make alterations/modifications if any suggested by NTPC on Free of Charge (FOC) basis. The decision of NTPC shall be final, in this regard.

## **PART-B {BOQ item: 20}**

### **CHAPTER 3.0: FIVE YEARS MAINTENANCE SERVICES**

- 1.0 SCOPE:** The contractor shall provide their offer for providing the on-site maintenance service (all types of maintenance i.e. scheduled, preventive, breakdown, troubleshooting etc.) for the buses supplied under the contract. All parts, assemblies, sub-assemblies, fitments, accessories etc; which have been supplied at the time of supply of bus to NTPC shall be deemed included in the scope of maintenance services for a period of 05 years from the commercial operation of electric bus. All the costs associated with providing on-site maintenance activities like manpower cost, spare parts cost and repair of battery packs, transportation costs (including towing charges of the defective vehicles to workshop) etc. are deemed to be included in the cost quoted by the contractor in the bidding document.

**The cost of consumables like tyres, auxiliary battery, accidental repairs and light fittings mounted on external body surface (like head light, tail light, brake lights etc.) are excluded from the scope of the AMC.**

**2.0** The contractor shall ensure that all the required maintenance activities are carried out timely and as per practices approved by the Bus manufacturer to ensure safe and reliable operation of the bus. The contractor shall ensure adequate availability of spare parts as well as after Sales Service during the entire contract period either by setting up a workshop or through suitable tie-ups with the authorized service providers.

**3.0** All records of maintenance must be maintained by the contractor, which can be accessed by NTPC on demand. These records are to be handed over to NTPC after the O&M period of contract.

**4.0** The average distance travelled by the bus fleet is expected to be 120 to 150 km/bus/day with a variation of +/- 10%. The average yearly running of the bus is expected to be approximately 45000 kms. The charges for maintenance services in Rs./km/bus; may be indicated by the contractors in the relevant bid price schedule. In case if average monthly Kms covered are less than assured 125KMs; difference kms shall be payable at 80% of actual rate. However, in case of excess kms coverage than assured; no additional payment shall be admissible.

**5.0** Availability during the AMC period:

(a) **E-Bus:** The availability of the bus fleet during the AMC period shall be maintained as follows:

- (i) During 1<sup>st</sup> to 3<sup>th</sup> Year of Operation: At least 98% on monthly basis.
- (ii) From 4<sup>th</sup> Year to 05<sup>th</sup> Year of Operation: At least 96 % on monthly basis.

For calculations of availability, the operation hours shall be considered from 06:00 am to 11:00 pm on the days of deployment. Thus any non-availability outside the above period shall not result in non-availability of the bus(es). Similarly accidental repairs and outages not attributed to the bidder shall not be considered for calculation of availability of the bus(es).

In case of availability of buses falling below 98%, NTPC reserves the right to levy liquidated damages for shortfall in performance of equipment/services at the rate of Rs. 1,50,000/- for every 1% drop in availability of buses maintained by the contractor.



**PART-C**  
**CHAPTER 1.0: BID DATA SHEET**

**1.0** The Contractor shall provide the general schematic drawings, bus layout, front/rear and both side views of the offered designs of the buses along with the techno-commercial bid.

**In addition to the above details, following information shall also be provided regarding the offered bus**

| S.No | Information   | Details              |
|------|---|----------------------|
| 1.   | Name of manufacturer  |                      |
| 2.   | Percentage indigenization achieved<br>(as per DHI norms)  |                      |
| 3.   | Vehicle homologation done   |                      |
| 4.   | Battery Details Pack Rating (in KWh)  |                      |
| i.   | Type of Advanced battery used<br>(Battery Chemistry)  |                      |
| ii.  | Maximum allowed charging rate<br>( 1 C, 2C or higher)<br>Please enclose the charging<br>characteristic graph of the battery |                      |
| iii. | Battery Charging Voltage Range  |                      |
| iv.  | Guaranteed Battery life   |                      |
|      | a) In years   |                      |
|      | b) In Kms   |                      |
|      | c) In cycles  |                      |
| v.   | Battery mounting position on Vehicle<br>(top / bottom/side)   |                      |
| 5.   | Charging communication protocol used  | <b>(CCS-Combo-2)</b> |
| 6.   | Tested / certified Efficiency of Vehicle<br>in KWh/Km   |                      |
| 7.   | Gross Body Weight (with all the batteries mounted)  |                      |
| 8.   | Motor KW rating in power train  |                      |
| 9.   | Acceleration time ( 0 to 30 kmph) in seconds Calculations and<br>test report in support of data to be submitted             |                      |

**2.0** The contractor shall be required to provide at the time of detailed engineering

- a) Specified salient features
- b) Scaled drawings indicating all dimensions of front, top view, both sides internal layout and rear elevations etc. of the bus
- c) Complete factory acceptance test reports.
- d) Copy of tests carried out on the offered bus from ARAI or other institute for meeting the homologation requirements.
- e) Routine Checks and Maintenance schedules along with list of activities.

## **Attachment 10 :**

To  
NTPC Limited,

Dear Sir,

We declare that the ratings, capacities and performance figures of the equipment/system furnished by us under this package are to be demonstrated by us. We further declare that in the event of any deficiencies in meeting the following parameters in respect of the characteristics mentioned below as established after conducting the guarantee test, you may at your discretion reject the equipment/system and recover payment already made or accept it after assessing the deficiency and effecting recovery from the contract price as specified in of bidding document.

| <b>S.No</b> | <b>Electric Bus Model</b>                                  | <b>Specific Energy Consumption of the bus (As per AIS-039 and as explained in Technical Specification)-kwh/km in figures</b> | <b>Specific Energy Consumption of the bus (As per AIS-039 and as explained in Technical Specification)-kwh/km in words</b> |
|-------------|--|--|--|
| 1.          | Midi segment, 900 mm Floor Height, AC Bus, BRT Application |  |  |

Date :

Place :