



**RFP for Procurement, Operation and Maintenance of Staff and  
School Buses for Shyamji Krishna Verma Township, Kutch,  
Gujarat serving GMDC Lignite mines at 1) Mata No Madh 2)  
Panandhro and 3) Umarsar**

**Volume 3(A): Specifications for 12 mtr and 9 mtr Diesel BSVI AC Fully  
Built Staff Buses**

**October 2023**

**Gujarat Mineral Development Corporation Limited**

**132 - Ring Road Gujarat University Ground, Vastrapur Ahmedabad - 380052**

## Part 1: General and material specifications

### 1. General Design Features of the buses:

- 1.1. Buses would generally be designed and manufactured in accordance with the UBS II specifications & 'Code of Practice for Bus Body Design and Approval' (AIS 052 includes amendments applicable to Diesel buses) -- hereinafter referred to as Bus Code--; as applicable to buses in India/CMVR rules/Gujarat motor vehicle rules whichever is superior. Details of relevant standard followed would be indicated against each item.
- 1.2. Bus design would consider all other aspects / provisions to be made on proposed bus body facilitating ease of its mounting /erection on the chassis without causing any



damage / defect to chassis / its aggregates etc and further facilitating ease of repair and maintenance of all other fitments / aggregates provided on bus chassis, etc.

- 1.3. Buses would be designed to carry commuters in the remote and semi rural areas mainly in the Lignite Mining colonies of GMDC and neighbouring area.
- 1.4. Bus design would be suitable for daily operation of 16 to 20 hours in GMDC with peak loading of about 40 passenger in midi buses and around 56 passengers in Large buses, average journey speed of about 40-50 Kms per hour. The operation would be a point to point chartered service.
- 1.5. Bus design would be modern, eco-friendly, energy-efficient, safe, and comfortable meeting specified exhaust emissions norms (Bharat Stage VI or Euro-VI or latest as amended up to date of supply).
- 1.6. Bus must be of proven design suitably modified to climatic & operational conditions, infrastructure and road conditions as obtaining in Semi urban area.
- 1.7. Bus design should meet all statutory requirements applicable for a AC Delux Bus.
- 1.8. The bus structure would meet requirements of structural strength, stability, deflection, vibration, crashworthiness, roll over protection etc. amongst others for at least the following main loads:
  - i. Static loads
  - ii. Dynamic loads
  - iii. Single wheel bump loads
  - iv. Double wheel bump (diagonally opposite) loads
  - v. Braking and acceleration loads
  - vi. Roll over loads
  - vii. Speed breaker induced loads

- 1.9. Bus body design would be approved by the agencies authorized as per CMVR using Finite Element Analysis for above loads. Bus Type Approval Certificate as per CMVR issued by an Authorised Agency for the Contracted buses shall be provided by the Operator.
- 1.10. The bus, loaded to Gross Vehicle Weight (GVW), with crush load and under static conditions, would not exhibit deflection or deformation that impairs the operation of steering mechanism, doors, windows, passenger escape mechanisms and service doors, articulation mechanism etc.
- 1.11. Detailed schematic drawings of bus structure, seats, interior/ exterior fittings, electrical systems, wiring looms / harness, photometric items, and other accessories along with complete details of materials used, their specification, manufacturing tolerances etc. would be provided by the bus manufacturer. Additionally, details / drawings of mounting / fastening bus body to chassis to be provided along with the bid specifically bringing out whether bus body would be welded and integrated to chassis or fastened using fasteners along with applicable mechanism system / arrangement. Detailed Circuit diagrams for electrical be also provided by the bidder/bus manufacturer.
- 1.12. Details of general appearance, seating layout and structural of roof, floor, sides, front & rear show and driver's cab, etc. would be supplied. Main dimensions of the fully built bus i.e., overall length, overall width, overall height, saloon height, pillar to pillar distance, seat pitch, number of seats (excluding seat for the driver), entry/exit gates, wheel chair locations/fastening arrangement and the accessibility mechanism, etc. would be supplied along with the schematic diagrams/printed literature of the bus.
- 1.13. Material used in construction of buses would be as per Bureau of Indian Standards (BIS/IS)/ Automotive Industry Standards (AIS)/ specifications and/or other international specifications meeting/ surpassing performance & other requirements as given in the Bus Code. In absence of above specifications, Association of State Road Transport Undertakings (ASRTU) specifications could be followed. Wherever Indian Standards are not available, internationally acceptable Standards may be referred. Specifications/ Standards followed would conform to Specification/Standards as amended /up dated/ or the latest published by the concerned agencies. Wherever no specifications of any item have been notified as International/ National Standards etc. actual specifications of that item used be mentioned. Guaranteed life of the bus and its other aggregates be indicated item by item. Periodical maintenance schedule for obtaining the said life of the bus be also indicated.
- 1.14. IS Standards are normally available from Bureau of Indian Standards, Manank Bhawan, 9-Bahadur Shah Zafar Marg, New Delhi-110 002. Web site: <http://www.bis.org.in>. Similarly, AIS Standards are available from Automotive Research Association of India, Post Box No.832, Pune-411 004. Web site: <http://www.araiindia.com>. ASRTU Specifications are available from Association of State Road Transport Undertakings, Sector 12, Dwarka, New Delhi. Web site: <http://www.asrtu.org>,

- 1.15. Suitable traps/openings with appropriate sealing and covers would be provided for repair and maintenance of various aggregate/systems/sub systems / chassis / body/ their components, etc of the bus.
- 1.16. Any restriction in design, manufacture and mounting of bus body on chassis, as provided by chassis manufacture, as a part of detailed instructions for this purpose, be meticulously followed while mounting / joining / integrating bus body to bus chassis.
- 1.17. The bus would be so designed as to maintain operational stability requirement as per Bus Code. Interior noise and pass by noise of the vehicle would conform to IS: 12832:1989 or latest and IS: 3028:1998, 10399: 1998 or latest respectively.
- 1.18. It would be ensured that the design, manufacture, certification (wherever called for) & installation of major bus sub-components and systems are compliant with all such sub-component vendors' requirements & recommendations within the frame work of any statutory, legal and or any other lawful/functional requirements. A certificate of compliance would be shown on demand. Components used in the vehicle would be of heavy-duty design.
- 1.19. Any other provisions/fitments required for safe and efficient operation and or for fulfilling statutory requirements be provided in the offered bus.

## **2. Under frame & Structure:**

- 2.1. The under frame and super structure of standard buses would be suitably designed to carry peak load of 60 passengers and dense crush load of over 75 passengers consisting of seated and standee passengers; the superstructure of steel tubing, bus tare weight, etc. and meet performance requirements under various loads indicated earlier. The structure would be designed to withstand the transit service conditions of operation throughout its service life.
- 2.2. Bus would be of integrated/ fastened/welded to chassis frame depending upon the chassis design, with the super structure fabricated using steel tubing (ERW– Rectangular / Square Sections) conforming to IS 4923-1985 or latest, of grade Yst – 240.
- 2.3. A comprehensive multi-stage anti-rust treatment would be provided to bus flooring, sides, roof, under-structure, axles, suspension, and all other components for resistance to corrosion or deterioration from atmospheric conditions & road salts so as to enable them & the bus frame to last for at least 10 years or 10,00,000 Kms whichever is later.
- 2.4. Samples of all materials & connections would withstand a two weeks (336 hours) Salt Spray test in accordance with ASTM procedure B117 with no structural detrimental effect to normally visible surfaces & no weight loss of over 1%. Details of treatment provided with relevant specification details be indicated along with suitable calculations to reflect that the corrosion prevention treatment meets the requirements of minimum 10 years life or 10,00,000 kms whichever is later, in

remote site operational environment. Details of the system followed for corrosion prevention of internal surfaces of structural tubing would be supplied. A certificate of testing from an authorised test lab be provided.

- 2.5. Front and rear structure design would be energy absorption type to reduce impact stresses into under frame/side structures/ other areas of the vehicle. Damaged area of the vehicle would be easily repairable and or replaceable in the event of any major damage at normally available workshop facilities and without any need for specialised tools / fixtures and equipment.
- 2.6. Entire surface of bus under floor and sides exposed to ground would be covered with appropriate corrosion prevention & flame-retardant paint coating for protection against harmful effects of water, mud etc and to retard flames, if any. Wheel housings would be constructed to contain tyre bursts during operation and be flame retardant in case of tyre fire.
- 2.7. Sufficient clearance & air circulation would be provided around the tyres, wheels & brakes to preclude over-heating when the bus is operating
- 2.8. Metal Inert Gas (MIG) welding would be used for steel structural member's fabrication.
- 2.9. All structural members would be MIG welded besides suitable gussets/ brackets of adequate size & thickness be provided on floor, sides, front, rear & roof structure to ensure structure rigidity & integrity. Material, shape size and specs of such gussets / brackets would be provided by the bus supplier in their supplied drawings.
- 2.10. After anti corrosive treatment, structural members would be coated with red oxide/ Zinc Chromate primer & superior quality black paint.
- 2.11. During structural assembly operations, several holes are drilled and or weldments made after the corrosion prevention treatment of components/structural items/members causing loss of such treatment and exposing these items to corrosion. Manufacturer would take sufficient care to carry out corrosion prevention of items so exposed to effectively prevent corrosion.
- 2.12. Under floor to sidewalls would be sealed to prevent dust ingress.

### **3. Panelling:**

- 3.1. Bus exterior side panels would be fitted with stretched steel sheet at waist level. The exterior front-end panelling would be of steel sheet/Fibre Reinforced Plastic (FRP) or a combination of both, while roof, rear, sides & skirt panelling would be of aluminium. All interior panelling would be of Acrylonitrile Butadiene Styrene (ABS)/ Aluminium Composite Material conforming to relevant National or International Standards-equivalent or better.

- 3.2. Wherever aluminium is joined with steel or with/ any dissimilar metals together, the involved joints would be treated with thick layer of approved quality dielectric paint conforming to relevant Indian/ International Standards, before assembly. Adequate treatment be also provided to avoid any incidence of galvanic corrosion between dissimilar metals.
- 3.3. Panels would not have any waviness & would be so mounted as to present smart aesthetic exteriors. Details of the above said panelling including specifications / thickness/ sizes of panels, fittings, rivet/ bolt pitch etc would be supplied.
- 3.4. All side skirt panels below stretch panel be of such design as would facilitate quick replacement of any damaged panel(s) with pre-painted panels. The side skirt would be able to withstand side impact as per provisions of IS: 14682-1999 or latest and or AIS 153. Similarly rear end would be able to withstand rear impact as per the provisions of IS: 14812-2000 or latest and or AIS 153.
- 3.5. Anti-drumming compound would be applied on inner side (enclosed surfaces) of entire panelling.
- 3.6. Roof structure and other structures would be thermally insulated with flame retardant Polyurethane or glass wool of minimum 40 kgs/m<sup>3</sup> density. The specifications/ IS Standards for aforesaid insulating material would be supplied. Insulation would also be provided at other locations for improved performance of air conditioning system.
- 3.7. MIG welding for fabrication of aluminium components would be used.
- 3.8. Rain gutters would be provided at appropriate locations to prevent water flowing from the roof onto the passenger doors, driver's side window, and exterior mirrors. When the bus is decelerated, gutters would not drain onto windshield, or driver's side window, or into the door boarding area. Cross sections of the gutters would be adequate for proper operation.
- 3.9. Entire front end of the bus would be sealed to prevent debris accumulation behind the dashboard and to prevent driver's feet from kicking or fouling wiring and other equipment. Front end would be free of protrusions that are hazardous to passengers standing or walking in front of the bus during rapid acceleration.
- 3.10. Interior panels would be attached so that there are no exposed unfinished or rough edges or rough surfaces. Panels & fasteners would not be easily removable by passengers. Fasteners and or their capping used for above purpose be such as to resist vandalism / easy removal by any person including but limited to commuters.

#### **4. Paints:**

- 4.1. All structural members of the bus would be treated for corrosion prevention internally as well as externally and painted wherever required. Polyurethane (PU) painting base spray paint conforming latest national / international Standards as applicable would be used for exteriors painting of bus including interiors wherever

required. Colour shade would match to the shades as per IS: 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 would be supplied.

4.2. All exterior surfaces would be smooth & free of wrinkles & dents. Exterior surface to be painted would be properly prepared as required by paint system supplier, prior to application of paint to ensure a proper bond between the basic surface and successive coats of original paint for stipulated service life of the bus. Paint would be applied smoothly and evenly with the finished surface free of dirt and following other imperfections:

- I. Blisters or bubbles appearing in the topcoat film.
- II. Chips, scratches, or gouges of the surface finish.
- III. Cracks in the paint film.
- IV. Craters where paint failed to cover due to surface contamination.
- V. Overspray.
- VI. Peeling.
- VII. Runs or sags from excessive flow and failure to adhere uniformly to the surface.
- VIII. Chemical stains and water spots.

#### **5. Colour and Graphics schemes:**

5.1. All exterior and Interior colour schemes and exterior logo/ graphics would be provided by GMDC. For exterior logo and graphics vinyl Decal stickers with thickness >80 micron (with printed letters >180 micron) shall be used.

#### **6. Windows:**

6.1. Windows would be of large size for panoramic view. They would be in fixed single piece window glasses. Toughened glass wherever used in bus body would be 4.8 mm to 5.3 mm thick aesthetically installed. Size and shape of the glasses would enable even the standees to have maximum outside view without kneeling. General requirements of windows would be as per the provisions of bus code (AIS 052).

6.2. Windows would have provision of suitable sealing to avoid ingress of dust and water and would have proper/ efficient drainage system.

6.3. Details of window design; fitment etc would be supplied by the bidder along with the bid.

#### **7. Passenger Seats:**

7.1. **Interior Projection:** All parts in Head Room (Free height over seating position) shall have a radius of not less than 2.5 mm. In addition, buses shall meet the requirements of interior fittings as specified in AIS-047 as amended from time to

time. All parts in gangway up to height of 1200 mm from bus floor shall have a radius not less than 25mm. Alternatively, its shore hardness shall not be more than 20 Shore A hardness.

- 7.2. Passenger seats would be front facing, comfortable, durable & maintenance free of 'PPLD/LDPE/HDPE' (Polypropylene/Low Density Polyethylene/High Density Polyethylene) moulded construction meeting performance requirements of AIS023 and other requirements as per the Bus Code (AIS 052). The 'PPLD/LDPE/HDPE' moulded seat would be fitted on metal frames.
- 7.3. Similarly, 'PPLD/LDPE/HDPE' moulded seat backrest would be appropriately fitted. Suitable integral type seat hand grab rails would be provided one on top of backrest & one at the back of backrest for seated passengers.
- 7.4. The Seating lay out, shall be 3X2. Seating capacity would be minimum 40 passenger plus the driver in 9 mtr buses and minimum 56 passenger plus the driver in 12 mtr buses. Standee capacity of bus, worked out as per system given in bus code (AIS 052), would be indicated by manufacturer. Seating and standee capacity of bus shall be as per formula provide in AIS 063). All seats should be forward facing except in the case of seats facing the passenger step well, which should not face the door. Alternatively a partition which prevents the child from falling into the step well shall be provided. However, this requirement of partition shall not be applicable to buses in which passenger step well does not exist.
- 7.5. **Storage Racks:** Storage racks of 300 mm minimum depth to be provided beneath all passenger seats, except the seats mounted above any tyre humps and last row of seat.

## **8. Seat Belts and its anchorages:**

- 8.1. Seat belts would be provided for the seats as per the provisions of CMVR & Bus Code (AIS 052). Any seats provided at rear end of bus/seats in centre (facing the gangway) would necessarily be provided with seat belts. Seat belts and its anchorages would conform to the requirements of AIS 005 and AIS 015

## **9. Sun Visor and Horn:**

- 9.2. Adjustable sun visors would be provided for windshield & driver's side window. Visors would be shaped to minimize light leakage between visors & windshield. Adjustment of visors would be made easily by hand with positive locking & releasing devices and would not be subject to damage by over-tightening. Sun visor construction & material would be strong enough to resist breakage during adjustment. Visors may be transparent but would not allow a visible light transmittance in excess of 10%. Visors where deployed would be effective in driver's field of view at angles more than 50 above horizontal.
- 9.3. An electric horn conforming to IS: 1884-1993 or latest and installation requirements conforming to AIS 014 would be fitted in bus and further conforming to the provisions of CMVR

**10. Stop requests:**

- 10.1. A suitable device for the convenience of passengers to request for stopping bus be provided at appropriate locations

**11. Stopping Signals:**

- 11.1. Whenever the passenger door opens, the following 2 signals shall operate.
- 11.2. The stop signal arm should project out of the co-driver side with a minimum projection of 150 mm with the ' STOP ' sign of minimum letter height of 40 mm to be installed.
- 11.3. The hazard warning shall operate automatically.

**12. Speed Governor:**

- 12.1. A speed governor complying with the requirements of Rule 118 of CMV(A)R 1989, which prevents driver from speeding beyond the speed limits set by the latest Central Government Notification shall be provided.

**13. Bumpers:**

- 13.1. Bus would be provided with front and rear bumpers of Steel or impact resistant polymer or combination of both or FRP meeting requirement of an energy absorbing system. The bumper would be easily repairable/replaceable. Bumpers would conform to the requirements of CMVR, AIS, and Bus Code/any other international Standards (to be specified by the manufacturer). Details of above bumpers along with drawings including thickness of bumpers, section, profile etc. would be supplied by the Successful bidder.

**14. Wind Screens:**

- 14.2. Front wind screen in the bus would be in single piece design, plain/ flat with curved corners, PVB film laminated safety glass of minimum thickness of 8.0 mm. The windshield glazing material shall have a laminated safety glass conforming to the requirements of AIS 052 / ANSI Z26.1.
- 14.3. Rear windscreen would also be in single piece design, flat in centre and curved on corners toughened glass of thickness of 5.5 mm (+ 0.5mm).
- 14.4. Windscreen glasses would meet the requirements of IS 2553: Part II-1992 or latest and that of CMVR and Bus code (AIS 052). The glazing used for fitment of glasses would be Ethylene Propylene Dien Monomer (EPDM) rubber of black colour conforming to Indian/ International Standards to be specified by the manufacturer.

- 14.5. A grab handle and suitable handles on the outside of windshield centre at waist level would be provided to facilitate manual cleaning of the windscreens.
- 14.6. The windshield shall permit an operator's field of view as referenced in SAE recommended practice J1050. The vertically upward view shall be a minimum of 15 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 1.35-metre-high no more than 600 mm in front of the bus. The horizontal view shall be a minimum of 90 degrees above the line of sight.

**15. Wind screen wipers:**

- 15.1. Electrically operated windscreen wiper system having two wiper arms with blades would be provided. Wiper motor would be heavy-duty steel body for minimum of two-speed operations. Wiper arms would rest horizontally when not in use. The sweep angle would be sufficiently wide for clear view during rainy days. Windscreen wiping system would be 24V, having variable speed, with fitment of time delay relay. Windshield washer system would spray washing fluid on windshield & when used with the wipers, would evenly & completely wet the entire wiped area. Windshield washer system would have a minimum of 2.5 litres capacity tank suitably located for easy refilling from inside the bus and two nozzles at suitable location for proper spray of fluid. Reservoir pumps, lines & fittings would be corrosion resistant & reservoir itself would be translucent for easy determination of fluid level. The windscreen wiping system would be in accordance with CMVR/ IS: 7827 Part1, 2, 3 (section 1, 2) or latest.

**16. Fire extinguishers:**

- 16.1. Multipurpose fire extinguishers would be ISI marked conforming to IS: 13849-1993 or latest, dry powder type (Stored pressure) duly filled, of capacity and quantity as per the provisions of GSR-853 (E) dated 19.11.2001 notification of Government of India, Bus Code, UBS II. Fire extinguishers would be encased & fitted with proper reinforcement. The enclosure box would have transparent breakable glass at front cover.

**17. First aid kit:**

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

**18. Battery:**

- 18.1. Battery system would be 24V of minimum 180 Amps-hour capacity, low maintenance type lead acid batteries. Batteries would be well secured to a hinged/ pivoted or slide out type carrier for ease of access for repair & maintenance, replacement and suitably ventilated for escape of fumes but

insulated against ingress of dust and moisture. Battery box would be mounted near/ next to engine compartment and would be well secured, easily accessible & ventilated. Performance requirements of batteries would conform to IS: 7372-1995 (or latest).

- 18.2. Battery terminals with positive locking system (e.g. angle type terminal with provision for double bolting) duly protected against all possible short circuit risk would be provided.
- 18.3. Each battery cable would be covered with flame retardant Grey colour corrugated flexible pipe and would be properly encased & clamped.
- 18.4. A relay controlled Heavy-duty type battery cut-off switch (isolator switch) capable of carrying & interrupting total circuit load would be provided 1 each near battery / driver on side panelling at appropriate level for disconnecting all battery positives except for safety devices such as fire suppression system & other systems as specified. Two points of battery cut off switch would be connected with battery and two points would be connected with self-starter. The battery Cut-off switch with power plant operating, would not damage any components of electrical system in off position. The battery Cut-off switch would be capable of carrying & interrupting the total circuit load.

**19. Electrical equipment and wiring:**

- 19.1. The bus would have 24 Volt D.C with multiplex wiring system for all its electrical equipment except in unavoidable circumstances to avoid sparking in buses. A separate system/ mechanism would be provided for discharge of electrostatic charge induced during the operation of vehicle. Adequate precaution would be taken in case of single pole wiring to avoid spark in items such as self-starter, alternator etc.
- 19.2. An adequate capacity alternator of 24V DC, minimum 180A rating with consistent output to take care of high idling periods of city operation would be provided and so located as to minimise ingress of oil or rain water into it. The Manufacturer may, if so required, must install two separate Alternators one each for Air Conditioning System and Auxiliary systems.
- 19.3. A pre-engaged type 24V DC Self-starter of adequate capacity ( $\geq 4.5$  kw) with relay would be fitted in bus and so located as to minimise ingress of oil or rain water into it.
- 19.4. Electrical equipment and wiring would conform to Indian/ international Standards and bus code. All cabling would be as per provisions of Bus code / UBS II. The multiplex system wiring would be, flame proof, ISI marked/ ISI Marked / E-Marked conforming to IS: 2465-1984 or latest or an equivalent international Standard. As far as possible electrical system would be 24V double pole multiplex wiring system except in unavoidable condition. However, in case of single pole wiring all power & ground wiring would have

double electrical insulation, which would be waterproof conforming to the Indian/ International Standards. Wiring would be grouped, numbered & colour coded. Wiring harnesses would not contain wires of different voltage classes unless all wires within the harness are insulated for highest voltage present in harness. Kinking, grounding at multiple points, stretching & exceeding minimum bend radius would be prevented.

- 19.5. Wiring looms/ harness for electrical system of bus would be properly routed, encased/ concealed type so mounted to eliminate chances of any spark. Details of above wiring loom including circuit diagram; layout of controls etc would be supplied by the bidder along with the bid. Wiring support would be protective & non-conducting at areas of wire contact & would not be damaged by heat, water, solvents or chafing.
- 19.6. All electrical fittings and lights would be fully wired up, running in flame retardant black colour PVC sleeves as per applicable Indian Standards (to be specified by the manufacturer) and installed in a manner to facilitate easy inspection/ rectification/ replacement etc as & when required without disturbing internal finish/ décor of the bus. Whenever any wire or cable or PVC sleeve carrying cable etc passes through holes in sheet metals/ structural member, suitable rubber grommets/ Bakelite inserts would be provided in these holes to avoid direct contact between cables and sheet metal causing damage to insulation coating.
- 19.7. Design of electrical, electronic & data communication systems would be modular so that each major component, apparatus panel or wiring bundle is easily separable with Standard hand tools or by means of connectors. Each module except main body wiring harness would be removable & replaceable. Power Plant wiring would be an independent wiring module. Replacement of engine compartment wiring module would not require pulling wires through any bulkhead or removing any terminals from the wires.
- 19.8. Electrical system & its electronic components would be capable of operating in area of the vehicle in which they will be installed. Electrical & electronic equipment would not be located in an environment that will reduce performance or shorten life of the component or electrical system. No vehicle component would generate or be affected by electro-magnetic interference or radio frequency interference (EMI/RFI) that can disturb performance of electrical / electronic equipment.
- 19.9. All electrical & electronics hardware would be accessible & replaceable easily. It would be mounted on an insulating panel to facilitate replacement. Mounting of hardware would not be used to provide sole source ground and all hardware would be isolated from potential EMI/ RFI.
- 19.10. All electrical/ electronic hardware mounted in interior of bus would be inaccessible to passengers & hidden from view unless intended to be viewed.

- 19.11. All electrical/ electronic hardware mounted on exterior of bus i.e. not designed to be installed in an exposed environment would be mounted in a sealed enclosure.
- 19.12. All electrical/ electronic hardware & its mountings would comply with shock & vibration requirements.
- 19.13. Alternator over voltage output protection would be provided.
- 19.14. To the extent practicable, wiring would not be located in environmentally exposed locations under the vehicle. Wiring & electrical equipment necessarily located under the vehicle would be insulated from water, heat, corrosion & mechanical damage. Where feasible front to rear electrical harnesses should be installed above the window line of vehicle.
- 19.15. All electrical motors would be easily accessible for servicing.
- 19.16. AC (Alternating Current) out-let of 220V be provided at suitable location for charging of electrical/electronic equipment, etc.
- 19.17. If any electronic components have an internal clock, it would be provided with its own battery back up to monitor time when battery power is disconnected.
- 19.18. All electronic components/equipment would have self-protecting capability in event of shorts in cabling and also in over voltage and reverse polarity conditions. If an electronic component is required to interface with other components it would not require external pull up and/ or pull down resistors.
- 19.19. RF components such as global positioning system (GPS) etc. whenever provided would use coaxial cable to carry the signal. The RF systems require special design consideration for losses along the cable. Connectors would be minimized, since each connector & crimp has a loss, which will attribute to attenuation of signal. Cabling should allow for removal of antennas or attached electronics without removing the installed cable between them.

**20. Lights and lighting system:**

- 20.1. Interior saloon lighting would be sunken type light assembly fitted with LED lights and mounted in staggered formation for uniform lighting in two separate circuits. First row of lamps provided in driver's cabin should be fitted with amber internal filter to reduce glare to driver at night. Overall bus lighting system would comply with CMVR provisions where-ever falls short of it.
- 20.2. Modern headlamps with relay and side light etc would be suitably styled into front-end construction.

- 20.3. White and Red marker lights as per AIS 052 would be fitted at both top side corners of the front and rear panel of the bus respectively.
- 20.4. Identical signal lights as per CMVR and AIS 008 would be fitted for interchangeability in each side i.e.; front, rear and side respectively
- 20.5. Brake lights and tail lights, two separate lights to reduce heat generation, should be in compliance with CMVR and AIS 008.,.
- 20.6. Reverse light, preferably with square lamps with white covers, should be in compliance with CMVR and AIS 008.
- 20.7. Side markers would be provided on both sides as per bus code/ AIS 008
- 20.8. Rear signal lights, brake lights, taillights and reverse lights would be arranged vertically.
- 20.9. Light wattages given above are indicative, however, all the lights and lighting systems would conform to requirements of Bus code, CMVR/Gujarat MVR and other relevant AIS Standards.
- 20.10. Following lights would be actuated when the headlights are 'ON' and the doors are 'Open':
  - i. Lights provided for illuminating exit/entrance door area, lights would illuminate outside area up to at least one meter when door/doors is/are opened. Lights for exit/entrance door areas would be flushed as far as possible to avoid tripping of passengers, protrusions if any would conform to relevant CMVR/ AIS Standards.
  - ii. Exterior door lights
  - iii. Lights would be automatically switched off when the door is closed.
- 20.11. A well-lighted bus registration number plate would be fitted at rear as per provisions of CMVR duly complying with directives/ regulations regarding high security number plates as notified by Government of India / Government of Gujarat if any.
- 20.12. No Electrical fittings would be mounted on front and rear bumpers.
- 20.13. Switches would be fitted on right hand side of instrument panel through evenly loaded circuits & fuses as per bus code.
- 20.14. A reverse buzzer would be installed at the rear of bus to sound intermittently when reverse gear is engaged.
- 20.15. A suitable light would also be provided in engine compartment for ease of maintenance/ emergency repairing.

## **21. Tool kit**

21.1. Bus manufacturer would provide a suitable tool kit and other mandatory items as per CMVR 138 (4)/ other applicable rules comprising of common tools and other essential items required. Complete list of tools in tool kit to be supplied with every bus would be supplied by the manufacturer. One wheel nut spanner and one Hydraulic Jack per bus of a capacity of at least 10 Ton as per design of bus would also be supplied.

## **22. Maintainability**

22.1. Design and fabrication of bus would be such as facilitates easy access for repair & maintenance, removal, replacement of various bus components/ assemblies/ sub-assemblies/ systems by providing suitable traps/ flaps etc. Also, removal and re-fitment of engine, transmission, differential, radiator, door closing mechanism, PIS, DIESEL cylinders, etc. would be easy for repair & maintenance purpose. Enough space would be provided between wind screen glasses and PIS boards for facilitating cleaning of glasses.

22.2. Radiator coolant/water filling and Fuel filling inlets would be easily accessible with suitable closing devices complete with locking arrangement/-holding arrangement.

22.3. Also, an access would be provided for attending to air cleaner assemblies mounted in the vehicle.

## **23. General requirements:**

23.1. GMDC reserves the right to alter, modify, change specifications as per requirement to suit the latest provisions of CMVR/ any other Notifications, safety aspects, emission aspects besides any practical/ operational difficulties etc. faced/likely to be faced by GMDC. Vehicle Manufacturer would ensure that all alterations, changes or modifications in specifications, if necessary, as mentioned above would be carried out in buses built by them as per the advice of GMDC without attributing any additional cost.

23.2. Ministry of Road Transport & Highways, Government of India (MORT&H) vide Notification No.GSR-853 (E) dated 19.11.2001 in the Gazette of India, inter-alia stipulated the following measures which need to be complied with for enhancement of safety by the Vehicle Manufacturers as per the statutory requirement for registration of vehicles

- All edges would be rounded off and would not cause injury to bus occupants.
- Complete bus would be rattle-free.
- All the rivet and bolt holes would be jig drilled as far as possible. The rivet holes should preferably be drilled before the corrosion prevention treatment. Holes drilled after the corrosion

treatment be suitably treated with anti-corrosion materials. Rivet heads neatly formed and each bolt/ rivet would be tightened after full mating of the surfaces to be fastened.

- All safety aspects should be considered while designing and fabricating the bus.
  
- Continuous length piano type hinges and tower bolts of stainless steel would be used as per relevant Indian Standards.
  
- Anodized decorative aluminium mouldings/ beadings etc would be used.
  
- All M.S pipes used in the bus would be ERW conforming to IS 3601:1984 or latest, of grade WT –160 or to IS 4923:1997 (or latest) Grade Yst 240, which-ever is equivalent / superior.
  
- All rubber items used on the bus body would be made of Ethylene Propylene Dien Monomer (EPDM) rubber of black colour conforming to the Indian/ International Standards to be specified by the Manufacturer.
  
- EPDM rub rail of aesthetic profile would be fitted in anodized extruded aluminium channel between stretch panel and skirt rail longitudinally at the widest portion of the bus. The quality of EPDM material would be as per the Indian/ International Standards to be specified by the Bidder.
  
- Every trap/-opening flap would be secured in a manner that the vibrations can't dislodge it. Lifting devices must not protrude above the flap.
  
- Ease of accessibility to engine & other aggregates for easy maintenance would be ensured. Assemblies / units would be so mounted that they are easily accessible & can be removed without disturbing other components / assemblies.
  
- All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsional modes, would be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during normal service.
  
- Exterior protrusions if any would conform to the provisions of relevant CMVR/ AIS/ Bus Code. The exterior rear-view mirrors

and required lights and reflectors are exempted from the protrusion requirement. Advertising frames would protrude no more than 22mm from the body surface and would have the exposed edges and corners rounded to the extent practicable. Grilles, doors, bumpers and other features on the sides and rear of the bus would be designed to minimize the ability of unauthorized riders to secure footholds or handholds. The exterior body features would be shaped to allow complete & easy cleaning by automatic bus washers without snagging washer brushes or retaining water & dirt.

- Hydraulic Grease Nipples would be provided for ease of proper lubrication & maintenance.
- Front panels, bumpers and grill should be designed such that there are no pointed or sharp protrusions to minimise injuries to vulnerable road users in case of impact.
- Any other safety and performance requirement features to be provided.

#### **24. Statutory Requirement**

24.1. Bus manufacturer would ensure that all statutory requirements in respect of each and every item of bus are fully met. Manufacturer would also obtain type approval certificates etc for bus & any other items from testing agencies specified in the CMVR namely Vehicle Research & Development Establishment, Ahmednagar of the Ministry of Defence of Government of India; or Automotive Research Association of India, Pune; or Central Institute of Road Transport, Pune; or Indian Institute of Petroleum, Dehradun; or ICT Manesar, and or any other agencies as specified by the Central Government on date of testing/ type approval or any other agency specified by competent authority. A certificate showing details of make/type/model of various units like engine, gear box/transmission system, clutch assembly, propeller shafts, rear axle, radiator, alternator, starter, regulator, batteries, tyres, steering, instruments on the panel, air compressor, shock absorbers, suspension system items, etc. would be furnished.

24.2. Bus Manufacture must make sure that the Fully built bus complies with standards and regulations for Diesel fuelled vehicle provided in the AIS-052, AIS 153, AIS 063, AIS 023, AIS 024, AIS 028, UBS II, any other applicable standard; CMVR 1989 as amended till date, and Gujarat MV Rules and all amendments thereto.

#### **25. Manufacturer's nameplate**

25.1. Manufacturer's nameplate may be fixed as per approval of GMDC.

**Part 2: Dimensions and other specifications**

Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
A	B	C	D
1	Propulsion System	Diesel fuelled Internal Combustion Engine (ICE);	
2	Emission norm and Fuel	BS-VI – Diesel	
3	Engine		
3.1	Engine HP sufficient to provide:		
3.2	Rated performance at GVW in a stop/start urban operations	Attain Geared minimum maximum speed of 75 kmph (without speed limiter) at GVW load and air conditioning system operational	
3.3	Acceleration (meter/sec <sup>2</sup> )	≥ 0.5	
3.4	Attain Bus speed of 0-30 kmph in seconds	≤ 14 seconds	
3.5	Maximum speed	Complying with the requirements of Rule 118 of CMV(A)R 1989 and as per applicable rule in Gujarat.	
3.6	Gradeability from stop at GVW and air conditioning and all other sub-systems operating.	17%	
3.7	Rated HP/torque preferably at lower rpm range	Rated HP >180HP at low rpm and Maximum engine torque required at lower range of RPM and spread over a wider range of RPM	Rated HP >120HP at low rpm and Maximum engine torque required at lower range of RPM and spread over a wider range of RPM
3.8	Power requirements for Air conditioning system, ITS, etc	Not required.	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
3.9	Engine management	Engine oil pressure, engine coolant temperature, engine speed in RPM, vehicle speed, engine % load (torque), diagnostic message (engine specific) generally as per UBS II.	
3.10	Engine operational requirements	Engine should be able to operate efficiently at ambient temperatures / environmental conditions of GMDC Sites generally operating in the semi-arid zone prevailing in the area.	
3.11	Cooling System	Heavy-duty radiator and other subsystems of cooling system would efficiently dissipate heat from the engine system. De-aeration tank and pressurized radiator cap would be provided. It would be easy for filling and level checking of coolant. Replacement/ maintenance of radiator and its items be also easily carried out. Details of radiator specifications, cooling capacity, coolant, repair and maintenance procedures etc would be supplied	
3.12	Engine location	Optional	
4	Transmission	Manual Transmission Manual transmission synchromesh type with appropriate clutch system and with 5 speed gear and one reverse speed gear.	
4.1	Operational safety	Transmission system to be fitted with a mechanism which makes it possible to engage reverse gear only when vehicle is stationary.	
4.2	Clutch	Required	
5	Rear axle	Single reduction, hypoid gears, full floating axle shafts with optimal gear ratios suitable for semi- urban/Mofussil operations	
6	Front axle	Heavy duty reverse Elliot type axle suitable for bus floor height	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
7	Steering system	Hydraulic/ Electric power steering with angle and height adjustments capability	
8	Suspension system		
8.1	Front	Air Suspension	Waveller
8.2	Rear	Air Suspension	Waveller
8.3	Kneeling (mm) applicable in case of air suspension	Not required.	
8.4	Antiroll bars/stabilizers	Both front and rear	
8.5	Shock absorbers	Hydraulic double acting 2 at front & 2/4 at rear	
9	Braking system	Disc Brakes in front and at rear wheels.	Drum Brakes in front and at rear wheels.
		<ul style="list-style-type: none"> <li>• Graduated hand-controlled, spring actuated parking brakes acting on rear wheels. Asbestos free brake linings / Pads at all places.</li> <li>• Brake squeal would be absent under normal conditions of operation. An air compressor / dryer which minimizes oil carry over would be fitted. Braking system would be fitted with air dryer and oil/ water separator system. Buses would also be provided with hand operated pneumatic flick valve type parking brakes at rear wheels. Air pressure line would be treated for corrosion resistance.</li> <li>• In the event of failure of engine and or loss of air in system, adequate provision be made for obtaining effectiveness of service brake system and or for deactivating the spring actuated brakes.</li> <li>• The air compressor system should have sufficient capacity to meet large compressed</li> </ul>	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
		air demand for braking in the start – stop type urban operations and frequent opening / closing of doors besides any other requirement.	
9.1	Anti-skid anti-brake- locking system (ABS)	Required	
10	Electrical system	24-volt DC	
10.1	Batteries:	Low maintenance type lead acid batteries for 24 V system- performances as per IS: 14257-1995(latest). 2*12V maintenance free batteries of 180Ah rating.	
10.2	Self starter	24V, ≥ 4.5KW rating	
10.3	Alternator	24V, 180 A. If required two separate alternators to be installed one each for AC requirement and Auxiliary support.	
10.4	Electrical wiring & controls –type	Multiplexing type -- As specified separately under ITS specifications	
11	Speed limiting device	Electronic type duly approved/certified as per AIS – 018/2001 or latest, tamper proof and be adjusted to applicable speed limit	
12	Wheels and Tyres	<ul style="list-style-type: none"> <li>• Steel radial tube-less tyres– size and ply rating for urban operations as per CMVR Standards as per AIS 044 part 3</li> <li>• Suitable guards be provided near wheels to prevent damage/ for obtaining safety from stones hurled from tyres.</li> <li>• Splash aprons of minimum 6.50±0.50mm thickness composed of rubberized fabric would be installed behind the wheels as needed to reduce road splash and protect under floor components. Splash aprons would extend downward to within 100mm of</li> </ul>	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
		road surface at static conditions. Apron widths would be no less than tyre widths, except for the front apron, which may extend across the width of the bus. Splash aprons would be bolted to the bus under structure. Splash aprons and their attachments would be inherently weaker than the structure to which they are attached. The flexible portions of splash aprons would not be included in road clearance measurements. Other splash aprons would be installed where necessary to protect bus equipment.	
13	Diesel Tank	Capacity of Deisel tank, adequate to enable bus operation of up to 300 km between consecutive fillings	
14	Bus characteristics		
14.1	Bus dimensions in mm		
A	Overall length (over body excluding bumper)	10000 mm -12000 mm	7000 mm -9000 mm
B	Overall width (sole bar/floor level-extreme points)	2600 +/- 100 mm	2400 +/-50 mm
C	Overall height (unladen-at extreme point)	3800 mm max	3800 mm max
D	Wheel-base	5500 mm -6200 mmm	4500 mm – 5000 mm
E	Front overhang	45% of wheelbase	40% of wheelbase
F	Rear overhang	< 50% of wheel base	>= 60% of wheel base
14.2	Floor height above ground (mm)	900 ± 10	
14.3	Clearances (mm)		
A	Axle clearance(mm)	Minimum 190 mm	
B	Wheel area clearance(mm)	> 220 mm for parts fixed to bus body & > 170 mm for the parts moving vertically with axle.	
C	Minimum ground clearance at GVW	Within the wheelbase not less than 240mm.	
14.4	Angles (degrees)		

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
A	Angle of approach (unladen)	Not less than 8.0°	
B	Angle of departure (unladen)	Not less than 8.5°	
C	Ramp over angle (half of break-over angle) unladen	Minimum 4.8°	
15	Bus Gates/Doors		
15.1	Entry exit gates with doors		
A	Operating mechanism	Electro pneumatically controlled	
B	Maximum opening / closing time in seconds per operation	4	
C	Positions of door controls	As per AIS 052	
D	Passenger safety system - allowing bus motion only on doors closing	√	
15.2	Entry / Exit door: <b>near side/non driver side:</b>		
A	Door aperture in mm	1200 mm as per AIS 052	800 mm as per AIS 052
B	Clear door width (fully opened)	≥1000 mm ± 50 mm.	650mm as per AIS 052
C	Door height	1900 mm.	
D	Number of gates	One	
E	Positioning doors	Option 1: On the front overhang Option 2: Rear of the front wheel	
F	Door Type and other requirements:	<ul style="list-style-type: none"> <li>Jack Knife type electro-pneumatically controlled by driver with internal and external emergency operational controls.</li> <li>The Service Door would be provided with suitable support in form of grab handles for boarding/ alighting passengers on JK door flaps.</li> </ul>	

Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
		<ul style="list-style-type: none"> <li>• A pilot lamp on the driver’s dashboard would be provided to warn that the door is ‘Open’ or not fully closed.</li> <li>• Service door would be provided with heavy-duty sealing to avoid ingress of dust into passenger compartment. Upper &amp; lower section of both front &amp; rear doors would be glassed for not less than 45% of the respective door opening area of each section. Glazing material &amp; glass in doors would be same as in side windows.</li> <li>• Photo-cell controlled opening / closing functions of doors and a “sensitive edge” made for safe entry exit be fitted.</li> </ul>	
G	Guard Rail:	Guardrails provided for service doors shall be such that they include a grasping/ gripping point available to a passenger standing on the ground and adjacent to the service door or any of the successive door steps. Such point shall be situated, vertically, between 400 to 1000 mm (instead of 800 ~ 1000 mm as specified in clause 2.2.9.11.2 of AIS-052 (Rev.1) above the ground or from the surface of each step.	
15.3	Maximum first step height (mm) from ground - unladen position in buses with:		
A	Stepped type entry on near side doors	400 mm	
B	Maximum height (mm) of other steps on near side gates	250 mm -- In no case, bus floor height should go beyond the maximum floor height.	
15.4	Emergency doors/exits or apertures (numbers)	All buses other than midi buses, shall have an emergency exit on the opposite side of the service door. In addition, there shall be an emergency exit on the rear side of the bus and as per AIS 052	
15.5	Emergency doors/exits or apertures dimension	As per AIS 052	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
15.6	Passenger safety system - allowing bus motion only when the doors are closed.	Mandatory	
15.7	Power operated service door - construction & control system of a power operated service door be such that a Passenger is unlikely to be injured/trapped between the doors while closing.	As per AIS 052	
15.8	Door components	As per AIS 052	
15.9	Door locks/locking systems/door retention items	As per AIS 052	
15.10	Door hinges	As per AIS 052	
16	Insulation		
16.1	Roof structure/body	Material to be decided by the manufacturer. Other requirements as per bus body code. Material should fulfill requirements indicated under Annexure-3 to UBS II/AIS 052 and part I above.	
16.2	Engine compartment		
17	Aluminium extruded sections for:		
17.1	Rub rail	Aluminium extrusion IS 733/1983 or better.	
17.2	Decorative moulding		
17.3	Wire cover		
17.4	Wearing strip		
17.5	Foot step edging		
17.6	Panel beading		
17.7	Window frame		
17.8	Roof grab rail brackets		
18	Floor type / materials etc		

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
18.1	Type of floor	Uniform floor inside bus without steps	
18.2	Steps on floor	No steps	
18.3	Maximum floor slope	As per AIS 052	
18.4	Floor surface material	12mm thickness phenolic resin bonded densified laminated compressed wooden floor board (both side plain surface) having density of 1.2 gms/cc conforming to IS 3513(Part-3): type VI 1989 or latest. The flooring should also be boiling water resistant as for marine board IS:710-1976/ latest and fire retardant as per IS:5509-2000(IS15061:2002)	
18.5	Anti – skid material	3 mm thick anti-skid type silicon grains ISO 877/76 for colour, IS5509 for fire retardancy	
19	Safety glasses and fittings:		
19.1	Front windscreen (laminated) glass:	Single piece laminated safety glass, plain, flat / curved with curved corners, with Poly Vinyl Butyral (PVB), film IS 2553 (Part-2)-1992/latest. Standard designs for Standard buses to be followed (Refer Annexure 1 to UBS II)	
A	Size:	Standard designs for Standard buses to be followed. (Refer Annexure 1 to UBS II)	
19.2	Rear windscreen:	Single piece flat/curved toughened glass-plain/flat/curved at center & curved at corners IS 2553(Part-2)-1992/latest	
A	Size:	Standard designs for Standard buses to be followed. (Refer Annexure 1 to UBS II), thickness 4.8-5.3 mm	
19.3	Side windows:	Flat, 2-piece design-top fixed toughened glass IS 2553 (Part-2)-1992/latest.	
A	Glass specifications	Toughened glass IS2553(Part-2)-1992/latest	
B	Glass thickness:	4.8-5.3mm	
C	Window & other glasses - material specifications, thickness etc	Toughened as per IS 2553(Part-2)-1992/latest of 4.8-5.3 mm thickness	

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<b>Sr. No.</b>	<b>Description</b>	<b>Specifications for 12 mtr BS VI Staff Bus</b>	<b>Specifications for 9 mtr BS VI Staff Bus</b>
19.4	Safety glass	As per AIS 052/CMVR	
19.5	Rear view mirrors	As per AIS 052, AIS 001, AIS 002	
19.6	RPAS	RPAS as per AIS 145 and a CCTV camera would be provided at rear end of the bus along with audio video facility at driver dash board.	
20	Seating and gangway etc		
20.1	Passenger seating		
A	Seat layout	3X2 seating	
B	Seat area/seat space per Passenger (width*depth) mm	400*400mm	
C	Seat pitch - minimum in mm	750 mm as per AIS 052	
D	Minimum backrest height-from floor to top of seat / headrest	1100mm as per AIS 052	
E	Seat base height-distance from floor to horizontal front upper surface of seat cushion mm.	450±50mm as per AIS 052	
F	Seat back rest height in mm	375	
G	Torso angle (degrees)	Minimum 12 degrees	
H	Free height over seating position in mm	More than 800	
I	Seat base height:	As per AIS 052	
J	Clearance space for seated Passenger facing partition mm	AIS 052	
K	Seat back/Pad material/Thickness:	Required as per IS 1741:1960	
L	Type:	MDI moulded IS 5509	
M	Upholstery:	Jacquard	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
O	Area for standee passengers (sq.mm.):	As per AIS 052	
Q	Number of seats including one for wheel chair	Minimum 56 seats + Driver	Minimum 40 seats + Driver
R	Number of standees (calculation as per AIS 052)	As per AIS 052	
S	Seats side facing location	Not permitted.	
T	Seat back rest	Fixed	
U	Seat belts & their anchorage	Not necessary except diver seat & wheel chair and those facing aisle (performance etc. as per AIS 052/AIS 005/AIS015,etc)	
V	Performance & strength requirements of:	√	
W	Driver seat	As per AIS 023	
X	Passenger seats	As per AIS 023	
20.2	Gangway:		
A	Minimum interior head room (centre line of gangway) in mm	1900 mm including that in the rear overhang area.	
B	At front axle:		
C	At rear axle:		
D	Other areas		
E	Gangway Width (mm) from gates to longitudinal space between rows of seats (Access to service doors)	Minimum 600 mm	
F	Gangway Width (mm) in longitudinal space between rows of seats	(Refer figure-1 AIS 052) minimum 650 mm excluding armrests and including stanchions- will be measured from seat edge to seat edge.	
21	Driver's working space	As per AIS 052	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
21.1	Driver's seat	As per AIS 023 & AIS 052	
21.2	Driver Door	A driver door of not less than 1600 mm height and 650 mm width and with requisite steps would be provided for entry and exit to driver's work area.	
21.3	Fan	Driver work area would be equipped with a 24V DC, 200mm diameter fan mounted at proper height on side structure.	
21.4	Driver Visibility in front of bus	As per AIS 052	
21.5	Driver Partition	As per AIS 052.	
22	Handrails Minimum length*diameter* height above floor in mm	Handrails as per AIS 052, Colour contrasting and slip resistant of aluminium tubing 32 mm dia, 3 mm thick.	
22.1	Handholds:	Colour contrasting and slip resistant. 2 to 4 Numbers. hand holds per bay of poly-carbonate transparent with provision for advertisements	
23	Stanchions:	Vertically fitted, aluminium tubing with Colour contrasting and slip resistant. 40 mm dia& 3.15 mm thick. Rest As per AIS 052.	
23.1	Bells for Passenger convenience	High visibility bell pushes shall be fitted at a suitable height ( $\geq 1.2$ meter on all/ alternate/convenient stanchions keeping in view convenience of passengers and avoidance of un-necessary/ inadvertent operation by passengers.	
23.2	Window Guardrails:	Not required	
24	Emergency exit doors, warning devices etc:	As per AIS 052/CMVR	
25	Front/rear door, stepwell lights, door open sign	LED as per AIS 008	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
26	Mirrors right/left side exterior/interior:	Convex as per AIS 001 & 002. Interior with double curvature	
27	Towing device at front	Heavy duty for loads of 1.2 times (minimum) the kerb weight of the bus within 30° of the longitudinal axis of the bus. As per CMVR & IS 9760 - ring type	
28	Warning triangle	As per AIS 052/CMVR	
29	Fog Lighting	As per AIS 052/CMVR	
30	Miscellaneous items/requirements		
30.1	Windows		
A	Type of window	Sliding Window	
B	Minimum height of window aperture (clear vision)	≥ 950 mm	
C	Minimum height of upper edge of window aperture from bus floor	As per AIS 052	
D	Cabin luggage racks	Required as per AIS 052	
31	Life cycle requirements of bus (whichever is later)	10 years or 10,00,000 km	
32	Additional requirements – air circulation in driver work area; Noise, vibration and harshness, etc		
32.1	Air circulations and ventilation in driver's area	An air passage/duct/roof hatch to be provided in driver area at a suitable location for proper inflow of air inside the driver cab Drivers work area to be provided with blower or suitable device (200 mm diameter fan) to ensure proper ventilation. These devices may be capable of 3 – speed adjustment	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
32.2	Noise, vibration and harshness, etc.		
32.3	Maximum noise levels inside the saloon (irrespective of AC, non-AC/fuel type/engine location)-test procedure as per AIS 020	85dba	
32.4	Noise Vibration and Harshness levels when measured under driving conditions	Vibration levels / Noise, vibration and harshness (NVH) levels (interior) or as per AIS 153	
33	Fire Detection and Suppression System (FDSS)	An automatic fire detection & Suppression system be essentially provided for engine compartment and Occupant Compartment Fire Protection system (OCFPS) be preferably provided. Possibility of provision of FDSS for entire bus including but not limited to drive line, DIESEL storage and supply system on-board; DIESEL filling point and distribution lines / cluster; wheel wells; electrical systems; etc. may be explored.	
33.1	Fire Condition Monitoring device	Pneumatic Electronic Linear fire detector with stainless steel tube with suitable diameter or as applicable under AIS 135	
33.2	Components for Fire Condition Monitoring Device		
A	Generally, as per, AIS 135, CMVR	Detector operating on rate of rise with Advanced Built in Test Module or as applicable under AIS 135	
		Stainless steel Tube sensor with suitable diameter and should be rodent free	
B	Detector Specification/ requirements: Generally, as per, AIS 135, CMVR (if any)	Detector should operate with Rate of Rise in temperature along with advanced Built-in Test Module that indicates failure in the event of reduced performance over the entire range of sensor tube.	
C	IP Rating	Minimum IP 54	

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Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
D	Enclosure	As per AIS 135/UBS II as applicable	
E	Operational Temperature Range	0°C to +125°C	
F	Shock & Vibration:	Should comply to: BS EN 61373, Table 1,2,3, MIL STD- 810:501.4, 516.5.4, AIS 135 Annexure III	
G	Sensor Tube	As per AIS 135 / UBS II as applicable	
H	Operating Voltage:	18 - 32 V DC	
I	Alarm Current:	Minimum 40mA	
J	General - FDSS		
K	Capacity of the Fire suppression system for each of the different areas	as decided by the Vehicle Manufacturer VM to decide optimal materials and the containers for fire suppression for each of the fire sensitive areas of the Bus.	
L	Material of Construction		
M	Fire suppression system trigger mechanism for each of the fire prone areas	Pneumatically/ mechanically / electro-mechanically and or any other mechanism Operated	
N	Powder (if any used)	UL listed ABC 90%	
34	Air conditioning system - test procedure for type approval		
34.1	Specifications	a) For up to 42°C of saloon temperature and b) For > 42°C of saloon temperature	
34.2	Target results	a) 24+/- 4°C (Up to 42°C) b) Temperature Gradient of 15° (> 42°C of saloon temperature) e.g. If the saloon temperature is 45°, then the target temperature inside the bus is 45°-15°= 30° c) Min avg. air velocity at air vent is 4.5 m/s	
34.3	Apparatus	Lab condition and heating chamber	

Sr. No.	Description	Specifications for 12 mtr BS VI Staff Bus	Specifications for 9 mtr BS VI Staff Bus
34.4	Procedure	<ol style="list-style-type: none"><li>1. Soak for 1 hour</li><li>2. At 2000 rpm</li><li>3. Upto 42°C: pull down time 30 minutes (maximum)(for more than 42°C of saloon temperature, pull down time within 40 min (maximum))</li><li>4. Thermocouple to be placed over minimum 20 number places at nose level</li></ol>	