



**NORTH WESTEREN KARNATAKA ROAD TRANSPORT CORPORATION
CENTRAL OFFICE, GOKUL ROAD, HUBBALLI-580030**

Tender No: T- 42/CALL-2

Dated: 22.06.2026

Specification for Fully Built Double Door Type (Type-II NDX of AIS-052) Bus Body Constructed on 5334mm to 5340mm (210") Wheel Base chassis, fitted with Engine conforming to BS-VI Emission Norms.

NWKRTC intends to procure fully Built Type-II NDX Buses constructed as per the detailed Chassis and Body Specifications provided. The supplier shall ensure that the fully built buses strictly comply with the latest CMVR provisions and are fully aligned with the requirements of AIS-052, AIS-153, and AIS-140 standards.

Quantity – 80 Nos. of Double Door Buses Only

A) Chassis:

IMPORTANT:

1. A complete set of Compliance/Type Approval Certificate (TAC), along with all relevant tables, drawings, briefs, and annexure issued by a certified testing agency established under the provisions of Rule-126 of CMVR, **for the offered model**, shall be uploaded along with the other documents. These documents must be uploaded in the KPP Portal as proof of meeting the pre-qualification criteria.
2. The chassis offered by the Tenderer shall be compliant with AIS-140, AIS-150, and AIS-153. Accordingly, the chassis shall be supplied with an approved GPS/VLT device, panic button, and complete wiring harness conforming to AIS-140 and AIS-153 requirements in all respects.

Sl. No	Particulars	Specification	Remarks
1	Chassis	<p>a) Full forward control, Ladder type with rigid cross members, drive away chassis without cowl or FES conforming to latest revision of KMVR, CMVR & MoRTH regulations prevailing at the time of supply in all respects.</p> <p>b) Chassis shall have front Diesel Engine compliant to BS-VI norms as per G.S.R. 889(E) Dt. 16.09.2016, CRDI-High pressure pump, Air compressor, Radiator, Intercooler, Transmission including Clutch, Gear box and Propeller shafts, Suspension, Rear Axle Assembly, Power Steering Assembly, Seven Tyre Assembly with discs (including spare wheel carrier of Cage Type with clamping arrangements, Brake System of Wabco type or equivalent D/D unit, 24 V Heavy Duty Wiper Assembly</p>	

		<p>with 30" Wiper Arm & 28" two Blades/OEM Design, Halogen head light bulbs and Tail Lamp Assemblies, Two electrical Horns (Roots Type or equivalent), Aesthetically designed Instrument panel</p> <p>c) Proper provision for foundation should be provided in the chassis for construction of Drivers Cabin Structure. The metallic bonnet/OEM Design should facilitate for easy maintenance by O&M staff around the engine area & fire retardant heat insulation to be provided</p> <p>d) Height of the dashboard frame should be at convenient height from the ground for proper visibility by drivers.</p> <p>e) Chassis & Aggregates supplied for bus construction should be a new one and shall not be more than 06 months old at the time of supply.</p>		
2	Dimension of Chassis	Particulars	Requirement	
		1) Wheel Base (mm)	5334 to 5340 (210")	
		2) Overall length (mm)	Shall meet CMVR-126 and details shall be mentioned in certificate	
		3) Overall Height (mm)	As per certificate (TAC) issued by testing Agencies under CMVR-126	
		4) Front overhang (mm)	Min 32% of wheel base and details shall be mentioned in testing Agencies certificate (FOH required for accommodating front door)	
		5) Rear overhang (mm)	Rear overhang should be between 58% to max 60% of Wheelbase.	
		6) GVW (Kg)	As per certificate issued by testing Agencies under CMVR-126	
		7) Max FAW (Kg)	As per certificate issued by testing Agencies under CMVR-126	
		8) Max RAW (Kg)	As per certificate issued by testing Agencies under CMVR-126	
		9) Height of the Chassis	Height of 1010 +/- 50 mm when measured at the middle of Wheel Base.	
		10) Min ground clearance	As per certificate issued by testing Agencies under CMVR-126	
3	Driver seat	3 way adjustable PVC tube knitted "FISA" type seat with 3 point safety belts compiling to AIS-023.		
4	Engine	6 cylinders Inline Diesel, Inter cooled, Turbocharged, and Water cooled, Gear driven Air compressor & Vane pump engine of Tata Cummins / H-Series / Eicher type Meeting CRS BS-VI standard with Power & Torque ranging from 130 KW to 150 KW and 550 Nm to 750 Nm Torque respectively.		

5	Exhaust After Treatment System (EATS)	The system should be rigidly mounted on either side of the chassis frame between the front and rear wheels in the wheel base portion or OEM Design with convenient ground clearance to avoid damages and impact during operations. The warranty of EATS will be 5 years from the date of Registration of vehicle	
6	Air intake system	a) Dry type double filtered Air Cleaner Shall be horizontally mounted underneath the driver seat floor for easy maintenance/OEM Design b) The filter choke up indicator / choke warning mechanism should be provided at a convenient place on dashboard for easy observation by O&M staff, additionally rain water splash guard to be provided c) Air Intake shall be designed to avoid rain water/water splashes into the cage during rainy session.	
7	Fuel Injection System	CRDI High Pressure Pump with Bosch/Denso/Cummins type injectors.	
8	Cooling System	With DAT radiator, Viscous/Viscotronic fan & the coolant reservoir fitted with pressurized cap and located conveniently for ease of filling the coolant.	
9	Lubrication	All lubricating points shall be properly located, easily accessible for ease of greasing.	
10	Pollution & Exhaust Gas	The chassis shall meet BS-VI emission norms complying latest CMVR.	
11	Clutch & Pressure Plate	a) Single plate, dry type, coil spring/diaphragm clutch of suitable diameter with mechanical only or with pneumatic/hydraulic or both actuation b) Pressure plate of diaphragm/ finger type has to be provided. c) Proper locking mechanism between clutch fork and clutch releaser bearing to be provided.	
12	Gear Box	Synchromesh ZF/OEM Design type or Combination of both with minimum 6 forward gears (including overdrive) and one reverse gear suitably designed for operation in all terrain. The Gear shifting mechanism shall be OEM design.	
13	Propeller shaft assembly	Lube for Life (LFL) RSB make or equivalent propeller shaft assemblies with CJ Cross, Yoke etc.	
14	Front Axle	I-beam shall be reverse Eliot design type with forged alloy steel conforming to CMV Rules. The Kingpin and its bushes shall be easily repairable.	
15	Rear Axle	Single type, Fully floating single reduction Hypoid	
16	Wheel Rims and Tyres	a) Tube type 10.00 X 20–16PR or 295/90R20 Radial with one spare wheel assembly. b) The tyres of Rib type pattern only of reputed make shall be provided. c) The tyres shall be confirming to latest IS:15636:2012	

		<ul style="list-style-type: none"> d) The tyres fitted to the chassis should not be more than 6 months old as on the Date of delivery of the chassis. e) Spare tyre shall be provided in a cage type carrier @ LH Side of the chassis/OEM Design. f) Wheel Discs shall be of Wheels India or equivalent type having slots Sufficient for easy inflation of tyres especially at rear wheels. The Inner tyres at rear shall be provided with tube extensions. 	
17	Steering	<ul style="list-style-type: none"> a) Steering system shall be with gear driven coupled to engine, Rane type or equivalent make. b) Oil reservoir shall be located at suitable place for easy maintenance or as per OEM Design and the oil level should be easily visible without opening the reservoir cap. c) Only one make of steering system shall be used for all the vehicles. 	
18	Suspension	Front and Rear Suspension System shall be with of standard semi elliptical multi leaves springs (with or without helper springs). Telescopic type shock absorber of Gabriel type or equivalent shall be used both in front & Rear (minimum 2 nos. in front and 2 nos. in rear).	
19	Brakes	<ul style="list-style-type: none"> a) Full air brake, dual line brake system with improved braking performance, ABS and front & rear drum Type brakes with asbestos free/organic type liners. b) The system shall consist of reputed make parts and assemblies viz Valves, Slack Adjuster, Air Compressor APU/DDU/QSPV/EVSC, hose pipes etc. (As per AIS:150 and AIS-153) c) Conveniently located Flick valve operated pneumatic Parking/Hand /Emergency brake for rear wheels. 	
20	Fuel Tank	Metallic fuel tank with a minimum capacity of 230 Ltrs.	
21	Ad Blue tank capacity	Proportionate to the HSD tank capacity considering the consumption of Ad Blue per liter of HSD consumed.	
22	Electrical System	<ul style="list-style-type: none"> a) Two Batteries of 12 Volts X 150 AH of Exide/Amaron or equivalent make. b) The Batteries fitted to the chassis should not be more than 6 months old as on the date of delivery of the chassis. c) Multiplex Wiring System confirming to AIS-153 d) All Electrical wires shall be clamped and tagged neatly to avoid Sagging, Rubbing etc. causing fire incidents due to Short circuits. e) Battery cable conforming to IS 2465 & IS 6722 of reputed make and suitable length shall be provided. f) Mechanically / Electrically operated battery isolation switch shall be provided. g) The universal Electrical cutoff switch (button operated) shall be located on the dashboard. h) Provision for charging Electronic Ticketing Machine (ETM), Front and Rear Camera, shall be provided. 	

23	Alternator & Self Starter	Starter & Alternator of suitable load/capacity as per manufacturer certificate of Lucas type/SEG be fitted	
24	Instrument panel	Aesthetically designed instrument panel consisting of Speedometer with odometer, Air pressure gauges, Flashing-side indicator and switch warning lamp/buzzer for low air pressure, Charging of batteries, Starter switch, Dipper switch, Battery voltage indicator, Real time KMPL Details, Ad-Blue indicator, etc (Separate provision for regeneration button is desired) The instrument cluster unit should be free from ingress of water and dust, the acrylic material of the instrument panel to be scratch resistant, clear to read all gauges till the life of the vehicle.	
25	High Security Registration Plates (HSRP)	High Security Registration Plates (HSRP) including the third registration mark shall be supplied by the chassis manufacturer in accordance with GSR No. 1162 (E) Dated 04.12.2018 of MoRTH at the time of Registration of fully built bus.	
26	Fire Detection and Alarm System	Fire Detection and Alarm System (As per AIS:135 and AIS-153- As this is a fully built vehicle, the required installations may be carried out during the body-building stage.)	
27	Service Life	The chassis shall be designed for a service life of minimum 15 years or 12 lakh kilometers whichever is earlier.	
28	Warranty	The bidder will be responsible for any defect or failure of Bus Chassis/Aggregates/Assembly Such as: Engine, Air compressor, Radiator, Common Rail, High Pressure Pump (HPP), Turbo charger, Alternator, Starter, Power steering assembly, Gearbox, , Water pump, Belt Tensioner, Pressure plate, Clutch disc, CR Bearing, Clutch Assemblies, Clutch booster, MC & SC Assemblies, Pull & Push rod ends, CJ Shafts bearing, CJ rubber, Rear axle assembly, Wiper assembly, Brakes system, ECU, EVSC, Battery, Wiring harness, Sensors, FDAS, Instrument Panel, AIS-140 & AIS-153 Components, Parking system, DVR & Camera Assemblies etc. due to defective design, material or workmanship for a period of 3 years from the date of registration with Transport Department individually for each bus. The rectification of defect/repair or replacement of failed components/Equipment shall be undertaken by the Bidder free of cost at workshop/division/depot of NWKRTC where these buses are operated. Upon intimation /communication from the depot/division rectification work will be arranged directly by the Bidder or his representative. The bidder shall collect and replace the failed & defective components /Equipments from NWKRTC site at their own cost and responsibility as per the tender clause. Depending on the nature of work to be attended the vehicle may be moved to dealer or attended at our premises	

		<p>A common e-mail ID of the company (supplier of buses) to be provided to all the DC's & DME's to intimate about the warranty related defects/breakdown of vehicles.</p> <p>As this is a fully built vehicle, the required installations such as the FDAS, Spare wheel carrier, wiper units, LED indicators, and other NWKRTC-specified fittings may be carried out during the body-building stage as per NWKRTC requirements.</p>	
--	--	---	--

B) BUS BODY SPECIFICATION:

IMPORTANT:

1. Construction of Bus Body shall be as per the specified Specifications in the Tender in line with NWKRTC AIS-052 Certification No. CIRT/CMVR/BUS CODE/2017/V01008/01 Dated 07.02.2017/amended. This certificate is sole property of the Corporation which shall not be shared for any purpose other than this contract in any form to any person/agency by the successful bidder.
2. Successful bidder has to obtain the AIS-052 extension certificate for BS-VI fully built buses and AIS-153 certification. The same shall be obtained to manufacture prototype bus from the certifying agency listed in CMVR.
3. The successful bidder shall adhere to the following minimum specification such as, type of materials, thicknesses specified, strength of materials, grade and quantity, however any additional/superior features of type approval shall be incorporated without additional cost. The drawings provided along with these specifications are nominal for 210" wheel base. The bus body construction shall be as per the type approved drawings.
4. With respect to usage of Sub-assemblies / Aggregates / parts of bus bodies, approved sources having TAC and COP indicated in the Table-22 of the Type Approval Certificate of the Corporations may be considered. In case of usage of items of other sources having valid TAC and COP, same shall be got approved from CME NWKRTC.
5. The fully built bus shall be as per requirements of AIS-052, AIS-140, AIS-153 and AIS-135.

Sl. No.	Particulars	Specifications		Remarks
1	DIMENSIONS	Description	Dimension / Details	
		Wheel base	210'' (5334 to 5340 mm)	
		Exterior Body width.	Dimensions of these shall meet type as per approved drawings.	
		Interior height at structure stage (at center)		
		Total Body length		
		Height		
		Seating capacity	Extension to the type approval certificate shall include seating capacity as below. Double Door Variant: Minimum 48+DR+CR	
		Seating Layout	2 X 3 seats for all above variants	
2	BUS BODY CONSTRUCTION- GENERAL DATA	STRUCTURE: The construction of caged structure shall be with cold rolled GI Rectangular / Square tubular sections of grade min YSt 240 conforming to IS:4923:1997 with limited quantity of MS Rolled and formed sections adopting TIG/MIG welding technology. All MS Rolled and formed sections shall be chemically treated adopting procedures/methods conforming AIS:052 as under: Corrosion Protection: The quality of the surface treatment shall be tested according to the test methods specified in JIS D0202 or any equivalent standards including BIS Standard. (General Rules of Coating Films for Automotive Parts or equivalent Indian Standards using test panels.) The minimum quality requirements in table below shall be met for test criteria specified in Para 4 of JIS D0202. The compliance to this requirement shall be demonstrated by the body builder to the testing agencies.		

		<p>Checker Mark : No of sections in which film remains intact (without peeling off)</p> <p>Grade 3 shall apply only to Copper and copper alloy bases, Aluminum and aluminum alloy bases and Zinc and Zinc alloy bases</p>	Grade 1	Grade 2	Grade 3	
			100	90 or more	60 or more	
		Note: Bus Body Manufacturer shall provide relevant internal reports or a declaration for compliance for relevant structural and body parts to respective standard.				
3	FLOOR STRUCTURE	<p>a) Min 14 No's of M.S. Rolled Channel conforming to IS-808: 2021 of size 50 x 100 x 50 x 5.5 to 6 mm thickness and 2490mm (98") length be laid on the chassis long member. Except at door pillar level and at rear axle level, collars of all main cross bearers shall faced backwards. 1 No of rear end cross bearer of MS rolled channel 50x100x50x5.5 to 6mm of 2336mm (92") long placed at rear end of chassis for mounting of rear end structure. Collar of this channel shall be faced towards front. 2 Nos of MS Rolled channels 50x100x50x5.5 to 6mm placed along chassis frames lengthwise on both side of chassis connecting corresponding (rear axle housing) "H" section channels. 1 No of MS rolled channel 50x100x50x5.5 to 6mm placed (above the level rear axle housing) width wise connecting H formation channels on both ends.</p> <p>b) The ends of rear axle "H" formation channels be welded to the respective main cross bearers in such a way that these does not come in contact with the rear axle spring assembly, bracket, tyres etc., while the vehicle is in operation. The top level of the "H" formation shall match to top surface of the Main Cross Bearers.</p> <p>c) The floor longitudinal joining the Cross bearers shall be of G.I. formed "C" sections of size 25x125x25x2.50mm in one row for fitment of stanchions and minimum 3 rows of floor longitudinal of G.I formed C section of minimum 25x75x25x2.50mm for 2 & 3 seat assemblies mounting and flooring chequered sheet joints. Two rows of G.I formed angle of size 40x40x3mm/MS Rolled angle 37x37x3mm with zinc coated be provided each in between seat mounting section and sole rail. The floor longitudinal used shall be arranged in such way that each seat leg is fixed on the floor longitudinal. The collar portion of the floor longitudinal be facing downwards. Opposite corners of Joints of floor longitudinal be provided with G.I. triangular Gussets of size 20x50x20x2.5mm.</p>				

4	BODY MOUNTING:	<p>a) The cross bearers be mounted on the chassis without drilling any holes on the chassis long members except at the approved places. M.S. base plates of size minimum 175 x 150 x 8 mm be welded to these rolled M.S. channels (Cross bearers) at the bottom. Diagonal holes of 5/8" dia (16mm) be drilled for these base plates for fitment of "U" Bolts. In between chassis long member and base plates, 12 mm thickness class-"A" grade balata packing conforming to AS:104:82:JUL2015/Latest in single piece be provided. The main cross bearer ends shall be fully welded with M.S. end plates of size minimum 90 x 150 x 6 mm thickness on either ends of channels for mounting of main and stump pillars.</p> <p>b) M.S. High Tensile case hardened galvanized " U " bolts of size 5/8" dia (16mm) conforming to AS:167:62:JULY2001/Latest be used to fasten the floor structure to the chassis with heavy-duty self-locking nylock nuts. The "U" Bolts shall not project more than 1/4" (6mm) above the nylock nuts when fully tightened. Necessary Aluminum Die-cast and tubular inter-poses of suitable dimensions be provided while clamping the "U"- bolts.</p>	
5	DRIVER'S CABIN STRUCTURE AND FLOORING	<p>a) Original Driver's cabin floor supplied along with the chassis be retained, apart from this additional support reinforcement angles of size GI Formed 40x40x3mm/MS Rolled angle 37x37x5mm with zinc coated.</p> <p>b) The main support structure to the Driver's cabin floor be of M.S. Rolled channel "C" Channel of size 40x75x40x5mm. The rear end of the channel be welded to the Bulk Head channel and connected to the original foundation member / brackets provided by the chassis manufacturer and extended up to front end structure. The remaining floor structure be fabricated with GI Formed 40x40x3mm/MS Rolled angle 37x37x3mm with zinc coated and M.S. flats of 40 x 6 mm, which shall be welded to structure including the mudguard support structure. Stump and main pillars at cabin LH side be connected to the cabin foundation channel with GI tube of 60 x 40 x 3mm.</p> <p>c) Original Driver's cabin floor shall be retained; apart from this additional reinforcement, angles be provided for the floor structure. The entire Driver's cabin flooring be covered with 10 SWG Aluminium 5 bar chequered sheet conforming to IS:737:2008 Alloy:523008 Temper: H8 with 4.76mm (3/16") Dia</p>	''

		<p>GI Rivets and 6mm (1/4 ") Dia HT Bolts of round head with Nylock Nuts. The cabin shall be made dust proof using appropriate materials like "T" & "J" rubber and aluminum "L" finisher.</p> <p>d) An opening in the Driver's cabin floor be provided for the gear-box and its lid be hinged to the floor structure with budget lock.</p>	
6	SIDE STRUCTURE:	<p>a) The main pillars of GI rectangular section of size 60 x 40 x 3 mm and stump pillars of GI Rectangular section of size 50 x 40 x 2 mm of grade min YSt 240 conforming to IS:4923:1997 be mounted vertically with Cross bearer. Center-to-Center distance between sides main and stump pillars be 540mm (21.25") below waist rail level, and above waist rail 1080mm (42.5") excluding front bays.</p> <p>b) G.I. flats of size 30 x 6 mm be provided as reinforcement to the side pillar for mounting of grip handles, grab rails etc., 30 x 3 mm G.I flats for fitment of window frames and 50 x 3 mm G.I flats for fitment of interior luggage racks.</p> <p>c) The waist rail G.I. Tubular section of size 60x40x2mm be mounted horizontally between the pillars at a height of 717mm measured from the top level of the cross bearer to top level of waist rail . Box type G.I gussets of size 20x 50x 50 x 20x 2.5 mm be welded at bottom corners of waist rail with side and stump pillars and reinforcement plates of size 125x125x2mm be provided joint of main pillar to waist rail.</p> <p>d) One row of GI Tubular rectangular section of size 50 x 40 x 2 mm be stitch welded between side pillars and parallel member as Center panel rail for fixing stretched panel and skirt panels. Above the wheel arches, G.I. tubular section of size 60 x 40 x 2mm be fully welded as Wheel arch horizontal from wheel arch bay to front end and at rear wheel arch bays.</p> <p>e) The sole rail shall be G.I formed "L" angle of size GI Formed 40x40x3mm/MS Rolled angle 37x37x5mm with zinc coated. The sole rail be mounted on top of the cross bearers on the corner edge of the side pillars, it shall be stitch welded with the side pillars and cross bearers.</p> <p>f) The seat rail GI formed "L" angle of size GI Formed 40x40x3mm/MS Rolled angle 37x37x5mm with zinc coated. Thickness be welded to the side structure at a height of 292mm from the Cross Bearer top level for fixing the Seats.</p> <p>g) G.I formed angle of size 25 x 25 x 3 mm thickness be</p>	

		<p>provided horizontally in between seat rail position and waist rail facing towards saloon side for fitment of truss panel sheet.</p> <p>h) Anti drumming cum truss of G.I. Rectangular Tube of 20x40x2mm be provided diagonally between waist rail and center panel rail.</p> <p>i) The top window rail be of G.I. Tubular section of size 50x40x2mm thickness be welded to the respective main side pillars on both sides at a height of 610mm from top level of Waist rail.</p> <p>j) The cant rail be of G.I Tube of size 40x40x2mm. Below this, GI "L" angle 25 x 40 x 1.6mm between side pillars be welded to the Cant rail for fitment of louver glasses. The cant rail be mounted on top of the side pillars and fully welded.</p> <p>k) The skirt rail be of G.I Tube of size 40x20x2mm welded to the side pillars bottom. Skirt rail at lid portion be made as box type and M.S. 'L' cleats of size 50 x 50 x 2mm be welded at top corners of bottom skirt rail with side pillars.</p> <p>l) Formed G.I "Z" section of size 25x10x25x2mm be stitch welded to the full perimeter of Driver & Emergency door frame for the fitment of ambassador dust proofing rubber.</p> <p>m) The side structure shall be fabricated as per the drawing provided along with this specification for both front and rear passenger door variants.</p>	
7	ROOF STRUCTURE	<p>a) Square tube section roof sticks of size 40 x 40 x 2mm thickness, contoured to body be provided. Height of the roof sticks from center to front and center to rear be lowered by 50 mm progressively. The roof sticks be mounted on the Cant rail and fully welded with formed M.S. "L" angle of size 90 x 25 x 2.5mm x 140mm long on saloon side and 50 x 50 x 2mm triangular gussets on both sides of outer surface. The curvature of the roof sticks be well finished and there should not be any wrinkles. The roof sticks be mounted on each main pillar and in between main pillars.</p> <p>b) Join the roof sticks, minimum 5 rows of roof longitudinal made out of GI formed hat sections of 20x40x40x20x2mm thickness be provided in each bay. Longitudinal be welded to the respective roof sticks with M.S. Gussets of size 50 x 50 x 2.5mm. Web of middle longitudinal be provided with 40 x 6mm M.S. Flats for fitment of Stanchions.</p> <p>c) All doors top apertures and apertures behind entrance door be provided with 1.6 mm thick GI Sheets connecting respective roof sticks and roof</p>	

		longitudinal. d) The structure shall be fabricated as per the drawing provided along with this specification.	
8	FRONT END STRUCTURE	<p>a) The original Front End Structure be adequately supported at the front sides. The front corner windscreen pillar, cant rail and waist rail of the front-end structure be of G.I. tubular section of size 60x40x3mm, remaining vertical and horizontal members be of 60x40x2mm GI tubular section.</p> <p>b) The front windscreen pillars be provided with rectangular insert G.I tube to the full height of the pillars. Wind screen frame made out of M.S. Rolled angle of size 25x25x3mm (for sides and top) and 37x37x3mm (for bottom) be welded to the windscreen pillar, waist rail & cant rail with M.S. flat reinforcement. Structural joints below waist rail level be provided with G.I box type gussets of size 25 x 50 x 50 x 25x2 mm and G.I. cleats of size 35 x 35 x 3 mm M.S. Rolled angle of size 37 x 37 x 3mm be provided at bumper bottom level. Outriggers and sections provided in the chassis front end structure be retained; its side verticals be made as box type and welded to the structure. Driver side original flooring be connected to the side structure with 40x40x3mm G.I angles/37x37x3mm MS Rolled angles.</p> <p>Strengthening of Front end: Two vertical supports of M.S. rolled "C" channels of size 75x40x5.5 to 6mm be provided on both sides of the chassis long member from the bottom of chassis long member to top level of the dash board by bolting to the chassis original holes. The location of channels shall be in such way that, passage for easy removal/ fitment of engine and radiator shall not be restricted. Vertical tubes of front- end structure be connected to these channels. These vertical channels be connected to windshield pillar by outrigger made out of M.S. Rolled "C" channel of size 75x40x5.5 to 6mm four two on each side from vertical support channel to front main pillars. Tow-hook plate of 10mm thick M.S. plate be welded to the vertical channel.</p> <p>The front end structure shall be fabricated as per the drawing provided along with this specification.</p>	
9	REAR END STRUCTURE	<p>The rear end structure be fabricated by using GI tubular section of size 50 x 40 x 2 mm, 40 x 40 x 2mm, 40 x 20 x 2 mm tubes, M.S. flats of 40 x 6 mm.</p> <p>G.I "C" Section of size 25 x 125 x 25 x 2 mm be</p>	

		<p>provided at bottom as rear bumper.</p> <p>The rear end structure shall be fabricated as per the drawing provided along with this specification.</p> <p>Tow-hook plate of 10mm thick M.S. plate be welded to the vertical channel.</p>	
10	SUB ASSEMBLIES	<p>WHEEL ARCH:</p> <p>Half round wheel arch frame with 1.6 mm thick GI sheet to be provided at truss side as additional reinforcement. Both front and rear wheel arch frame shall be fabricated by G.I. formed angle of size 40x40x3mm thickness with M.S. flats of size 40 x 3 mm. The front and rear wheel arches be mounted and welded at a minimum height of 250 mm measured from the top level of the tyre.</p> <p>MUDGUARDS:</p> <p>The mudguard be made of 10 SWG 5 bar Aluminium Chequered sheet be provided. Saloon side half round gap be covered and welded properly. The bottom folding be bolted with the respective structure</p> <p>MUDGUARD FLAPS:</p> <p>Mudguard flaps of 10mm thickness (Rubber sheathing reinforced canvas) for full width of the wheels be provided for front and rear wheels mudguard and bolted with 3mm X 25 mm Aluminum flat beading.</p> <p>Foot Step Well Assembly for Front Door, Rear door & Double door Variants :</p> <p>The main entrance cum exit with three raised step well be provided before the front wheel on LH side. Step well shall suit the Jack Knife (J/k) door with independent pneumatic cylinder mechanism. The step well assembly structure be fabricated by using G.I formed angles of size 40 x 40 x 5 mm/Rolled Angle of size 37x37x5mm with zinc coated, M.S. rolled channel 75 x 40 x 5.5 to 6mm and 40x20x2mm GI tube. Foot step be covered with 10swg (3.15mm) five bar Aluminum chaquered sheet. The steps raised portion and step-well truss portion be provided with 0.7mm thick stainless steel sheet. GI Formed 40x40x3mm/MS Rolled angle 37x37x3mm with zinc coated be provided diagonally between footstep horizontal rolled channels to the channel bolted to the chassis as outrigger apart from welding neatly to the floor structure. 40 mm width step-edge aluminum extrusions & LED lamp for footboard to be provided. One door shall be provided ahead of the front axle and the second door shall be positioned behind the rear axle in double-door buses.</p> <p>BATTERY BOX:</p> <p>Battery Box be provided behind LH front wheel and</p>	

		<p>below the flooring using the space between chassis frame and body skirt. The battery box size be minimum 24" x 25" clear in width and depth. The length of the cables from battery to the main cable cutoff switch be in one length without any joints. The frame be fabricated by using MS formed angles of size 40 x 40 x 3mm. The frame sides be covered with SSLN-1 (Stainless Steel with Low Nickel) grade sheet of 1mm thickness with MIG welding and bottom flooring with 10swg Aluminium chequered sheet riveted to the respective structure rigidly. The battery cable cutout be provided with 6 mm thick Balata packing having "X" cutout at center. The box be made dust proof by applying P.U. sealant at the joints. Battery box lid be fabricated by using 14 SWG Aluminium sheet of hinged type with right round aluminum angular frame of 25 x 3mm, door stiffener of aluminum hat section of size 12x12x50x12x12x12swg and a folding of 35mm at skirt rail.</p> <p>The hinges should be of 40 x 3mm width Aluminium of volvo type having 12mm pitch with stainless steel rod. Budget lock be provided to the lid. Hinged type Metallic stoppers, 2 Nos. of 75mm long Brass Tower Bolts and an Aluminium grip handle of 3" length be provided for the lid.</p> <p>The batteries be kept on the Battery Box platform with 20mm thick good quality wood. One holding clamp made out of MS flat of size 40x3mm be provided.(Or OEM Design)</p> <p>Box type door for fuel tank & Ad blue tank: A Suitable frame work be provided in the side structure just above the fuel tank neck for fueling the vehicles & Top up for AUS-32(Urea) the flap (flush type) made out of 14 SWG Aluminum sheet with spring loaded type hinges be provided.</p>	
11	TOOL BOX	<p>One Tool box be provided behind the Battery Box using the horizontal space up to corresponding Main side pillar. Usage of materials shall be as that of Battery Box. Inside heavy duty lock with outside grip handle and tower bolts be provided with stay rod. stay rod should to tightly intact to avoid vibration & noise</p>	
12	SIDE LUGGAGE BOXES	<p>Luggage box shall be at the left side of the body using the space beside tool box (After providing provision</p>	

for stepney carrier). The frame shall be fabricated by using GI Formed 40x40x3mm/MS Rolled angle 37x37x3mm with zinc coated, M.S. flats of size 40x6mm and G.I tube 40x20x3mm both for up-right and horizontals. Bottom flooring shall be covered with 10 SWG Aluminum chequered sheet and sides be paneled with 14swg Aluminum chequered sheet by using Aluminum solid rivets. Appropriate dust proofing be carried out. Good quality wooden reapers of size 20x40mm x full width shall be provided on the flooring spacing equally. The boxes shall be provided with box lids of 14 SWG Aluminum sheet and one number Heavy duty inside lock for each door. Hinged type door stoppers and one number 75mm Aluminum handles be provided. Rubber pad lining be provided on the side pillars and skirt rail where the lid seats. Inside the box electrical lighting arrangement shall be provided.

REAR DICKEY (Optional)

The Rear Dickey box is to be provided at the rear end of the body by using the space of length body width. The main structure brackets of 75x40x5mm M.S. rolled channels bolted to the chassis frame on each side and extended up-to the body length on both side of chassis longitudinal and the remaining structure be fabricated by using 38x38x3mm M.S. formed angles. Its bottom flooring shall be covered with 10 SWG Aluminum chequered sheet and sides be paneled with 16swg chequered sheet and riveting be done at a pitch of 75mm. The box shall be made dust and leak proof by using P.U. sealant and pitch (roofing compound) for joints. Inside the box electrical lighting arrangement shall be provided. The flooring of the Box shall be covered with Rubber mat.

The box shall be provided with a lid for opening and closing. The lid frame shall be fabricated by using Aluminium "z" section of size 25x40x25x3mm and inside be paneled with 18 SWG. Aluminium sheet riveted with solid rivets and outside be paneled with 14 SWG Aluminium sheet. In the lid structure, M.S. hinges of heavy- duty type two numbers made with 8mm MS flat be provided with reinforcement. The lid stoppers shall be of good quality highly reliable heavy duty gas springs provided on either side of the lid and also with mechanical stopper. Heavy duty inside lock shall be provided for the lid. One number heavy duty hasp and staple shall be provided. Inside saloon, dickey box top structure and flooring should be as that of saloon flooring. The raised dickey portion be provided with MS pressed 'Z' section 2.50mm thickness to the width of the body. 16 SWG GI sheet be stitch welded to the raised dickey box structure at rear end

		<p>also below the lid to the body width at rear end bottom.</p> <p>(All skirts door should be covered by ambassador rubber and uniform gaps to avoid ingress of dust)</p>	
13	DOORS:	<p><u>Passenger doors shall be of jack-knife type</u></p> <p>The door shall be provided with independent pneumatic cylinder (Janatics/Wabco make or equivalent) mechanism enabling to control the movements of the door from switch operation controlled by driver. The entire system shall be ensured Back pressure sensor for passenger safety be provided. Beep sound system to be provide while door is opened, Emergency switches be provided outside and inside of the bus on the body sheet. as per AIS-052 & IP 65 rating</p> <p>Grab rail of 25.00 OD x 2.00 mm of 1.00 mtr length be provided diagonally for front easy climbing up of the steps. MS three hinges of reputed make be provided conforming to IS: 14225:1995 Or latest with easy operation, out of three hinges one foldable hinge-cum-handle be provided at the centre. The complete door frame is powder coated with black color. MS 'L' bracket be fitted on the top of the door along with replaceable type bearing. The door assembly shall fold suitably and should not rub with the footstep. Proper care be taken to ensure no ingress of water and dust & robber stopper to be provided at end.</p> <p>The frames be fabricated with CRMS tube of 50 x 20 x 2.00 mm for outer main frame, also inside be stitched welded with CRMS tube of size 15 x 15 x 2.00 mm to the outer surface of the main frame. Behind the inner tube clear toughened flat safety clear glass of 5.00 mm thickness be pasted with black PU sealant of metal to glass. This rubber profiles- flap rubber, male and female rubber extrusion be provided of EPDM quality conforming to AS: 276:68:DEC2004/ Latest. The flap rubbers be placed in the aluminum grove channels. The entire system shall be ensured for trouble free operation. Three signages of 'X' type red color stickers on glass and standard make tower bolt shall be provided. The finishing work be done neatly with elegant aesthetic. The above specification should be fallowed also for double / Front / rear door vehicles</p> <p>a) Driver's Door:</p> <p>One latest hinged type door be provided to the Driver on the off side in the foremost front bay. Heavy duty Standard quality reputed make lock conforming to IS:14225:1995 with striker plate be provided for inside and outside operation. This lock shall comprise of cup</p>	

		<p>and handles. One No. 6" Aluminum handle at door inside and 12" Aluminum handle at outside be provided. The doorframe be fabricated out of G.I "Z" section of 2mm thickness and the door interior be paneled with 0.7mm stainless steel sheet. The external paneling of the door be done with 18 SWG (1.2mm) half -hard Aluminum sheet. The window frame be as that of saloon windows and clear toughened glasses with locks be provided. The Driver Door Window shall be so positioned to assist the Driver to put his head out to see back side while reversing the vehicle. The door be fitted with 3 Nos. M.S. Forged Hinges conforming to IS: 14225:1995 of latest type with reinforcement, one latch lock and one brass tower bolt also be provided. One hinged type Toughened Clear glass of 5 mm thickness with locking arrangements be provided for Delight bay as ventilator in front of driver door. Additional water bottle holder and compartment to be provide</p> <p>b) Emergency Door/Exits: The emergency door/exits for Driver Cabin and passenger saloon shall be as per specification and to comply with the requirement mentioned in AIS-052.</p>	
14	DASH BOARD AND INSTRUMENT PANEL	<p>The dashboard be extend and connected to the front-end structure. The dashboard be fabricated out of GI Formed 40x40x3mm/MS Rolled angle 37x37x3mm with zinc coated and 40x6mm flats to the full width of the body and up-to the front end structure. The original height of the dashboard be retained. The dash board be paneled with 18 SWG GI sheet over which PVC mat of 2 mm thickness be provided. Original instruments panel be retained. Dashboard truss panel be provided with 0.7 mm thickness stainless steel sheet; maintenance cutout of size 10" x 10" with lid fitted with piano hinges and 3" aluminum tower bolt be provided for power steering oil container 5" x 5" lid to be provided for radiator reservoir. Peep glass of size 10" x 8" to be fitted at LH side below the dash board level.</p> <p>OR FRP dashboard assembly may be provided in place of conventional fabrication for improved aesthetics, finish, and durability to ease the maintenance with proper strengthening of the dash board structure. The shape and design and thickness of the FRP may be got approved from CME before fitment.</p>	
15	BONNET ASSEMBLY	Original bonnet supplied along with chassis be retained. The bonnet top and sides be applied with 2-K P.U. Putty, 2-K P.U. Primer surfacer and topcoat with 2-	

		K P.U. Silver Grey Metallic paint or Other suggested colour. & Clear coat to be applied for better aesthetic look	
16	INTERIOR LUGGAGE RACK:	The light luggage rack of 18" width be made inside the passenger saloon on both sides. The brackets of the rack be fabricated with powder coated M.S. Flats of size 32 x 6mm. The rack flooring be provided with 18 SWG G.I. sheet in tray type riveted to the mounting brackets with GI rivets. The rack (tray) bottom on outer surface be provided with heatlon material over which good quality PVC cloth (Rexine) conforming to IS 1259/1984 of Grade-1 & Class 'A' and 2 mm PVC Matt to be pasted inside the luggage rack area. The rack edges towards saloon side be provided with Aluminium extruded "J" section. The vertical clearance of the rack with roof ceiling shall not be less than 250mm. Brackets be mounted to roof stick with 2 Nos. 5/16" HT GI Bolts and with 2 Nos. 5/16" HT GI Bolts to side pillars. Foremost bay of interior luggage rack behind driver be provided with lid and locking arrangements for providing ETM charger & Driver belongings rack.	
17	POWDER COATED STANCHIONS POLES AND GRAB RAILS	<p>Entrance rail made out of 32 OD x 2 mm thick M.S. ERW tube be provided from cant rail to floor with M.S. end plates of 6 mm thickness and fitted with 5/16" dia HT GI bolts.</p> <p>One row of grab rail (standee grab rail) of 32 OD x 2 mm M.S. ERW tube be fitted to the ceiling in the front and stanchions with golden yellow powder coated Aluminum sockets (Including end brackets) . The grab rail be in line with the edge of the three seater and grab rail shall not be more than in two pieces. Three number of good quality latest design handgrips of plastic triangular type with nylon belt be provided in each bay.</p> <p>Five Nos. strong and rigid stanchions of 38 OD x 2mm thick M.S. ERW golden yellow powder coated pipes with 6 mm M.S. end plates be fitted vertically from the floor to roof properly and rigidly, approximately equitant to each other. These stanchions be fastened to roof and to bottom structure with 5/16" Dia M.S. Bolts and Nylock nut. Suitable reinforcement also be provided to roof structure and floor where the stanchions are fixed. additional standee grab rail</p> <p>Clearly visible Marking with paint be made on the two stanchion pipes at the step well to the following heights from the floor.</p> <ol style="list-style-type: none"> 1. 117 cm. 2. 140 cm. 	

		to enable the conductors to check the height of child passengers in case of doubt. Cross hatch test will be conducted of powder coated poles in order to determine the quality of powder coating work	
18	DRIVER'S CABIN PARTITION:	The driver partition be provided to the 1/3 rd width of the body (interior). The partition be fabricated with M.S. ERW pipes of size 38 OD x 2mm. vertically with 6 mm thickness end plates. M.S. ERW pipes of size 32 OD x 2mm with end plate of 6 mm thickness be provided horizontally at waist rail and window rail level. In between these two pipes, 5 No's of M.S. square tubes of size 25 mm x 2 mm thickness be provided vertically at equidistance. The complete frame be golden yellow powder coated before fitment. 2mm thickness SS covering plate to be provided for entire frame, The fastening of this frame, reinforcement of 6 mm thick M.S. plates be provided at roof structure, Window rail and Waist rail level.	
19	DRIVERS FOOT STEP and GENERAL REQUIREMENTS:	<p>a) The footstep be as per AIS-052 requirements</p> <p>b) For fastening sub-structure like Driver's partition, grab rails, assistance rails, interior luggage carrier, window frames etc., M.S. reinforcements be provided in the body structure.</p> <p>c) All bolts and nuts be of Galvanized high tensile steel conform to IS1367, IS1364 with (BSF threads) self lock- nuts be used except where specifically mentioned.</p> <p>d) All the joints at the structure stage be properly notched and matched, with the rest of the main structural components, to ensure perfect plain surface. The joints be fully welded to ensure proper alignment of the structure before taking-up for panelling work.</p> <p>e) After completion of structure work in all respects, the complete structure be applied with anti-corrosive epoxy paint.</p>	
20	PASSENGER SALOON FLOORING	The passenger saloon flooring 10 SWG (3.15mm) five bar aluminum chequered sheet conforming to IS: 737:2008 Alloy: 523008 temper:H8 be provided. The flooring joints shall be made dust proof. All the joints of the flooring (where two flooring sheets are to be joined) be reinforced at the bottom with 25x75x25x2.00mm M.S pressed C section and riveted with 4.75mm GI Solid rivets in zig zag manner at a pitch of 50mm. In addition to zigzag riveting, bolting be done with GI HT Half Round head bolts of ¼" Dia with Nylock Nuts on Cross Bearers and also right round edge of	

		<p>flooring on Sole rail at a pitch of 200mm..</p> <p>The saloon flooring shall be dust proof, no dust shall enter the passenger saloon from any part of the floor or the bus.</p> <p>Separate inspection lids in two pieces be provided for gear- box and this shall be hinged to the floor structure with budget lock made as of floor material.</p>	
21	PANELLING	<p>EXTERNAL PANELING: In between exterior and interior panels thermocole of 40mm thickness be provided. The exterior body sides panelling i.e., waist stretched panel be of 1 mm thickness reputed make good quality SSLN-1 stainless steel single sheet. The stainless steel sheet be conforming to IS: SS-304. PU sealant be applied on the structure members on which the stainless steel sheet be stretched full be provided and its edges be stitch welded.</p> <p>The skirt paneling be of 14 SWG (2.00mm) thickness Aluminum sheets conforming to IS-737: 1986. The edges and surface of skirt panel on side pillars and at centre panel rail level be pasted by using reputed make adhesive paste. There shall not be any drumming sound in the panels. Inside additional reinforcement at flap doors be hinged from the center panel rail level. The hinges shall be 40x40x2mm width Aluminum of Volvo type having 12mm pitch with stainless steel rod; structure side of hinges be bolted with 6mm bolt & nylock nuts and panel side be Aluminum TIG welded. The wheel arch bay panels also be of 14 SWG Aluminum sheets in which wheel arch finisher be made as a unit. The skirt panels be folded 35 mm at bottom and bolted by using 5/16" bolts and nuts at skirt rail level except at body lids. The body lids be provided with Aluminum formed hat section as reinforcement at center of the lid and ambassador rubber beading to provided at panel edge in order to avoid ingress of dust and water.</p> <p>The rear end stretched panel be of 18 SWG Aluminum sheet conforming to IS-737: 1986, it shall be provided in 2 rows between waist rail & skirt rail to the body width. Provision be made on both sides of middle row of panel to provide sunken type Aluminum box made out of 14" Aluminum sheet for fitment of original tail lamps.</p> <p>The rear corner side doom paneled with 18 SWG Aluminum sheet.</p> <p>EXTERIOR ROOF PANELING:</p> <p>The exterior roof paneling be of 18 SWG aluminum. The roof exterior panels be in lengthwise of the vehicle. The sides of the panels be of Volvo type at cant</p>	

		<p>rail level. The overlap of center panels properly riveted with sealants to avoid ingress of water.</p> <p>Exterior roof panel be covered with Bitumen water proofing compound having Alluminium foil on top of minimum 2 mm thickness of reputed Make covering body full length.</p> <p>After completion of roof exterior paneling, full length of water gutter channel "J" type to be provided at cant rail level.</p> <p>INTERIOR ROOF PANELING: In between exterior and interior roof panels Thermocole of 40mm thickness be provided. The interior roof be paneled with 18 SWG thick Aluminum pre coated sheets/ Powder coated sheets. The panels be widthwise and panel joints be provided with 25mm width Aluminum sleeve beading; at roof longitudinal, Aluminum pop rivets be provided at a pitch of 75 mm.</p> <p>In between the exterior side panel and truss panel 40 mm thickness thermocole be provided. Truss panel be provided with 0.70 mm thickness stainless steel sheets. Vertical joints of panels be provided with 25mm width aluminum sleeve beading. At waist rail level, Aluminum extruded "J" section be provided with star screws. Truss panel be provided with star screws at side pillars and horizontal angle provided in the side structure.</p> <p>Window pillar finishers and louver pillars be of 0.70 mm thickness stainless steel sheets provided with star screws.</p> <p>Stainless steel sheet and thermocole be got approved from the CME.</p> <p>WINDOW FRAMES: The side windows shall be of unit construction to match the profile contour of the side structure so that the whole window frame assembly can be easily fixed on to the body by using rubber packing and fasteners rigidly.</p> <p>The window frame shall be black powder coated. Aluminum extrusion 'E' section of Aluminum extrusion SAL BW 3662 type and SAL BW 3663 type or its equivalent be used with inner flocked rubber channel with terrene at top and sides, Mazda type runner at bottom sliding. The window frame be fixed by using 6mm dia CSK Machine screws by tapping (2 No's at LH, 2 No's at RH and 3 No's at top). The frame be fitted so as to cover the respective pillars. Before fitment of window frame, Aluminum "z" Section of 2 mm thickness be provided at waist rail level by using Silicon Adhesive sealant. The window frame at bottom be provided with slot holes of size 25 x 8 mm to drain-out</p>	
--	--	--	--

		<p>water. The frame corners be riveted with 2 mm thick Aluminum 'L' cleats.</p> <p>WINDOW GLASSES:</p> <p>Good quality approved clear toughened float glasses of 5.00 mm thickness conforming to IS:2553:Part-II:1992 or latest be provided to the windows. Both the sliding glasses be provided with powder coated 3" Aluminum catches with machine screws or Self Spring mechanism lock type catches for easy movement. The overlapping of glasses shall be minimum 50 mm. Aluminum "H" extrusion or equivalent with EPDM sweep rubber be provided as dust and water- proof.</p> <p>LOUVER GLASS: Good quality approved clear toughened float louver glasses of 5.00mm thickness conforming to IS:2553:Part-II:1992 or latest having black colour ceramic border for overlapping area be pasted with UV resistance Poly Urethane metal to glass sealant of reputed make on the cant rail, window rail and side pillars on each bay after application of sealant primer. The pasting be made leak proof. Black colour glass paint be painted on the louver glasses inside at the edges of minimum 30mm width right round the glass. Overlapping edge of louver glass at cant rail inside and top edge window frame collars be applied with PU sealant. The glasses be got approved from CME.</p> <p>FRONT AND REAR WIND SHIELD PAN AND GLASSES:</p> <p>The front windscreen pan be made of unit construction and the pan be fabricated out of 14 SWG Aluminium sheet with M.S. rolled angle 25 x 25 x 3mm at top and sides and 37 x 37 x 3mm at bottom as main frame. Laminated toughened (triplex) front glass be of reputed make in single piece at A-A quality cured profile bend type of size 97" x 47" x 8.76 +/- 0.3mm thickness conforming to IS: 2553. The glass be fixed in good quality EPDM rubber glazing conforming to AS: 276:68: DEC: 2004/ Latest of size 45 x 30 x 15mm with a minimum inclination of 18° with the vertical plane.</p> <p>Rear windshield glasses be of toughened clear float glass of 5.00mm thickness fitted to the window pan by using 25mm EPDM rubber glazing.</p> <p>Front windscreen glass should be three years warranty against natural air crack. Which excludes stone hit, external damages on windscreen and front body shape,</p>	
22	PAINT	<p>2-K High Solid PU Base paint and clear coat conforming to AS: 375:83: SEP: 2016/ Latest be used for exterior Body and interior roof panels. The exterior and interior shall be neatly finished following standard practices of</p>	

		2K painting method with a DFT of 50-60 microns in 2 coats and glossiness of more than 90 units. The approval of design and shade of the paint be obtained from CME before painting.	
23	PASSENGER SEATS	<p>Passenger seat assemblies shall be conforming to AIS-023.</p> <p>All the seats shall be forward facing. Total seating capacity for Double door variant be Min 48 + Driver + Conductor & Safety belts be provided for the seats of foremost row and middle seat of rearmost row. Decorative seat numbers be provided on the window rails.</p> <p>The passenger seats, color, & Rexene material be got approved from CME. Passenger seats shall be one of the approved sources indicated in the Type Approval of Karnataka STUs.</p>	
24	ALUMINIUM EXTRUSIONS:	After completing the internal paneling, the following Aluminum extrusions conforming to IS: 733:1983 be provided. Aluminum extruded step edges strips be provided to the edges of step-well and dashboard. Aluminum extruded 'J' section for truss panel at waist rail level and interior luggage racks. Aluminum "L" extrusion for window catches	
25	FRONT COWL CUM BUMPER:	<p>The front cowl cum bumper be fabricated with 14 SWG Aluminium sheet. The cowl assembly shall have provision for fitment of Headlamps, Indicators and Fog lamps. The cowl shall have least air drag effect. Side door radius be minimum 300mm. Joints of the cowl be perfectly welded. Engine access door/grill be fabricated with right round frame made out of 40x40x3 mm G I formed angles and horizontal ribs of aluminum "V" extrusion and knob type lock be provided at both side of grill.</p> <p>REAR BUMPER: The original bumper received along with chassis shall be fitted at the rear matching to the skirt level. The bumper be fitted with 6 mm thickness M.S. flat brackets with 5/16" Bolts and nuts.</p>	
26	WIRING HARNESS	<ol style="list-style-type: none"> 1. The product shall be of Fire Retardant grade meeting DIN 72551- part 6 standards. 2. Specification: <ol style="list-style-type: none"> a) LT Cables of 4, 5, 6, 8mm having tinned conductors of unhealed copper. b) The corrugated Tubes / Fuses used shall be of Fire Retardant grade. c) Connected Nylon Terminals shall also be of Fire Retardant grade. <p>Good quality Rocker switches shall be used for longer life. The wiring inside the saloon shall be drawn at cant rail level concealed type provided for the full length.</p>	


		Rubber grommets be used for holes on the metal surfaces where wires are drawn.	
27	LIGHTING	<p>The coach shall be provided with lighting arrangement as follows:</p> <ul style="list-style-type: none"> a) Two rows of full length tube type LED lights cum night lamp assemblies conforming to AIS: 012 in the passenger saloon be provided. Reputed make choke should be provided. b) Highly reliable separate electric switches conforming to IS: 9433:1980 be provided to each light assembly. c) One more LED light complete assembly of same make be provided in the Driver's cabin above the Bonnet Assembly. d) Highly reliable separate electric switches be provided to each light assembly. e) Two side indicator lights be provided at the sides of the headlamps. Two numbers fog lamps of 5" dia be provided in the front at the convenient places in the front Bumper. f) Chassis original headlamps be retained as it is addition 2 Nos. headlamps, 65 watt LED fog lamp to be provided g) Original tail lamp assemblies supplied along with the chassis be retained. h) One Buzzer or electric bell shall be provided in the Driver's cabin and bell switch near the conductor seat. i) 8 No's (4 No's on LH & 4 No's on RH) of Volvo type amber colour body indicator lamps be provided at skirt panels. j) Retro reflective conspicuity markings strip line markings of reputed make having not less than 50 mm width conforming to AIS:090:2005 white in colour be provided to the full width of the bus at the front and red at the rear and yellow for LH & RH sides of the bus. k) Original wiring be bundled and bound by a tape and it shall be properly secured in PVC flexible pipe to the rigid portion of the body / chassis with clips. l) The battery cable joining the starter to the batteries shall be with main cable cut-off switch (Isolation switch). Main cable cut-off switch (Isolation switch) be mounted at the Right side of the Driver seat for easy operation. m) One No monotype lamp assembly be provided above the conductor seat. 	


28	SWITCH BOARD AND FUSE BOX:	All the electric switches be of highly reliable latest type. Two main control switches be provided, one for saloon lamps, buzzer, night lights, destination box light and other for head lights, tail lights, number plate lights. The switches be provided near to the Driver for easy operation. The fuse box shall be located at suitable place on dash board to easy maintenance.	
29	WIPER ASSEMBLY:	Wiper assembly motors, With Opposite type wash and wiper system blades of 750 mm shall be fitted.	
30	REAR VIEW MIRROR	Good quality rectangular wide convex rear view mirror conforming to AIS:001:2002 be provided with suitable mounting brackets for adjustments on either side. Smaller size rear view mirrors shall also be provided on either side. Vibration of mirror assembly after fitment shall be avoided. Interior rear view mirror shall be provided above front windshield glass (Cant rail level).	
31	ROOF AIR VENTILATORS	Two Nos. of roof Air ventilators in the Passenger Saloon be provided. The lid of ventilators be Pull and push type mechanism with gas springs. Ventilators be made perfectly dust and leak proof by providing dustproof rubber as per AIS-153. Both Ventilators be emergency exit type as per AIS 052.	
32	SPARE WHEEL CARRIER:	Spare wheel carrier provided in the chassis be retained at suitable place at LH side of the body	
33	OTHER ITEMS	<p>a. HAND GRIPS: Min 15 Nos. of good quality plastic triangular type handgrips with nylon belt having Type Approval shall be provided in the saloon portion.</p> <p>b. FIRST AID AND SUGGESTION BOX: One number First Aid box sealed with medicines as per CMVR rules with transparent front glass and with lettering done in Kannada with red cross mark be provided in driver cabin above cant rail level. One number good quality suggestion box with locking arrangements be fitted on the driver partition facing the saloon portion and lettering in Kannada.</p> <p>c. FIRE EXTINGUISHERS: Minimum Two number standard quality having total 10 kg capacity, dry powder type fire extinguishers with refill confirming to IS 2171 of 1985 (tested for 30kgf/cm²) along with bracket, one fitted on the driver cabin area and remaining in the passenger saloon at convenient place.</p> <p>d. CERTIFICATE FRAME: One number certificate frame of size 254x432mm covered with glass in front be fitted in driver partition at convenient</p>	

		<p>place.</p> <p>e. STICKERS: One set of white background blue labeled signage stickers be provided in the saloon portion mentioning seats for ladies, handicap, senior citizen , emergency door, no smoking and red colour cross mark for door glass. Radium stickers with monogram be provided on either side of the vehicle and on the rear side in Kannada, Corporation sign be provided on front grill, all the letterings shall be in Kannada, type, size and colour and location as per requirements of respective Corporations. Additional “ಪ್ರಾಣಿಗಳ ಮೇಲೆ ದಯೆ ಇರಲಿ” Sticker to be pasted on rear windscreen</p> <p>f. “ಮಕ್ಕಳ ಸಹಾಯವಾಣಿ 1098/112” sticker should be pasted inside bus to visible for passengers</p> <p>g. DIESEL HOOD COVER & AD BLUE TANK COVER Diesel hood cover & Ad blue tank cover be provided at floor level for easy access without disturbing the diesel tank & Ad blue tank location.</p> <p>h. DRIVER SEAT: Original OE Driver Seat Assembly to be retained.</p> <p>i. SPLASH APRONS (MUD FLAPS): splash aprons shall be fitted behind each wheel.</p> <p>j. Window Guard rails: Two rows of Window guard rails made out of 19mm OD 2mm Thick Aluminium duly black powder coated shall be provided on both sides of the entire vehicle. The first guard rail shall be provided at a height of 75 mm from the lower window sill and the distance between two guard rails shall be 75 mm.</p> <p>k. Drivers footrest: Driver footrest (Hat section) of size 25x50x80x50x25mm x 610mm long made out of 16 SWG chequered sheet shall be provided.</p>	
34	DUAL CAM FOR FRONT & REAR WITH PARKING CAMERA SYSTEM	<ol style="list-style-type: none"> 1. ECU – Operating voltage 10-28V 2. Min 7” Display LED unit, with multi function 3. Operating Temperature - minus 30 to +80 degrees 4. Frequency - 58 KHz 5. Measurement range - 0 to 5 Mtrs 6. Waterproof grade minimum IP 67 7. Active sensors & 2 TB storage system(SSD) 8. Buzzer with Hooter audible sound [70-80 db] 9. Four (4) no’s Latest HD Camera including min 2.00 	

		<p>Mega pixel, Anti glare, Night vision, 120° Wide angle, Seamless loop recording function, USB HD output, with doom covering As per IS 16833 specification .</p> <p>Position of cameras :</p> <p>a) 01 Camera at front to view road :</p> <p>It continuously records video footage of the road ahead, while the vehicle is in motion. This device should operate autonomously and can capture crucial moments during driving, providing visual evidence in the event of accidents or disputes.</p> <p>b) 02 Camera to be provided at driver cabin/Saloon for surveillance of the passenger movements.</p> <p>The most common duties and responsibilities of surveillance camera monitoring people to identify instances of suspicious or unusual behaviour with tracking suspect individuals aspects move within a vehicle. Vehicle inside surveillance camera covers aspects of protecting vehicle against risk.</p> <p>c) 01 Camera at rear to view road</p> <p>01 camera at rear to assist the driver to park the vehicle and to view rear portion blind spots while driving.</p>	
35	DESTINATION BOARD:	<p>Two number of destination box to suit the board size of 220mm(9") x 900mm (35.5") be provided in the front LHS of bus behind the windscreen glass. & rear side. The box be fabricated out of 12 SWG Aluminum sheet with an opening piano type hinged lid and locking arrangement by using 2 Nos. 3" brass tower bolts. It shall be on the dashboard with brackets. The box be illuminated with one number Two feet length LED lights and two Nos. 6 mm thick route boards of Hylam to be fitted in the channel guides.</p>	
36	PUBLIC INFORMATION SYSTEM	<p>Vehicle shall be provided with Audio Information System permitting driver or recorded or digitized human speech to inform passengers inside the bus regarding emergency escape provisions, destination, bus stops etc. The System shall comprise of Amplifier, 4 Nos. of Speakers at interior roof of passenger saloon and mic within reach of the Driver.</p>	

37	EMERGENCY DECLARATION SYSTEM.	Vehicle shall be provided with a emergency declaration switch to be operated by the driver / co-driver. This switch should activate a Audio hooter and Visual red blinking light inside and amber light outside the bus to declare an emergency for speedy evacuation of the passengers	
38	EMERGENCY DOOR ALARM SYSTEM	The Emergency doors shall be provided with an audible device to warn the driver when the emergency doors are not securely closed. The warning device shall operate due to the movement of the door catch and not by the movement of the door itself.	
39	VEHICLE LOCATION TRACKING (VLT) WITH EMERGENCY PANIC BUTTONS AS PER AIS-140	<p>Requirement of VLT and Panic Buttons as per AIS-140 shall be as under:</p> <p>Clause No. 3.0 of AIS-140 for ITS functions and requirements.</p> <ol style="list-style-type: none"> Clause No. 3.1.1 of AIS-140 for Functional requirements of VLT. Clause No. 3.1.2 of AIS-140 for Functional requirements of Emergency System Clause No. 4.0 of AIS-140 for Communication Protocol. Clause No. 5.0 of AIS-140 for Construction and Installation. Clause No. 6.0 of AIS-140 for Functional, Performance, Durability, Environmental and Protocol Tests. <p><u>AIS-140 compliant VMUs - Responsibilities of the Vendors</u></p> <ol style="list-style-type: none"> The VLTS device shall be complaint with AIS-140. Fully integrated and working VLTS device fitted to bus shall deliver real time data as per AIS-140. Supplier shall integrate the AIS-140 VLTS devices fitted to vehicles with NWKRTC's VTMS application or it's appointed Vendor's application within 90 days from the date of supply of buses or from the date of communication from NWKRTC. Installation, Integration, Commissioning, O&M is sole responsibility of supplier and these services shall be provided without any additional cost to NWKRTC. The supplier shall ensure sharing of necessary protocols/documents necessary for tracking of the devices throughout life of the bus/device. If NWKRTC implements new Tracking Application in future, existing devices to be integrated with the new Application, without any additional cost to 	

		<p>NWKRTC within 45 days from the date of communication.</p> <p>g) Supplier should bear the subscription charges / monthly rentals of SIM cards during 5 years warranty period.</p> <p>h) Supplier shall provide software up-gradation in existing devices if any during life time of vehicle without any additional cost.</p> <p>i) Required user manual, training manual and O&M manual shall be given by supplier.</p> <p>j) Supplier shall provide all technical and operational support to update file (including OTA), firmware etc. during entire contract and extend all required support during integration and O&M period.</p> <p>k) Supplier shall provide software up-gradation if any during life time of device without any additional cost.</p> <p>l) Vehicle location tracking (VLTS) with emergency panic buttons shall cover warranty of 5 years from date of commissioning of the vehicle.</p> <p>m) If there is any delay in NWKRTC server integration, the OEM should provide the vehicle tracking software for the buses at no additional cost, up to the completion of the 5 years warranty period.</p>	
40	YELLOW COLOUR BAND	A yellow colour band of 50 mm width shall be provided on all steps of entrance door foot steps to assist visually impaired people.	
41	ETM STAND	<p>ETM MACHINE HOLDER – Adjustable Compatible with the Ebix Cash ETM with curvature base the tall pole makes the machine accessible for the user. The stand base bolts securely to a counter and the holder has a rear-locking design to mount Ebix Cash ETM.</p> <p>The sample should get approval from CME NWKRTC</p>	
42	PROVISIONS FOR DIFFERENTLY ABLED PASSENGERS	<p>i) Four passenger seats nearer to entrance door to be designed as priority seats for persons with disabilities. The seats designated for differently abled passengers shall be indicated with appropriate sign.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>ವಿಶೇಷ ಚೇತನರಿಗಾಗಿ</p> </div> <div style="flex: 0.5; text-align: center;">  </div> </div> </div> <p>ii) The priority seats shall be provided with appropriate facility for securing the crutches, canes, walkers etc., to facilitate convenient travel for persons with disabilities.</p> <p><u>In addition to adhering to the AIS-052, the following provisions are also to be made in the buses as per the requirement of respective Corporations:</u></p>	

		<p>iii) Handrails and / or stanchions shall be provided at the entrance .Which allows persons with disabilities to continue using such assists from outside the vehicle while starting to board and to continue using such assists throughout the boarding process, until they reach the designated seat area.</p> <p>iv) Bus shall be provided with controls adjacent to priority seats for requesting stops and which alerts the driver that a mobility aid user wishes to disembark. Such a system shall provide auditory and visual indications  that the request has been made. Controls shall be mounted not higher than 1300 mm and not lower than 410 mm above the floor, shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. (All signs Stickering must be both in Kannada and English language)</p>	
43	GENERAL INSTRUCTIONS	<p>1) Wind screen glass, Window glasses, interior paneling materials, Flooring materials, Passenger seat assemblies, Painting colour shade & make etc., be got approved from CME before taking up the work.</p> <p>2) One No of good quality mirror size 24"x10" shall be provided at inside above the entrance door. Clear coat shall be applied after completion of Stickering work.</p> <p>3) Inside portion battery box be applied with silver gray hammer tone type paint</p> <p>4) The complete under chassis be painted with polyurethane anti- corrosive black paint. Proper precaution is taken to avoid damages to any original equipment / assemblies of chassis. The body builder shall check the Radiator coolant level, battery charging, engine oil level, power steering oil level, oil level in the gearbox as well as in the differential. Care shall be taken to re-connect all the parts and assemblies disconnected while in fabrication and tyre inflation shall be maintained. The pedals removed also be refitted properly. Modification / deviations suggested by authorized inspecting officials during inspection of proto type vehicle shall be incorporated and carried out.</p> <p>5) The documents pertaining to the procurement of materials to the required specification shall be produced at the time of inspection. A copy of the Seating layout drawing shall be given along with each vehicle.</p>	

	<p>6) At the time of delivery/handing over bus to NWKRTC, every BUS shall have minimum 20-litre HSD in fuel tank and 15 liters DEF in DEF tanks.</p> <p>7) Before the delivery of the completed bus, the body be shower tested for roof and sides water leakages and vehicle be taken for Road Test.</p> <p>8) The completed Bus Body shall invariably be delivered to the receiving end in TIP-TOP good condition after thoroughly cleaning the Bus Body including under chassis and to ensure that no metal parts which are not part of bus body is left over in the engine compartment and above the Radiator, Gear box etc.</p>	
--	--	--

Training and Information

Training- the Successful Bidder should provide following mandatory training free of charge to NWKRTC Staff, to ensure proper maintenance and operation of fully Built Buses proposed to be procure under this tender. The Bidder should keep record of these trainings sessions and submit them to the NWKRTC Central Office. Failure to submit proper records within specified time may result in the forfeiture of the security deposit. Training provision is mandatory requirement for the bidder.

Staff	Expected Training Details
Drivers	<ul style="list-style-type: none"> • Per Bus; 5 Drivers / Minimum 30 Drivers. Per depot whichever is more. • Practical on road driving training should be provided on BS VI engine buses. • Training to be given at each Division / Depot where the buses are allotted. • Separate schedule will be given by the central office. • Type of Training - Drive the vehicle smoothly, efficiently, economically, with tips to avoid Break Down and accident. Increase KMPL of buses with special focus on BS VI technology, OBD, use of sensors, and fault codes. • Duration- 1 Day. • Venue- Regional Training Centers, of NWKRTC with a maximum of 20 Drivers per batch.
Driver Trainer's Training	<ul style="list-style-type: none"> • 5 Trainers per division, with an additional 8 Trainers as required by NWKRTC. • Training Focus- How to teach Drivers to drive smoothly and efficiently, avoid breakdowns and accidents, improve KMPL, and understand BS VI technology, fault codes, and auto regeneration Lymph mode etc. • Practical on road driving training on BS VI engine buses. • Duration- 2 Days • Frequency - One Training program per year (5/6 days). • Venue – Regional Training Centers, of NWKRTC,
Mechanics	<ul style="list-style-type: none"> • Depot Training in all depot where buses are allotted. • Duration – 1 Day • Minimum 3 Training program per year, Total 9 training program over 3 years. • Focus: Daily routine maintenance, fault finding using laptops and diagnostic

	<p>tool, maintenance of chassis to maintain BS VI standards, OBD, body building drawings, other essential training.</p> <ul style="list-style-type: none"> • Divisional Workshop Training in all divisions where buses are allotted. • Minimum of 3 Training program per year . Total 9 training program over 3 years. • Focus: Overhauling of various assemblies, aggregates, fault finding, chassis maintenance to maintain BS VI standard, OBD, Body building Drawings and other essential training. • Venue – Regional Training Centers, of NWKRTC,
Supervisors/ Senior Mechanics	<ul style="list-style-type: none"> • Training as designed by the Bidder in consultation with NWKRTC, Central Office. • Minimum 6 Batches over 3 years as per NWKRTC's consent. • Focus ; Chassis, Body maintenance, BS VI Norms • Duration- As per Mutual Discussion. • Venue – Regional Training Centers, of NWKRTC,
Officers & Team	<ul style="list-style-type: none"> • Training designed by the bidder, with a minimum 3 batches in 3 years • Focus: Chassis and Body maintenance and Engine Construction for BS VI technology. • Venue – Manufacturers Training Center consultation with Central office, NWKRTC. • Maximum Participants - 20 per batch • Duration – 3 days per batch • Expenses should be borne by Bidder.

General Conditions:

I). For regular supplies:

1. The bus body structure shall be fabricated as per the drawings provided along with this specification. The drawings pertain to the nominal 210" wheel base chassis. Minor modifications shall be made by the successful tenderer while obtaining the type approval/homologation certificate based on their actual chassis dimensions.
2. All the aggregates shall conform to latest regulations of KMVR & CMVR.
3. Each chassis should be supplied with CMVR related Certificates, Annexures and kit containing standard accessories viz bottle type Hydraulic Jack (Minimum 10 ton capacity), Hand tools, Spare wheel, Wheel spanner & levers, Operator's manual etc. Chassis supplied without relevant document required for registration & proper accessories will not be accepted.
4. All the documents, Type approval certificates etc., in accordance with CMVR rules shall be provided by the OEM for smoother registration of the vehicle. It is the responsibility of the chassis/bus body supplier to provide all the documents required for the Registration of the vehicle.

5. Operator's manual, Body building drawings showing the critical areas to be monitored during body building should be provided for each chassis.
6. A service engineer shall visit the Body builders at the time of body building of the first chassis and arrange a training program to explain the salient features of the new BS-VI chassis and the care to be taken during body building.
7. 04 sets of Hard and soft copies of Service manual consisting of technical features, maintenance schedule, troubleshooting / diagnosis of defects, various lubricants to be used, removal procedure of assemblies or parts, special tools required etc., should be handed over to CME NWKRTC.
8. **04 sets** of parts catalogue both in hard and soft form be handed over to COSP NWKRTC and divisions as informed by CME NWKRTC
9. The successful bidder shall bear the subscription fees for a period of five (5) years during the warranty period for the AIS-140 compliant GPS device. Further, the successful bidder shall carry out the integration of the AIS-140 system with the NWKRTC back-end application, including integration with the VAHAN portal."
10. One set per 20 buses (i.e., 04 Sets for 80 No's) of Tech tool including laptop, connectors, cords, and plug etc., with uploaded current software version/ Back-end software shall be supplied before the delivery of last bus; otherwise, the last bus will not be accepted. The successful bidder has to provide software upgrades without any additional costs till the end of life of vehicle i.e. 15 years as per current government notification. (Laptop should be 12th Generation Intel core i7-(8GB RAM / 1TB SSD) with window 11 home. Tablet should be minimum 8GB RAM, 128GB ROM, 6000 mAH Battery with latest processor and Wi-Fi+5G Cellular Connectivity)

II). Documents to be furnished along with the Tender:

1. The Tender documents shall include one copy of operator's manual, (Hard/Soft) copies specification card and workshop manual for all the models offered in the tender at time of proto
2. Publication of specifications for each model offered in the tender.
3. Manufacturer's chassis drawing including large scale drawings for use of bus body builders.
4. Periodicity for replacement of all types of lubricants along with recommended specification and filters with part numbers.
5. Enlarged drawing showing front end, steering, engine units etc.
6. Electrical Circuit diagram etc.

III). Technical aspects to be complied with:

1. Battery main cable and all electrical cables should be routed properly (tagging / clamping / insulating etc.,) should not pass besides any heating components (Turbo charger, exhaust manifold etc.,) to avoid rubbing, peeling of outer skin of cables, sagging of cables etc., The concealment of all electrical cables/conducting each wiring modules with a separate color coding for easy identification of wiring harness / modules separately with an opening / chamber facility at certain intervals.
2. All pneumatic hose pipes should be properly clamped to avoid sagging and rubbing against other parts.
3. Proper provision for carrying out easy maintenance of all assemblies to be facilitated i.e., easy removal and fitment without any obstacles.
4. ECU, CBCU, Fuse box, battery cutoff switch etc should be placed at appropriate location without any obstacles for easy maintenance and body building.

IV). Pre-delivery Inspection (PDI) : (After completion of Fully built vehicle)

- 1) The chassis should be thoroughly checked of lubricants, Oil & DEF Level greased properly and delivered to bidders' authorized bus body builder workshop along with all relevant documents and standard accessories, the buses delivered shall be complaint to all CMVR/KMVR/MoRTH notification, guidelines etc. issued from time to time.
- 2) The fully built bus should be thoroughly checked, cleaned before delivered to NWKRTC Regional Workshop, HUBBALLI.

CME, NWKRTC

Enclosures: Drawing & Table-22 of NWKRTC.