

Ultra Deluxe Fully built bus (CNG) specifications		
Sr. No.	Parameters	APSRTC TYPE-II
1	Overall Dimensions	Ultra Deluxe
I	Length	As per OEMs ladder frame 11 Meters chassis
II	a. Height	As per Bus Body Code/CMVR
	b. Height of the chassis	Should be 900-1100 +/- 50 mm in unladen condition
III	Width	2600 mm
IV	Wheel base	5639 mm (222") WB to 5845 mm (230") WB
V	Front Over Hang	<= 43 % of WB, 2425 mm (222") & 2513 mm (230")
VI	Rear Over Hang	< = 60% of WB, 3383 mm (222") & 3507 mm (230")
VII	Internal Height	Min 1900 mm
2	Bus Body Structure Homologated Design as per AIS 052 & AIS 153	GI Tubular Structure of YST 310 grade with 3mm thickness.
3	Exterior Panelling	
I	Front	FRP with 4 mm thickness
II	Rear	FRP with 4 mm thickness
III	Roof	Min.0.91 mm GPSP or as approved by APSRTC
IV	Skirt	Fixed panels:1.22 mm, All Flap doors :2.00 mm Aluminium sheets with Air vent lovers
V	Stretch Panel	0.91 mm GPSP
4	Interior Panelling	
I	Roof	ACP sheet of 3mm thickness with FR grade
II	Colour Shade	Prior approval has to be obtained from APSRTC
III	Side	ACP sheet of 3mm thickness with FR grade
IV	Colour Shade	Prior approval has to be obtained from APSRTC
5	Flooring (plywood & Vinyl type / shade /Code)	Plywood 12mm thickness with 2 mm Vinyl mat (BWR, FR grade)
6	Body Insulation	
I	Roof	Thermocol 40mm

II	Side	Thermocol 40mm
7	Dashboard	FRP with 3 mm thickness
8	Engine Hood	Engine Bonnet of preferably 5mm thick in FRP and it should be hinge type with lifting provision towards dash board with proper heat shield like FR Grade glass wool/Nitrile rubber
9	Passenger door	
I	Number of Door	Ultra Deluxe bus with Front entrance door i.e. a head of front axle with min. 780 mm clear aperture (Clear passage of min. 680 mm)
II	Type of door	JK door
III	Passenger door glass tint	Clear glass
IV	Operation(Manual/Pneumatic)	Pneumatically operated
10	Driver door	Hinged type half-length door
I	Driver door window	Sliding window with clear glass
11	Passenger seats	
I	Number of seats	Ultra Deluxe Min. 40+1D seats
II	Seat Layout configuration (3X2, 2X2, 2X1), last rear seat row	2X2 pattern with 125 mm reclining back mechanism
III	Type of seats (High back seats, Plastic moulded, reclining luxury, fixed luxury)	DLX passenger seats with 125 mm reclining back mechanism & with USB wiring harness for charging of mobile phones to be provided in between the seats with suitable connectors, fasteners shall be M 10 X 1.0 H.T. Approved makes are M/s UNO Minda Ltd.
IV	Width of seats	Two seater width – 1020 mm
V	Seat Pitch/span	870/750 mm
VI	Seat leg space	Min 280 mm
VII	Gangway (Excluding Arm rest)	Min 350 mm
VIII	Seat Upholstery - (Fire retardant), Colour, shade, code no. if any	Dobby fabric. Prior approval of fabric sample to be obtained from APSRTC.
IX	Arm Rest	To provide for all seats and arm pad with min 50 mm width
X	Seat Belts (Type of belt)	As per CMVR
XI	Any other specific requirements of seats	As per CMVR
12	Emergency Exits	One Emergency door to be provided on RH side rear of rear wheel as per Bus body code
13	Roof Hatch Passenger saloon	2 roof hatches for seating greater than 30 seater

	qty. and type	
14	Driver roof ventilator.	To be provided
15	Front Windshield	Single glass laminated size (2620 W X 1300 H) mm
16	Rear Windshield	Single glass toughened size (1760 W x 800 H) mm
17	Side Windows	
I	Type	Horizontal sliding windows and sizes as per Homologation Certificate with Top Fixed Glass.
II	Glass tint	5.0 mm thick toughened float quality, safety bronze tinted glasses as per IS: 2553 - 1990 & IS: 2835 – 1987.
III	Any other specific requirements of window	Window frames to be powder coated
18	Sun visor	Roller type to be provided.
19	Rear view Mirrors	Bigger Rear View Mirror to be provided as per CMVR and sample shall be approved by APSRTC
20	Passenger Saloon area mirror	To be provided
21	Wipers	24V, Electrical- Dual Speed, 2 Nos Blades
22	Driver's Partition& Engine Guard Rail	Half partition to be provided in SS sq tubes. Engine guard rail to be provided at bonnet area 25 mm dia, 1.6 mm SS round pipe with grade of 304.
23	Step partition	SS pipe 25 mm dia 1.6 mm thick with grade of 304.
24	Steps	First Step from ground: max. 400 mm Remaining Steps Height: max. 250 mm Step Depth : as per CMVR guidelines
25	Front bumper	FRP with 3.0 mm thickness
26	Rear bumper	FRP with 3.00 mm thickness
27	Towing hook	Both at front & rear to be provided.
28	Battery box	Sliding type to be provided on LH side
29	Tool box	Tool Kit as per CMVR i.e., with suitable size wheel box spanner preferably of min. 450mm length & tommy bar of 1Mtr length with EN8/EN19 steel.
30	First Aid box	As per CMVR Rules and as per approved by APSRTC.
31	Roof Lamps	8 nos. 390x130 mm long LED type light assemblies of approved design & make in passenger saloon in which 2 assemblies shall have in-built night lamps in blue colour & E1 LED light in driver cabin to be provided or as approved by APSRTC
31	Step well lamp	To be provided with aesthetic appearance
32	External Lamps	
I	Headlamps	Halogen in round type with suitable relay as per OEM Design and CMVR requirements.

II	Front direction Indicator	Front direction Indicators to be provided
III	Side direction Indicator	Side direction Indicators to be provided. E1 AMW type indicator light to be provided on both sides at front wheel arch top area.
IV	Side marker lamp	Amber colour side markers to be provided
V	Tail Lamps	Tail lamps as per the OE design or as approved by APSRTC.
VI	Height Marker lamp	LED type height marker lamps E 2 in white color at front and E 2 in red at rear shall be provided.
VII	Fog Lamp (Front and Rear)	Two FOG lamps with Golden Yellow to be provided.
33	Fire extinguisher	E2 of totalling 10 Kgs Fire extinguishers to be provided as per CMVR
34	Reverse horn	To be provided
35	Hatrack	Hat racks to be fabricated as per respective drawings in GI structure.
36	Parcel Courier Box	One Parcel Courier box to be provided at left side of parcel rack in 2nd pillar bay with suitable locking system.
37	Stanchions	Four stainless steel tube stanchions in 304 grade of 38 mm OD x 1.6mm thickness as per IS: 6913-1992 should be provided in the saloon as per seat layout plan.
38	Roof guard rails	Grab rails to be provided on LH & RH side of hat rack with 25mm X 1.6mm SS tube in alternate bays. Length of each grab rail is 1130 mm.
39	Window guard rail	As per CMVR guidelines, 2 rows of WGR shall be provided in SS tube of 20 dia & 1.6 mm thick 304 GR on both sides with SS brackets.
40	Driver seat	Adjustable type HDPE Knitted Driver Seat Assembly for 222"/230"WB of M/s UNO Minda or M/s Pinnacle or any brand as approved by APSRTC with ELR safety belt (in loose also) driver seat confirming to CMVR requirements
41	Driver Seat Belt	
40	Driver Fan	To be provided
41	Bell switch	Electrical to be provided
42	Battery cut off switch	To be provided (both at dash board and in battery box)
43	Side baggage box	To be provided
44	Rear Baggage Box	To be provided
45	Destination Indicators (Qty, Location, size, Make)	2 Nos LED digital destination boards to be provided with proper rigid clamping at Top & Side areas to display in Telugu & English fonts in Amber colour. Size of board at front is 1800x220 mm & 900x 200 mm at rear with in-built controller. Microcraft / Sumeet or any other source approved by APSRTC.
46	TV, Invertor ,Speakers & PA System	Provision for mounting 32" LED TV on driver partition, power Invertor & 6 Nos speakers to be provided . PA system to be provided with voice announcement system.
47	AIS -140 Compliance	As per AIS 140 compliance
48	USB Charger for driver	TIM charger & USB for cell charging to be provided

49	Retro reflective tape	As per CMVR More over Full body back border covered by Red reflective tape.
50	Colour Scheme	Using PU paints as per APSRTC approved colour scheme.
51	AIS 0153 Features – Fire Safety	Fire detection & Alarm system (FDAS) and Fire detection & Suppression System (FDSS) to be provided as per AIS 135 Std.
52	Emergency Lighting system	Emergency Lighting system to be provided as per AIS 0153
53	Warranty	Chassis - 2 years or 3 lakh KM (whichever is later) Body - 2 years or 3 lakh KM (whichever is later)
55	Front Center Out Side Mirror	To be provided
56	Chassis type approval certification issued by GoI	Required
57	Hydraulic jack/Mechanical Jack	>8 Ton Hydraulic jack with self-locking provision/ Mechanical screw jack with min. total height of 480 mm in open condition and 295 mm max. in closed condition. Minimum/Maximum height as per OEM design shall serve the purpose i.e., shall lift the vehicle for removal of tyre with any type of approved tyre sizes in open/closed condition.
58	Air intake system	air filter shall be above the Engine level/under driver seat to intake fresh Air into the engine.
59	Air tanks	should be provided in between rear wheels or in such a way not to cause any obstruction for maintenance of suspension system.
60	CNG cylinders capacity	800 Kgs to 960 Kgs for the chassis for front door, chassis shall be supplied with minimum of 50kgs of CNG
61	Engine with suitable mountings on the chassis frame	a) The Engine shall be 6 - cylinder, vertical, in line, water-cooled with Turbo Charger and Inter Cooler confirming to BS-VI emission norms. TATA Chassis shall be with Cummins Engine AL chassis shall be with H-Series Engine Eicher chassis shall be with Eicher Engine
		b) Engine Output: Minimum 180 HP.
		c) Air compressor maximum duty cycle shall be 30% and should be gear driven for all models. Air compressor minimum capacity shall be 230CC water cooled for air suspension chassis.
62	Cooling system	a) The System shall include Aluminium Radiator with transparent/Translucent De-aeration Tank, Water pump and Viscous Fan of adequate capacity with thermostat of failsafe type to control the coolant temperature in between 85°C to 95°C. The water pump supplied shall be of self-lubricating system type only. The position of the fuse box/electric panel shall not be beside the radiator cap/Coolant top up point.
		Approved radiator makes: Halgona, TATA Toyo, Alkraft, Banco & Modine

63	Pollution & Exhaust Gas (OBD-II NORMS)	The Engine shall meet Bharat Stage-VI OBD-II emission norms applicable at the time of delivery of chassis. The Tenderers shall give a certificate based on their Engine Dynamo Meter Test, the exhaust gas analysis of CO, HC, NOX and PM (Particulate matter) in gms/KWh. A Photo Copy of the test certificate issued under CMVR rules by the Competent Authority shall be submitted along with the tender.
64	Transmission & clutch	a) Single plate dry type, Air assisted Hydraulic actuated. b) ZF WABCO make of clutch booster (With fork & pin type and push on clutch operating lever) or any other make approved by APSRTC. c) PP shaft of Spicer India / RSB makes, (self-lubricated).
65	Gear box	Shall have synchromesh gear box with minimum 5 forward gears (<u>over drive optional</u>) and one reverse gear.
66	Front Axle	a) The Front Axle shall be of I-beam type made of alloy steel forging with a minimum load carrying capacity of 6,000 Kgs., with Reverse Eliot design. b) Approved makes of AAL/TVSAI/VE or OE make.
67	Rear Axle	a) Fully floating type with Hypoid Gears, with a minimum carrying capacity 9700 kgs. and the Crown Wheel Pinion ratio shall be • Maximum 5.29:1 for the chassis with wheel base ranging from 222" to 230" b) Approved makes of AIL(Dhana)/Meritor (AAL)/OE make.
68	Tyres	a) Tyres – 6 nos + 1 Spare tyre shall be provided in a cage type carrier/OEM design carrier. b) 222"/230" chassis shall be supplied with 10.00 x 20 – 16 PR radial tyres with wheel disc size 7.5" x 20" or tubeless. c) Tyres must be less than six (6) months old as on the date of delivery of chassis. d) Wheel disc make - Wheels India. Approved makes and brands: a) 10.00X20 Steel Radial - JK – JUH3/JUH 3+/JUH5, MRF – Steel Muscle S1R4 R16, Michelin XZE2/XZE3 HD/XYZ3 HD/X Multi Z, Apollo, Ceat. Tyres shall meet GSR 479(E) of MoRTH for new design tyres with Rolling resistance, wet and tyres with rolling sound. VMs shall submit certification regarding tyres provided are meeting AIS:142 norms for rolling resistance and wet grip.
69	Steering	a) The steering position shall be on the right-hand side of the bus. The steering system shall be power assisted gear driven pump and sufficiently rugged in design to withstand peak road shocks without risk of component failure or inadvertent alteration of steering geometry. b) Approved makes: ZF or Rane preferably in equal numbers or any other make approved by APSRTC

		c) Drag link/ Tie rod (Steering ball joints) shall be of grease type only.
70	Suspension	Double acting Telescopic Type Shock absorbers shall be provided at front & rear. i) 222"/230" WB chassis shall be supplied with Front weveller suspension & rear air suspension.
71	Brakes	a) Brake system either with disc brake or drum brake or combination of both will be accepted. b) Dual line Full Air Brake system shall be provided on all four wheels with Auto Slack Adjusters of approved make MEI/Haldex/WABCO/Knorr Bremse c) Air shall be drawn by compressor from after filter and before turbo charger. d) The Quick release valve/relay valve at front and relay valve at rear. e) Graduated type hand control valve shall be provided for Hand Brake system with actuators operating on rear wheels. The control valve shall be provided on the right-hand side of the driver/on the Dash Board only and must be easily accessible to the driver. f) APDI is not recommended and may provide ASP /APU as per requirement. g) Auxiliary air tank shall be provided for utilizing air for Auxiliaries. h) Polyamide brake pipes/sleeves with identification colours at ends from SP Valve shall be provided for front, rear and hand brake connections. (Tapes and stickers not allowed). i) Brake system must be of fully WABCO or fully Knorr Bremse, but not in combination. j) ABS has to be provided with 4S/3M or 4S/4M configuration. k) All the chassis shall be with Electronic Vehicle Stability Control (EVSC)
72	Gradeability	16% to 27%
73	Electrical System	a) The system shall be of 24 Volt DC. Battery-isolator switch (main cable cut off switch) shall be provided, besides providing the remote cut off switch on the dashboard. b) Batteries shall be of 2x12 Volts, minimum 25 plates & 180 AH of approved make for 222" - 230" WB c) Electric wires shall be clamped in a neat form and must not be left haphazardly. The electric units and the electrical system fitted shall not be prone to short circuit problems. d) ECU should be placed in such a location easily accessible to the technicians and away from the dash board to avoid damages in case of accidents. e) Battery cable (325 strands with 0.45 mm strand dia.) of reputed make with suitable length shall be provided. f) Approved Battery makes: Exide, Amco, Amaron. g) Batteries must be less than six months old as on the date of delivery of chassis.
74	Alternator & Self Starter	a) Dynamically balanced Alternator with built in regulator shall be provided with minimum of <u>90 to 100 Amps output</u> . b) The Starter Motor shall be with 4 step relay pre-engaged type, flange mounted with minimum rating

		of 4.0 KW.
		c) Both these units shall be so located as to prevent ingress of oil or rainwater into them.
		d) Self-Starter & alternator shall be of make Lucas-TVS, Bosch.
75	Instrument panel	Aesthetically designed Instrument panel with backlit light. It should be as per OBD-II norms and all parameters like speed, air pressure, range, fuel, etc should be displayed in digital form.
		The instrument panel should be properly covered at bottom side to avoid ingress of dust and water
76	Noise Level	Shall meet the MOEF notified limit of 82 db tested as per IS:3028 of 1998 for noise reduction system for the noise made by components of the chassis particularly engine, exhaust system etc.
77	Diagnostic tool	2 nos per depot or 1 no for 10 chassis whichever is higher. <i>The same shall be for life time and there shall not be any renewal fee for continuation of the software. The software update also shall be at FoC basis.</i>
78	Vinyl Stickers	Slogans inside and outside the bus to be provided in vinyl stickers as approved by APSRTC.

Express Fully built bus (CNG) specifications		
Sr. No.	Parameters	APSRTC TYPE-II
1	Overall Dimensions	Express
I	Length	As per OEMs ladder frame 11 Meters chassis
II	a. Height	As per Bus Body Code/CMVR
	b. Height of the chassis	Should be 900-1100 +/- 50 mm in unladen condition
III	Width	2600 mm
IV	Wheel base	5639 mm (222") WB to 5845 mm (230") WB
V	Front Over Hang	<= 43 % of WB, 2425 mm (222") & 2513 mm (230")
VI	Rear Over Hang	< = 60% of WB, 3383 mm (222") & 3507 mm (230")
VII	Internal Height	Min 1900 mm
2	Bus Body Structure Homologated Design as per AIS 052 & AIS 153	GI Tubular Structure of YST 310 grade with 3mm thickness.
3	Exterior Panelling	
I	Front	1.22mm thick Aluminium sheets
II	Rear	1.22mm thick Aluminium sheets
III	Roof	Min.0.91 mm GPSP/18 Gauge Aluminium or as approved by APSRTC
IV	Skirt	Fixed panels:1.22 mm, All Flap doors :2.00 mm Aluminium sheets with Air vent lovers
V	Stretch Panel	0.91 mm GPSP
4	Interior Panelling	
I	Roof	0.91 Aluminium sheet
II	Colour Shade	NA
III	Side	Stainless steel sheet of 0.7 mm of 430 Grade and in scotch/mirrorbright finish
IV	All Interior Finishers	Stainless steel sheet of 0.5 mm of 430 Grade and in scotch/mirror bright finish
V	Colour Shade	NA
5	Flooring (plywood & Vinyl type / shade /Code)	3.00 MM Alu chequered sheet
6	Body Insulation	

I	Roof	Thermocol 40mm
II	Side	Thermocol 40mm
7	Dashboard	0.91 GI sheet
8	Engine Hood	Engine Bonnet of preferably 5mm thick in FRP and it should be hinge type with lifting provision towards dash board with proper heat shield like FR Grade glass wool/Nitrile rubber
9	Passenger door	
I	Number of Door	Express bus with Front entrance door i.e. a head of front axle with min. 780 mm clear aperture (Clear passage of min. 680 mm)
II	Type of door	JK door
III	Passenger door glass tint	Clear glass
IV	Operation(Manual/Pneumatic)	Pneumatically operated
10	Driver door	Hinged type half-length door
I	Driver door window	Sliding window with clear glass
11	Passenger seats	
I	Number of seats	Express Min. 50+1D seats
II	Seat Layout configuration (3X2, 2X2, 2X1), last rear seat row	3X2 pattern
III	Type of seats (High back seats, Plastic moulded, reclining luxury, fixed luxury)	Individual high back seats with powder coated seat frames
IV	Width of seats	a) Two seater width : 840 mm, c) Conductor / Single Seat width : 500 mm. b) Three seater width :1240 mm
V	Seat Pitch/span	860/695 mm
VI	Seat leg space	Min 280 mm
VII	Gangway (Excluding Arm rest)	Min 350 mm
VIII	Seat Upholstery - (Fire retardant), Colour, shade, code no. if any	Seat Rexine shall be as per RDSO specifications. Rexine colour will be approved by APSRTC. Seat assembly sample to be submitted to APSRTC for approval.
IX	Arm Rest	Wherever required as per seat layout
X	Seat Belts (Type of belt)	As per CMVR
XI	Any other specific requirements of	As per CMVR

	seats	
12	Emergency Exits	One Emergency door to be provided on RH side rear of rear wheel as per Bus body code
13	Roof Hatch Passenger saloon qty. and type	2 roof hatches for seating greater than 30 seater
14	Driver roof ventilator.	To be provided
15	Front Windshield	Single glass laminated size (2620 W X 1300 H) mm
16	Rear Windshield	Single glass toughened size (1760 W x 800 H) mm
17	Side Windows	
I	Type	Horizontal sliding windows and sizes as per Homologation Certificate with Top Fixed Glass.
II	Glass tint	5.0 mm thick toughened float quality, safety bronze tinted glasses as per IS: 2553 - 1990 & IS: 2835 – 1987. Bronze tinted Glass and % of tint as per CMVR
III	Any other specific requirements of window	Window frames to be powder coated
18	Sun visor	Roller type to be provided.
19	Rear view Mirrors	Bigger Rear View Mirror to be provided as per CMVR and sample shall be approved by APSRTC
20	Passenger Saloon area mirror	To be provided
21	Wipers	24V, Electrical- Dual Speed, 2 Nos Blades
22	Driver's partition & Guard rail	Half partition to be provided in SS sq tubes. Engine guard rail to be provided at bonnet area 25 mm dia, 1.6 mm SS round pipe with grade of 304.
23	Step partition	SS pipe 25 mm dia 1.6 mm thick with grade of 304.
24	Steps	First Step from ground: max. 400 mm Remaining Steps Height: max. 250 mm Step Depth : as per CMVR guidelines
25	Front bumper	MS formed readymade / FRP. The bumper shall be fabricated in GI sheet 2 mm thick of size 40x300x40 mm to suite the body width.
26	Rear bumper	GI formed section with 2.00 mm thickness. The rear bumper shall be in GI sheet of 2.0 mm thick-formed channel section of size 50x175x50 mm in single piece with brackets in MSL40x40x6mm and to be fitted to the chassis long members.
27	Towing hook	At front & Rear to be provided
28	Battery box	Sliding type to be provided on LH side
29	Tool box	Tool Kit as per CMVR i.e., with suitable size wheel box spanner preferably of min. 450mm length & tommy bar of 1Mtr length with EN8/EN19 steel.

30	First Aid box	As per CMVR Rules and as per approved by APSRTC.
31	Roof Lamps	LED lamp/tube light assembly of 8 nos (size 390x130 mm) in passenger saloon & driver cabin to be provided in which 2 assemblies shall have in-built night lamps in blue colour and 01 no. LED light assembly in driver cabin. Total: 08
31	Step well lamp	To be provided with aesthetic appearance
32	External Lamps	
I	Headlamps	Halogen in round type with suitable relay as per OEM Design and CMVR requirements.
II	Front direction Indicator	Front direction Indicators to be provided
III	Side direction Indicator	Side direction Indicators to be provided. E1 AMW type indicator light to be provided on both sides at front wheel arch top area.
IV	Side marker lamp	Amber colour side markers to be provided
V	Tail Lamps	Tail lamps as per the OE design or as approved by APSRTC.
VI	Height Marker lamp	LED type height marker lamps E 2 in white color at front and E 2 in red at rear shall be provided.
VII	Fog Lamp (Front and Rear)	Two FOG lamps with Golden Yellow to be provided
33	Fire extinguisher	E2 of totalling 10 Kgs Fire extinguishers to be provided as per CMVR
34	Reverse horn	To be provided
35	Hatrack	SS tubes of 16 mm dia with 40x20x1.6 mm 304 GR
36	Stanchions	Four stainless steel tube stanchions in 304 grade of 38 mm OD x 1.6mm thickness as per IS: 6913-1992 should be provided in between the saloon continuous beam and saloon floor as per seat layout plan.
37	Roof grab rail	SS TUBE of 25 dia 1.6 mm 304 GR in 2 rows with E 24 arm slings
38	Window guard rail	As per CMVR guidelines, 2 rows of WGR shall be provided in SS tube of 20 dia & 1.6 mm thick 304 GR on both sides with SS brackets.
39	Driver seat	Adjustable type HDPE Knitted Driver Seat Assembly for 222"/230"WB of M/s UNO Minda/ M/s Pinnacle or any brand as approved by APSRTC with ELR safety belt (in loose also) driver seat confirming to CMVR requirements
40	Driver Seat Belt	
41	Driver Fan	To be provided
42	Bell switch	Electrical To be provided
43	Battery cut off switch	To be provided (both on dash board & in battery box)
44	Side baggage box	To be provided
45	Rear Baggage Box	To be provided
46	Destination Indicators (Qty,	2 Nos LED digital destination boards to be provided with proper rigid clamping at top and both sides to

	Location, size, Make)	display in Telugu & English fonts in Amber color. Size of board at front 1800x220 mm & 900x 200 mm at rear with inbuilt controller. Microcraft / Sumeet or any other source approved by APSRTC.
47	Speakers & PA System	6 Nos to be provided. PA System to be provided with voice announcement system.
48	AIS -140 Compliance	As per AIS 140 compliance
49	USB Charger for driver and conductor	TIM charger & USB for cell charging to be provided at both areas
50	Retro reflective tape	As per CMVR More over Full body back border covered by Red reflective tape.
51	Colour Scheme	Using PU paints as per APSRTC approved colour scheme.
52	AIS 0153 Features – Fire Safety	Fire detection Alarm system (FDAS) and Fire detection and Suppression System (FDSS) to be provided as per AIS 135 Std.
53	Emergency Lighting system	Emergency Lighting system to be provided as per AIS 0153
54	Warranty	Chassis - 2 years or 3 lakh KM (whichever is later) Body - 2 years or 3 lakh KM (whichever is later)
55	FRONT CENTER OUT SIDE MIRROR	To be provided
56	Chassis type approval certification issued by GoI	Required
57	Hydraulic jack/Mechanical Jack	>8 Ton Hydraulic jack with self-locking provision/ Mechanical screw jack with min. total height of 480 mm in open condition and 295 mm max. in closed condition. Minimum/Maximum height as per OEM design shall serve the purpose i.e., shall lift the vehicle for removal of tyre with any type of approved tyre sizes in open/closed condition.
58	Air intake system	air filter shall be above the Engine level/under driver seat to intake fresh Air into the engine.
59	Air tanks	should be provided in between rear wheels or in such a way not to cause any obstruction for maintenance of suspension system.
60	CNG cylinders capacity	800 Ltrs to 960 Ltrs WLC for the chassis for front door, chassis shall be supplied with minimum of 50kgs of CNG
61	Engine with suitable mountings on the chassis frame	c) The Engine shall be 6 - cylinder, vertical, in line, water-cooled with Turbo Charger and Inter Cooler confirming to BS-VI emission norms. TATA Chassis shall be with Cummins Engine AL chassis shall be with H-Series Engine Eicher chassis shall be with Eicher Engine
		b) Engine Output: Minimum 180 HP.
		c) Air compressor maximum duty cycle shall be 30% and should be gear driven for all models.

		Air compressor minimum capacity shall be 230CC water cooled.
62	Cooling system	a) The System shall include Aluminium Radiator with transparent/Translucent De-aeration Tank, Water pump and Viscous Fan of adequate capacity with thermostat of failsafe type to control the coolant temperature in between 85°C to 95°C. The water pump supplied shall be of self-lubricating system type only. The position of the fuse box/electric panel shall not be beside the radiator cap/Coolant top up point. Approved radiator makes: Halgona, TATA Toyo, Alkraft, Banco & Modine
63	Pollution & Exhaust Gas (OBD-II NORMS)	The Engine shall meet Bharat Stage-VI OBD-II emission norms applicable at the time of delivery of chassis. The Tenderers shall give a certificate based on their Engine Dynamo Meter Test, the exhaust gas analysis of CO, HC, NOX and PM (Particulate matter) in gms/KWh. A Photo Copy of the test certificate issued under CMVR rules by the Competent Authority shall be submitted along with the tender.
64	Transmission & clutch	a) Single plate dry type, Air assisted Hydraulic actuated. b) ZF WABCO make of clutch booster (With fork & pin type and push on clutch operating lever) or any other make approved by APSRTC. c) PP shaft of Spicer India / RSB makes, (self-lubricated).
65	Gear box	Shall have synchromesh gear box with minimum 5 forward gears (<u>over drive optional</u>) and one reverse gear.
66	Front Axle	a) The Front Axle shall be of I-beam type made of alloy steel forging with a minimum load carrying capacity of 6,000 Kgs., with Reverse Eliot design. d) Approved makes of AAL/TVSAI/VE or OE make.
67	Rear Axle	a) Fully floating type with Hypoid Gears, with a minimum carrying capacity 9700 kgs. and the Crown Wheel Pinion ratio shall be • Maximum 5.29 :1 for the chassis with wheel base ranging from 222" to 230" b) Approved makes of AIL(Dhana)/Meritor (AAL)/OE make.
68	Tyres	a) Tyres – 6 nos + 1 Spare tyre shall be provided in a cage type carrier/OEM design carrier. b) 222"/230" chassis shall be supplied with 10 x 20 – 16 PR radial tyres with wheel disc size 7.5" x 20". c) Tyres must be less than six months old as on the date of delivery of chassis. d) Wheel disc make - Wheels India. Approved makes and brands: a) 10.00X20 Steel Radial - JK – JUH3/JUH 3+/JUH5, MRF – Steel Muscle S1R4 R16, Michelin XZE2/XZE3 HD/XYZ3 HD/X Multi Z, Apollo, Ceat. Tyres shall meet GSR 479(E) of MoRTH for new design tyres with Rolling resistance, wet and tyres with rolling sound.

		VMs shall submit certification regarding tyres provided are meeting AIS:142 norms for rolling resistance and wet grip.
69	Steering	a) The steering position shall be on the right-hand side of the bus. The steering system shall be power assisted gear driven pump and sufficiently rugged in design to withstand peak road shocks without risk of component failure or inadvertent alteration of steering geometry.
		b) Approved makes: ZF or Rane preferably in equal numbers or any other make approved by APSRTC
		c) Drag link/ Tie rod (Steering ball joints) shall be of grease type only.
70	Suspension	Double acting Telescopic Type Shock absorbers shall be provided at front and Rear. i) 222"/230" WB chassis shall be supplied with Front & rear weveller suspension.
71	Brakes	a) Brake system either with disc brake or drum brake or combination of both will be accepted.
		b) Dual line Full Air Brake system shall be provided on all four wheels with Auto Slack Adjusters of approved make MEI/Haldex/WABCO/Knorr Bremse
		c) Air shall be drawn by compressor from after filter and before turbo charger.
		d) The Quick release valve/relay valve at front and relay valve at rear.
		e) Graduated type hand control valve shall be provided for Hand Brake system with actuators operating on rear wheels. The control valve shall be provided on the right-hand side of the driver/on the Dash Board only and must be easily accessible to the driver.
		f) APDI is not recommended and may provide ASP /APU as per requirement.
		g) Auxiliary air tank shall be provided for utilizing air for Auxiliaries.
		h) Polyamide brake pipes/sleeves with identification colours at ends from SP Valve shall be provided for front, rear and hand brake connections. (Tapes and stickers not allowed).
		i) Brake system must be of fully WABCO or fully Knorr Bremse, but not in combination.
		j) ABS has to be provided with 4S/3M or 4S/4M configuration.
72	Gradeability	k) All the chassis shall be with Electronic Vehicle Stability Control (EVSC) 16% to 27%
73	Electrical System	a) The system shall be of 24 Volt DC. Battery-isolator switch (main cable cut off switch) shall be provided, besides providing the remote cut off switch on the dashboard.
		b) Batteries shall be of 2x12 Volts, minimum 25 plates & 180 AH of approved make for 222" - 230" WB
		c) Electric wires shall be clamped in a neat form and must not be left haphazardly. The electric units and the electrical system fitted shall not be prone to short circuit problems.
		d) ECU should be placed in such a location easily accessible to the technicians and away from the dash board to avoid damages in case of accidents.
		e) Battery cable (325 strands with 0.45 mm strand dia.) of reputed make with suitable length shall be

		provided.
		f) Approved Battery makes: Exide, Amco, Amaron.
		g) Batteries must be less than six months old as on the date of delivery of chassis.
74	Alternator & Self Starter	a) Dynamically balanced Alternator with built in regulator shall be provided with minimum of <u>90 to 100 Amps output</u> .
		b) The Starter Motor shall be with 4 step relay pre-engaged type, flange mounted with minimum rating of 4.0 KW.
		c) Both these units shall be so located as to prevent ingress of oil or rainwater into them.
		d) Self-Starter & alternator shall be of make Lucas-TVS, Bosch.
75	Instrument panel	Aesthetically designed Instrument panel with backlit light. It should be as per OBD-II norms and all parameters like speed, air pressure, range, fuel, etc should be displayed in digital form.
		The instrument panel should be properly covered at bottom side to avoid ingress of dust and water
76	Noise Level	Shall meet the MOEF notified limit of 82 db tested as per IS:3028 of 1998 for noise reduction system for the noise made by components of the chassis particularly engine, exhaust system etc.
77	Diagnostic tool	2 nos per depot or 1 no for 10 chassis whichever is higher. <i>The same shall be for life time and there shall not be any renewal fee for continuation of the software. The software update also shall be at FoC basis.</i>
78	Vinyl Stickers	Slogans inside and outside the bus to be provided in vinyl stickers as approved by APSRTC.

Ultra Pallevelugu Fully built bus (CNG) specifications		
Sr. No.	Parameters	APSRTC TYPE-II
1	Overall Dimensions	Ultra Pallevelugu
I	Length	As per OEMs ladder frame 11 Meters chassis
II	a. Height	As per Bus Body Code/CMVR
	b. Height of the chassis	Should be 900-1100 +/- 50 mm in unladen condition
III	Width	2600 mm
IV	Wheel base	5639 mm (222") WB to 5845 mm (230") WB
V	Front Over Hang	<= 43 % of WB, 2425 mm (222") & 2513 mm (230")
VI	Rear Over Hang	< = 60% of WB, 3383 mm (222") & 3507 mm (230")
VII	Internal Height	Min 1900 mm
2	Bus Body Structure Homologated Design as per AIS 052 & AIS 153	GI Tubular Structure of YST 310 grade with 3mm thickness.
3	Exterior Panelling	
I	Front	1.22mm thick Aluminium sheets
II	Rear	1.22mm thick Aluminium sheets
III	Roof	Min.0.91 mm GPSP/18 Gauge Aluminium or as approved by APSRTC
IV	Skirt	Fixed panels:1.22 mm, All Flap doors :2.00 mm Aluminium sheets with Air vent Lovers
V	Stretch Panel	0.91 mm GPSP
4	Interior Panelling	
I	Roof	0.91 Aluminium sheet
II	Colour Shade	NA
III	Side	Stainless steel sheet of 0.7 mm of 430 Grade and in scotch/mirrorbright finish
IV	All Interior Finishers	Stainless steel sheet of 0.5 mm of 430 Grade and in scotch/mirrorbright finish
V	Colour Shade	NA
5	Flooring (plywood & Vinyl type / shade /Code)	3.00 MM Alu chequered sheet
6	Body Insulation	

I	Roof	Thermocol 40mm
II	Side	Thermocol 40mm
7	Dashboard	0.91 GI sheet
8	Engine Hood	Engine Bonnet of preferably 5mm thick in FRP and it should be hinge type with lifting provision towards dash board with proper heat shield like FR Grade glass wool/Nitrile rubber
9	Passenger door	
I	Number of Door	Ultra Pallevelugu bus wider middle door with min. 1300 mm clear aperture (min. 1200 mm clear passage)
II	Type of door	JK door
III	Passenger door glass tint	Clear glass
IV	Operation(Manual/Pneumatic)	Pneumatically operated
10	Driver door	Hinged type half-length door
I	Driver door window	Sliding window with clear glass
11	Passenger seats	
I	Number of seats	Ultra Pallevelugu Min. 55+1D seats
II	Seat Layout configuration (3X2, 2X2, 2X1), last rear seat row	3X2 pattern
III	Type of seats (High back seats, Plastic moulded, reclining luxury, fixed luxury)	Continuous bottom, individual high back seats with powder coated seat frames.
IV	Width of seats	Single seater width : 406 mm. Two seater width : 813 mm. Three seater width :1200 mm.
V	Seat Pitch/span	740/530 mm
VI	Seat leg space	Min 280 mm
VII	Gangway (Excluding Arm rest)	Min 350 mm
VIII	Seat Upholstery - (Fire retardant), Colour, shade, code no. if any	Seat Rexine shall be as per RDSO specifications. Rexine colour will be approved by APSRTC. Sample seat assembly to be submitted to APSRTC for approval.
IX	Arm Rest	Wherever required as per seat layout
X	Seat Belts (Type of belt)	As per CMVR
XI	Any other specific requirements of	As per CMVR

	seats	
12	Emergency Exits	One Emergency door to be provided on RH side rear of rear wheel as per Bus body code
13	Roof Hatch Passenger saloon qty. and type	2 roof hatches for seating greater than 30 seater
14	Driver roof ventilator.	To be provided
15	Front Windshield	Single glass laminated size (2620 W X 1300 H) mm
16	Rear Windshield	Single glass toughened size (1760 W x 800 H) mm
17	Side Windows	
I	Type	Horizontal sliding windows and sizes as per Homologation Certificate with Top Fixed Glass.
II	Glass tint	5.0 mm thick toughened float quality, safety bronze tinted glasses as per IS: 2553 - 1990 & IS: 2835 – 1987. Bronze tinted Glass and % of tint as per CMVR.
III	Any other specific requirements of window	Window frames to be powder coated
18	Sun visor	Roller type to be provided.
19	Rear view Mirrors	Bigger Rear View Mirror to be provided and sample shall be approved by APSRTC
20	Passenger Saloon area mirror	To be provided
21	Wipers	24V, Electrical- Dual Speed, 2 Nos Blades
22	Driver's partition & Guard rail	Half partition to be provided in SS sq tubes. Engine guard rail to be provided at bonnet area 25 mm dia, 1.6 mm SS round pipe with grade of 304.
23	Step partition	SS pipe 25 mm dia 1.6 mm thick with grade of 304.
24	Steps	First Step from ground: max. 400 mm Remaining Steps Height: max. 250 mm Step Depth : as per CMVR guidelines
25	Front bumper	MS formed readymade / FRP .
26	Rear bumper	GI formed section with 2.00 mm thickness .
27	Towing hook	To be provided at front and rear.
28	Battery box	Sliding type to be provided on LH side
29	Tool box	Tool Kit as per CMVR i.e., with suitable size wheel box spanner preferably of min. 450mm length & tommy bar of 1Mtr length with EN8/EN19 steel.
30	First Aid box	As per CMVR Rules and as per approved by APSRTC.
31	Roof Lamps	LED lamp/tube light assembly of 8 nos (size 390x130 mm) in passenger saloon & driver cabin to be provided in which 2 assemblies shall have in-built night lamps in blue colour and 01 no. LED light

		assembly in driver cabin. Total: 08
31	Step well lamp	To be provided with aesthetic appearance
32	External Lamps	
I	Headlamps	Halogen in round type with suitable relay as per OEM Design and CMVR requirements.
II	Front direction Indicator	Front direction Indicators to be provided
III	Side direction Indicator	Side direction Indicators to be provided . E1 AMW type indicator light to be provided on both sides at front wheel arch top area.
IV	Side marker lamp	Amber colour side markers to be provided
V	Tail Lamps	Tail lamps as per the OE design or as approved by APSRTC.
VI	Height Marker lamp	LED type height marker lamps E 2 in white color at front and E 2 in red at rear shall be provided.
VII	Fog Lamp (Front and Rear)	Two FOG lamps with Golden Yellow to be provided .
33	Fire extinguisher	E2 of totalling 10 Kgs Fire extinguishers to be provided as per CMVR
34	Reverse horn	To be provided
35	Hatrack	SS tubes of 16 mm dia with 40x20x1.6 mm 304 GR
36	Stanchions	Four stainless steel tube stanchions in 304 grade of 38 mm OD x 1.6mm thickness as per IS: 6913-1992 should be provided in between the saloon continuous beam and saloon floor as per seat layout plan.
37	Roof grab rail	SS TUBE of 25 dia 1.6 mm 304 GR in 2 rows with E 24 arm slings
38	Window guard rail	As per CMVR guidelines, 2 rows of WGR shall be provided in SS tube of 20 dia & 1.6 mm thick 304 GR on both sides with SS brackets.
39	Driver seat	Adjustable type HDPE Knitted Driver Seat Assembly for 222"/230"WB of M/s UNO Minda/ M/s Pinnacle or any brand as approved by APSRTC with ELR safety belt (in loose also) driver seat confirming to CMVR requirements
40	Driver Seat Belt	
41	Driver Fan	To be provided
42	Bell switch	Electrical To be provided
43	Battery cut off switch	To be provided(both on dash board & in battery box)
44	Side baggage boxes	To be provided
45	Rear Baggage Box	To be provided
46	Destination Indicators (Qty, Location, size, Make)	2 Nos LED digital destination boards to be provided with proper rigid clamping on top and sides to display in Telugu & English fonts in Amber color. Size of board at front 1800x220 mm & 900x 200 mm at rear with inbuilt controller. Microcraft /Sumeet or any other source approved by APSRTC.
47	Speakers & PA System	6 NOS to be provided .PA system to be provided with voice announcement system.

48	AIS -140 Compliance	As per AIS 140 compliance
49	USB Charger for driver & Conductor	TIM charger & USB for cell charging to be provided at both areas
50	Retro reflective tape	As per CMVR More over Full body back border covered by Red reflective tape.
51	Colour Scheme	Using PU paints as per APSRTC approved colour scheme.
52	AIS 0153 Features – Fire Safety	Fire detection Alarm system (FDAS) and Fire detection and Suppression System (FDSS) to be provided as per AIS 135 Std.
53	Emergency Lighting system	Emergency Lighting system to be provided as per AIS 0153
54	Warranty	Chassis - 2 years or 3 lakh KM (whichever is later) Body - 2 years or 3 lakh KM (whichever is later)
55	FRONT CENTER OUT SIDE MIRROR	To be provided
56	Chassis type approval certification issued by GoI	Required
57	Hydraulic jack/Mechanical Jack	>8 Ton Hydraulic jack with self-locking provision/ Mechanical screw jack with min. total height of 480 mm in open condition and 295 mm max. in closed condition. Minimum/Maximum height as per OEM design shall serve the purpose i.e., shall lift the vehicle for removal of tyre with any type of approved tyre sizes in open/closed condition.
58	Air intake system	air filter shall be above the Engine level/under driver seat to intake fresh Air into the engine.
59	Air tanks	should be provided in between rear wheels or in such a way not to cause any obstruction for maintenance of suspension system.
60	CNG cylinders capacity	800 Ltrs to 960 Ltrs for the chassis for middle door, chassis shall be supplied with minimum of 50kgs of CNG
61	Engine with suitable mountings on the chassis frame	a) The Engine shall be 6 - cylinder, vertical, in line, water-cooled with Turbo Charger and Inter Cooler confirming to BS-VI emission norms. TATA Chassis shall be with Cummins Engine AL chassis shall be with H-Series Engine Eicher chassis shall be with Eicher Engine
		b) Engine Output: Minimum 180 HP.
		c) Air compressor maximum duty cycle shall be 30% and should be gear driven for all models. Air compressor minimum capacity shall be 230cc water cooled for air suspension chassis.
62	Cooling system	a) The System shall include Aluminium Radiator with transparent/Translucent De-aeration Tank, Water pump and Viscous Fan of adequate capacity with thermostat of failsafe type to control the coolant

		temperature in between 85°C to 95°C. The water pump supplied shall be of self-lubricating system type only. The position of the fuse box/electric panel shall not be beside the radiator cap/Coolant top up point.
		Approved radiator makes: Halgona, TATA Toyo, Alkraft, Banco & Modine
63	Pollution & Exhaust Gas (OBD-II NORMS)	The Engine shall meet Bharat Stage-VI OBD-II emission norms applicable at the time of delivery of chassis. The Tenderers shall give a certificate based on their Engine Dynamo Meter Test, the exhaust gas analysis of CO, HC, NOX and PM (Particulate matter) in gms/KWh. A Photo Copy of the test certificate issued under CMVR rules by the Competent Authority shall be submitted along with the tender.
64	Transmission & clutch	a) Single plate dry type, Air assisted Hydraulic actuated. b) ZF WABCO make of clutch booster (With fork & pin type and push on clutch operating lever) or any other make approved by APSRTC. c) PP shaft of Spicer India / RSB makes, (self-lubricated).
65	Gear box	Shall have synchromesh gear box with minimum 5 forward gears (<u>over drive optional</u>) and one reverse gear.
66	Front Axle	a) The Front Axle shall be of I-beam type made of alloy steel forging with a minimum load carrying capacity of 6,000 Kgs., with Reverse Eliot design. b) Approved makes of AAL/TVSAI/VE or OE make.
67	Rear Axle	a) Fully floating type with Hypoid Gears, with a minimum carrying capacity 9700 kgs. and the Crown Wheel Pinion ratio shall be • Maximum 5.29:1, for the chassis with wheel base ranging from 222" to 230" b) Approved makes of AIL(Dhana)/Meritor (AAL)/OE make.
68	Tyres	a) Tyres – 6 nos + 1 Spare tyre shall be provided in a cage type carrier/OEM design carrier. b) 222"/230" chassis shall be supplied with 10 x 20 – 16 PR radial tyres with wheel disc size 7.5" x 20" c) Tyres must be less than six (6) months old as on the date of delivery of chassis. d) Wheel disc make - Wheels India. <u>Approved makes and brands:</u> a) 10.00X20 Steel Radial - JK – JUH3/JUH 3+/JUH5, MRF – Steel Muscle S1R4 R16, Michelin XZE2/XZE3 HD/XYZ3 HD/X Multi Z, Apollo, Ceat. Tyres shall meet GSR 479(E) of MoRTH for new design tyres with Rolling resistance, wet and dry rolling sound. VMs shall submit certification regarding tyres provided are meeting AIS:142 norms for rolling resistance and wet grip.
69	Steering	a) The steering position shall be on the right-hand side of the bus. The steering system shall be power

		assisted gear driven pump and sufficiently rugged in design to withstand peak road shocks without risk of component failure or inadvertent alteration of steering geometry.
		b) Approved makes: ZF or Rane preferably in equal numbers or any make approved by APSRTC
		c) Drag link/ Tie rod (Steering ball joints) shall be of grease type only.
70	Suspension	Double acting Telescopic Type Shock absorbers shall be provided at front & rear. i) 222"/230" WB chassis shall be supplied with Front & rear weveller suspension.
71	Brakes	a) Brake system either with disc brake or drum brake or combination of both will be accepted. b) Dual line Full Air Brake system shall be provided on all four wheels with Auto Slack Adjusters of approved make MEI/Haldex/WABCO/Knorr Bremse c) Air shall be drawn by compressor from after filter and before turbo charger. d) The Quick release valve/relay valve at front and relay valve at rear. e) Graduated type hand control valve shall be provided for Hand Brake system with actuators operating on rear wheels. The control valve shall be provided on the right-hand side of the driver/on the Dash Board only and must be easily accessible to the driver. f) APDI is not recommended and may provide ASP /APU as per requirement. g) Auxiliary air tank shall be provided for utilizing air for Auxiliaries. h) Polyamide brake pipes/sleeves with identification colours at ends from SP Valve shall be provided for front, rear and hand brake connections. (Tapes and stickers not allowed). i) Brake system must be of fully WABCO or fully Knorr Bremse, but not in combination. j) ABS has to be provided with 4S/3M or 4S/4M configuration. k) All the chassis shall be with Electronic Vehicle Stability Control (EVSC)
72	Gradeability	16% to 27%
73	Electrical System	a) The system shall be of 24 Volt DC. Battery-isolator switch (main cable cut off switch) shall be provided, besides providing the remote cut off switch on the dashboard. b) Batteries shall be of 2x12 Volts, minimum 25 plates & 180 AH of approved make for 222" - 230" WB c) Electric wires shall be clamped in a neat form and must not be left haphazardly. The electric units and the electrical system fitted shall not be prone to short circuit problems. d) ECU should be placed in such a location easily accessible to the technicians and away from the dash board to avoid damages in case of accidents. e) Battery cable (325 strands with 0.45 mm strand dia.) of reputed make with suitable length shall be provided. f) Approved Battery makes: Exide, Amco, Amaron. g) Batteries must be less than six months old as on the date of delivery of chassis.

74	Alternator & Self Starter	a) Dynamically balanced Alternator with built in regulator shall be provided with minimum of <u>90 to 100 Amps output.</u>
		b) The Starter Motor shall be with 4 step relay pre-engaged type, flange mounted with minimum rating of 4.0 KW.
		c) Both these units shall be so located as to prevent ingress of oil or rainwater into them.
		d) Self-Starter & alternator shall be of make Lucas-TVS, Bosch.
75	Instrument panel	Aesthetically designed Instrument panel with backlit light. It should be as per OBD-II norms and all parameters like speed, air pressure, range, fuel, etc should be displayed in digital form.
		The instrument panel should be properly covered at bottom side to avoid ingress of dust and water
76	Noise Level	Shall meet the MOEF notified limit of 82 db tested as per IS:3028 of 1998 for noise reduction system for the noise made by components of the chassis particularly engine, exhaust system etc.
77	Diagnostic tool	2 nos per depot or 1 no for 10 chassis whichever is higher. <i><u>The same shall be for life time and there shall not be any renewal fee for continuation of the software. The software update also shall be at FoC basis.</u></i>
78	Vinyl Stickers	Slogans inside and outside the bus to be provided in vinyl stickers as approved by APSRTC.

Metro Express Fully built bus (CNG) specifications		
Sr. No.	Parameters	APSRTC TYPE-I
1	Overall Dimensions	Metro Express
I	Length	As per OEMs ladder frame 11 Meters chassis
II	a. Height	As per Bus Body Code/CMVR
	b. Height of the chassis	Should be 900-1100 +/- 50 mm in unladen condition
III	Width	2600 mm
IV	Wheel base	5639 mm (222") WB to 5845 mm (230") WB
V	Front Over Hang	<= 43 % of WB, 2425 mm (222") & 2513 mm (230")
VI	Rear Over Hang	< = 60% of WB, 3383 mm (222") & 3507 mm (230")
VII	Internal Height	Min 1900 mm
2	Bus Body Structure Homologated Design as per AIS 052 & AIS 153	GI Tubular Structure of YST 310 grade with 3mm thickness.
3	Exterior Panelling	
I	Front	1.22mm thick Aluminium sheets
II	Rear	1.22mm thick Aluminium sheets
III	Roof	Min.0.91 mm GPSP/18 Gauge Aluminium or as approved by APSRTC
IV	Skirt	Fixed panels:1.22 mm, All Flap doors :2.00 mm Aluminium sheets with Air vent lovers
V	Stretch Panel	0.91 mm GPSP
4	Interior Panelling	
I	Roof	0.91 Aluminium sheet
II	Colour Shade	NA
III	Side	Stainless steel sheet of 0.7 mm of 430 Grade and in scotch/mirrorbright finish
IV	All Interior Finishers	Stainless steel sheet of 0.5 mm of 430 Grade and in scotch/mirror bright finish
V	Colour Shade	NA
5	Flooring (plywood & Vinyl type / shade /Code)	3.00 MM Alu chequered sheet
6	Body Insulation	

I	Roof	Thermocol 40mm
II	Side	Thermocol 40mm
7	Dashboard	0.91 GI sheet
8	Engine Hood	Engine Bonnet of preferably 5mm thick in FRP and it should be hinge type with lifting provision towards dash board with proper heat shield like FR Grade glass wool/Nitrile rubber
9	Passenger door	
I	Number of Doors	Metro Express city bus with front and rear entrance doors i.e. a head of front axle and behind the rear axle with clear aperture of min. 780 mm (clear passage of 680 mm) OR Front entrance door with clear aperture of 780 mm and wider middle door within WB
II	Type of door	JK door
III	Passenger door glass tint	Clear glass
IV	Operation(Manual/Pneumatic)	Pneumatically operated
10	Driver door	Hinged type half-length door
I	Driver door window	Sliding window with clear glass
11	Passenger seats	
I	Number of seats	Metro Express with Min. 45+1D seats
II	Seat Layout configuration	2X2 pattern
III	Type of seats	Continuous bottom and continuous back seats with seat frames in powder coating
IV	Width of seats	Two seater width: 813 mm, Single seat width : 420 mm, Conductor seat width : 500 mm. Five Seater width : 1990 mm. Six Seater width : 2440 mm
V	Seat Pitch/span	700/508
VI	Seat leg space	Min 280 mm
VII	Gangway (Excluding Arm rest)	Min 350 mm
VIII	Seat Upholstery - (Fire retardant), Colour, shade, code no. if any	Seat Rexine shall be as per RDSO specifications. Rexine colour will be approved by APSRTC. Seat assembly sample to be submitted to APSRTC for approval
IX	Arm Rest	As & where required as per seat layout
X	Seat Belts (Type of belt)	As per CMVR
XI	Any other specific requirements of seats	As per CMVR
12	Emergency Exits	To be provided as per Bus Body Code.

13	Roof Hatch Passenger saloon qty. and type	2 roof hatches for seating greater than 30 seater
14	Driver roof ventilator.	To be provided
15	Front Windshield	Single glass laminated size (2620 W X 1300 H) mm
16	Rear Windshield	Single glass toughened size (1760 W x 800 H) mm
17	Side Windows	
I	Type	Horizontal sliding windows and sizes as per Homologation Certificate with Top Fixed Glass.
II	Glass tint	5.0 mm thick, toughened safety clear glasses as per IS: 2553-Part-2-1990 & IS: 2835 - 1987.
III	Any other specific requirements of window	Window frames to be powder coated
18	Sun visor	Roller type to be provided.
19	Rear view Mirrors	Bigger Rear View Mirror to be provided and sample shall be approved by APSRTC
20	Passenger Saloon area mirror	To be provided
21	Wipers	24V, Electrical- Dual Speed, 2 Nos Blades
22	Driver's partition & Guard rail	Half partition to be provided in SS sq tubes. Engine guard rail to be provided at bonnet area 25 mm dia, 1.6 mm SS round pipe with grade of 304.
23	Step partition	SS pipe 25 mm dia 1.6 mm thick with grade of 304.
24	Steps	First Step from ground: max. 400 mm Remaining Steps Height: max. 250 mm Step Depth : as per CMVR guidelines
25	Front bumper	MS formed readymade / FRP . The bumper shall be fabricated in GI sheet 2 mm thick of size 40x300x40 mm to suite the body width .
26	Rear bumper	GI formed section with 2.00 mm thickness .The rear bumper shall be in GI sheet of 2.0 mm thick- formed channel section of size 50x175x50 mm in single piece with brackets in MSL40x40x6mm and to be fitted to the chassis long members.
27	Towing hook	At front
28	Battery box	Sliding type to be provided on LH side
29	Tool box	Tool Kit as per CMVR i.e., with suitable size wheel box spanner preferably of min. 450mm length & tommy bar of 1Mtr length with EN8/EN19 steel.
30	First Aid box	As per CMVR Rules and as per approved by APSRTC.
31	Roof Lamps	LED lamp/tube light assembly of 8 nos (size 390x130 mm) in passenger saloon & driver cabin to be provided in which 2 assemblies shall have in-built night lamps in blue colour and 01 no. LED light assembly in driver cabin. Total: 08

31	Step well lamp	To be provided with aesthetic appearance
32	External Lamps	
I	Headlamps	Halogen in round type with suitable relay as per OEM Design and CMVR requirements.
II	Front direction Indicator	Front direction Indicators to be provided
III	Side direction Indicator	Side direction Indicators to be provided . E1 AMW type indicator light to be provided on both sides at front wheel arch top area.
IV	Side marker lamp	Amber colour side markers to be provided
V	Tail Lamps	Tail lamps as per the OE design or as approved by APSRTC.
VI	Height Marker lamp	LED type height marker lamps E 2 in white color at front and E 2 in red at rear shall be provided.
VII	Fog Lamp (Front and Rear)	Two FOG lamps with Golden Yellow to be provided
33	Fire extinguisher	E2 of totalling 10 Kgs Fire extinguishers to be provided as per CMVR
34	Reverse horn	To be provided
35	Hatrack	NA
36	Stanchions	Four stainless steel tube stanchions in 304 grade of 38 mm OD x 1.6mm thickness as per IS: 6913-1992 should be provided in between the saloon continuous beam and saloon floor as per seat layout plan.
37	Roof grab rail	SS TUBE of 25 dia 1.6 mm 304 GR in 2 rows with E 24 arm slings
38	Window guard rail	As per CMVR guidelines, 2 rows of WGR shall be provided in SS tube of 20 dia & 1.6 mm thick 304 GR on both sides with SS brackets.
39	Driver seat	Adjustable type HDPE Knitted Driver Seat Assembly for 222"/230"WB of M/s UNO Minda/ M/s Pinnacle or any brand as approved by APSRTC with ELR safety belt (in loose also) driver seat confirming to CMVR requirements
40	Driver Seat Belt	
41	Driver Fan	To be provided
42	Bell switch	Electrical To be provided
43	Battery cut off switch	To be provided(both on dash board & in battery box)
44	Side baggage box	NA
45	Rear Baggage Box	NA
46	Destination Indicators (Qty, Location, size, Make)	2 Nos LED digital destination boards to be provided with proper rigid clamping on top and rear to display in Telugu & English fonts in Amber colour. Size of board at front 1800x220 mm & 900x 200 mm at rear with inbuilt controller. Microcraft / Sumeet or any other source approved by APSRTC.
47	Speakers & PA Systems	6 NOS to be provided. PA system to be provided with voice announcement system.
48	AIS -140 Compliance	As per AIS 140 compliance
49	USB Charger for driver and	TIM charger & USB for cell charging to be provided at both areas

	Conductor	
50	Retro reflective tape	As per CMVR, More over Full body back border covered by Red reflective tape.
51	Colour Scheme	Using PU paints as per APSRTC approved colour scheme.
52	AIS 0153 Features – Fire Safety	Fire detection Alarm system (FDAS) and Fire detection and Suppression System (FDSS) to be provided as per AIS 135 Std.
53	Emergency Lighting system	Emergency Lighting system to be provided as per AIS 0153
54	Warranty	Chassis - 2 years or 3 lakh KM (whichever is later) Body - 2 years or 3 lakh KM (whichever is later)
55	FRONT CENTER OUT SIDE MIRROR	To be provided
56	Chassis type approval certification issued by GoI	Required
57	Hydraulic jack/Mechanical Jack	>8 Ton Hydraulic jack with self-locking provision/ Mechanical screw jack with min. total height of 480 mm in open condition and 295 mm max. in closed condition. Minimum/Maximum height as per OEM design shall serve the purpose i.e., shall lift the vehicle for removal of tyre with any type of approved tyre sizes in open/closed condition.
58	Air intake system	air filter shall be above the Engine level/under driver seat to intake fresh Air into the engine.
59	Air tanks	should be provided in between rear wheels or in such a way not to cause any obstruction for maintenance of suspension system.
60	CNG cylinders capacity	800 Ltrs to 960 Ltrs WLC for the chassis for front door, chassis shall be supplied with minimum of 50kgs of CNG
61	Engine with suitable mountings on the chassis frame	a) The Engine shall be 6 - cylinder, vertical, in line, water-cooled with Turbo Charger and Inter Cooler confirming to BS-VI emission norms. TATA Chassis shall be with Cummins Engine AL chassis shall be with H-Series Engine Eicher chassis shall be with Eicher Engine
		b) Engine Output: Minimum 180 HP.
		c) Air compressor maximum duty cycle shall be 30% and should be gear driven for all models. Air compressor minimum capacity shall be 230CC water cooled.
62	Cooling system	a) The System shall include Aluminium Radiator with transparent/Translucent De-aeration Tank, Water pump and Viscous Fan of adequate capacity with thermostat of failsafe type to control the coolant temperature in between 85°C to 95°C. The water pump supplied shall be of self-lubricating system type only. The position of the fuse box/electric panel shall not be beside the radiator cap/Coolant top up

		point.
		Approved radiator makes: Halgona, TATA Toyo, Alkraft, Banco & Modine
63	Pollution & Exhaust Gas (OBD-II NORMS)	The Engine shall meet Bharat Stage-VI OBD-II emission norms applicable at the time of delivery of chassis. The Tenderers shall give a certificate based on their Engine Dynamo Meter Test, the exhaust gas analysis of CO, HC, NOX and PM (Particulate matter) in gms/KWh. A Photo Copy of the test certificate issued under CMVR rules by the Competent Authority shall be submitted along with the tender.
64	Transmission & clutch	a) Single plate dry type, Air assisted Hydraulic actuated. b) ZF WABCO make of clutch booster (With fork & pin type and push on clutch operating lever) or any other make approved by APSRTC. c) PP shaft of Spicer India / RSB makes, (self-lubricated).
65	Gear box	Shall have synchromesh gear box with minimum 5 forward gears (<u>over drive optional</u>) and one reverse gear.
66	Front Axle	a) The Front Axle shall be of I-beam type made of alloy steel forging with a minimum load carrying capacity of 6,000 Kgs., with Reverse Eliot design. b) Approved makes of AAL/TVSAI/VE or OE make.
67	Rear Axle	a) Fully floating type with Hypoid Gears, with a minimum carrying capacity 9700 kgs. and the Crown Wheel Pinion ratio shall be • Maximum 5.29:1, for the chassis with wheel base ranging from 222" to 230" b) Approved makes of AIL(Dhana)/Meritor (AAL)/OE make.
68	Tyres	a) Tyres – 6 nos + 1 Spare tyre shall be provided in a cage type carrier/OEM design carrier. b) 222"/230" chassis shall be supplied with 10 x 20 – 16 PR radial tyres with wheel disc size 7.5" x 20". c) Tyres must be less than six (6) months old as on the date of delivery of chassis. d) Wheel disc make - Wheels India. <u>Approved makes and brands:</u> a) 10.00X20 Steel Radial - JK – JUH3/JUH 3+/JUH5, MRF – Steel Muscle S1R4 R16, Michelin XZE2/XZE3 HD/XYZ3 HD/X Multi Z, Apollo, Ceat. Tyres shall meet GSR 479(E) of MoRTH for new design tyres with Rolling resistance, wet and tyres with rolling sound. VMs shall submit certification regarding tyres provided are meeting AIS:142 norms for rolling resistance and wet grip.
69	Steering	a) The steering position shall be on the right-hand side of the bus. The steering system shall be power assisted gear driven pump and sufficiently rugged in design to withstand peak road shocks without risk of component failure or inadvertent alteration of steering geometry.

		b) Approved makes: ZF or Rane preferably in equal numbers or any other make approved by APSRTC c) Drag link/ Tie rod (Steering ball joints) shall be of grease type only.
70	Suspension	Double acting Telescopic Type Shock absorbers shall be provided at front & rear. i) 222"/230" WB chassis shall be supplied with Front & rear weveller suspension.
71	Brakes	a) Brake system either with disc brake or drum brake or combination of both will be accepted. b) Dual line Full Air Brake system shall be provided on all four wheels with Auto Slack Adjusters of approved make MEI/Haldex/WABCO/Knorr Bremse c) Air shall be drawn by compressor from after filter and before turbo charger. d) The Quick release valve/relay valve at front and relay valve at rear. e) Graduated type hand control valve shall be provided for Hand Brake system with actuators operating on rear wheels. The control valve shall be provided on the right-hand side of the driver/on the Dash Board only and must be easily accessible to the driver. f) APDI is not recommended and may provide ASP /APU as per requirement. g) Auxiliary air tank shall be provided for utilizing air for Auxiliaries. h) Polyamide brake pipes/sleeves with identification colours at ends from SP Valve shall be provided for front, rear and hand brake connections. (Tapes and stickers not allowed). i) Brake system must be of fully WABCO or fully Knorr Bremse, but not in combination. j) ABS has to be provided with 4S/3M or 4S/4M configuration. k) All the chassis shall be with Electronic Vehicle Stability Control (EVSC)
72	Gradeability	16% to 27%
73	Electrical System	a) The system shall be of 24 Volt DC. Battery-isolator switch (main cable cut off switch) shall be provided, besides providing the remote cut off switch on the dashboard. b) Batteries shall be of 2x12 Volts, minimum 25 plates & 180 AH of approved make for 222" - 230" WB c) Electric wires shall be clamped in a neat form and must not be left haphazardly. The electric units and the electrical system fitted shall not be prone to short circuit problems. d) ECU should be placed in such a location easily accessible to the technicians and away from the dash board to avoid damages in case of accidents. e) Battery cable (325 strands with 0.45 mm strand dia.) of reputed make with suitable length shall be provided. f) Approved Battery makes: Exide, Amco, Amaron. g) Batteries must be less than six months old as on the date of delivery of chassis.
74	Alternator & Self Starter	a) Dynamically balanced Alternator with built in regulator shall be provided with minimum of <u>90 to 100</u> Amps output.

		b) The Starter Motor shall be with 4 step relay pre-engaged type, flange mounted with minimum rating of 4.0 KW.
		c) Both these units shall be so located as to prevent ingress of oil or rainwater into them.
		d) Self-Starter & alternator shall be of make Lucas-TVS, Bosch.
75	Instrument panel	Aesthetically designed Instrument panel with backlit light. It should be as per OBD-II norms and all parameters like speed, air pressure, range, fuel, etc should be displayed in digital form.
		The instrument panel should be properly covered at bottom side to avoid ingress of dust and water
76	Noise Level	Shall meet the MOEF notified limit of 82 db tested as per IS:3028 of 1998 for noise reduction system for the noise made by components of the chassis particularly engine, exhaust system etc.
77	Diagnostic tool	2 nos per depot or 1 no for 10 chassis whichever is higher. <u>The same shall be for life time and there shall not be any renewal fee for continuation of the software. The software update also shall be at FoC basis.</u>
78	Vinyl Stickers	Slogans inside and outside the bus to be provided in vinyl stickers as approved by APSRTC.

City Ordinary Fully built bus (CNG) specifications		
Sr. No.	Parameters	APSRTC TYPE-I
1	Overall Dimensions	City Ordinary
I	Length	As per OEMs ladder frame 11 Meters chassis
II	a. Height	As per Bus Body Code/CMVR
	b. Height of the chassis	Should be 900-1100 +/- 50 mm in unladen condition
III	Width	2600 mm
IV	Wheel base	5639 mm (222") WB to 5845 mm (230") WB
V	Front Over Hang	<= 43 % of WB, 2425 mm (222") & 2513 mm (230")
VI	Rear Over Hang	< = 60% of WB, 3383 mm (222") & 3507 mm (230")
VII	Internal Height	Min 1900 mm
2	Bus Body Structure Homologated Design as per AIS 052 & AIS 153	GI Tubular Structure of YST 310 grade with 3mm thickness.
3	Exterior Panelling	
I	Front	1.22mm thick Aluminium sheets
II	Rear	1.22mm thick Aluminium sheets
III	Roof	Min.0.91 mm GPSP/18 Gauge Aluminium or as approved by APSRTC
IV	Skirt	Fixed panels:1.22 mm, All Flap doors :2.00 mm Aluminium sheets with Air vent Lovers
V	Stretch Panel	0.91 mm GPSP
4	Interior Panelling	
I	Roof	0.91 Aluminium sheet
II	Colour Shade	NA
III	Side	Stainless steel sheet of 0.7 mm of 430 Grade and in scotch/mirrorbright finish
IV	All Interior Finishers	Stainless steel sheet of 0.5 mm of 430 Grade and in scotch/mirrorbright finish
V	Colour Shade	NA
5	Flooring (plywood & Vinyl type / shade /Code)	3.00 MM Alu chequered sheet
6	Body Insulation	

I	Roof	Thermocol 40mm
II	Side	Thermocol 40mm
7	Dashboard	0.91 GI sheet
8	Engine Hood	Engine Bonnet of preferably 5mm thick in FRP and it should be hinge type with lifting provision towards dash board with proper heat shield like FR Grade glass wool/Nitrile rubber
9	Passenger door	
I	Number of Doors	City bus with front and rear entrance doors i.e. a head of front axle and behind the rear axle with clear aperture of min. 780 mm (clear passage of 680 mm) OR Front entrance door with clear aperture of 780 mm and wider middle door within WB
II	Type of door	JK door
III	Passenger door glass tint	Clear glass
IV	Operation(Manual/Pneumatic)	Pneumatically operated
10	Driver door	Hinged type half-length door
I	Driver door window	Sliding window with clear glass
11	Passenger seats	
I	Number of seats	City Ordinary Min. 45+1D seats
II	Seat Layout configuration	2X2 pattern
III	Type of seats	Continuous bottom and continuous back seats with powder coated seat frames
IV	Width of seats	Two seater width: 813 mm, Single seat width : 420 mm, Conductor seat width : 500 mm. Five Seater width : 1990 mm. Six Seater width : 2440 mm.
V	Seat Pitch/span	700/508 mm
VI	Seat leg space	Min 280 mm
VII	Gangway (Excluding Arm rest)	Min 350 mm
VIII	Seat Upholstery - (Fire retardant), Colour, shade, code no. if any	Seat Rexine shall be as per RDSO specifications. Rexine colour will be approved by APSRTC. Seat assembly sample to be submitted to APSRTC for approval
IX	Arm Rest	As & where required as per seat layout
X	Seat Belts (Type of belt)	As per CMVR
XI	Any other specific requirements of seats	As per CMVR
12	Emergency Exits	To be provided as per Bus Body Code.

13	Roof Hatch Passenger saloon qty. and type	2 roof hatches for seating greater than 30 seater
14	Driver roof ventilator.	To be provided
15	Front Windshield	Single glass laminated size (2620 W X 1300 H) mm
16	Rear Windshield	Single glass toughened size (1760 W x 800 H) mm
17	Side Windows	
I	Type	Horizontal sliding windows and sizes as per Homologation Certificate with Top Fixed Glass.
II	Glass tint	5.0 mm thick, toughened safety clear glasses as per IS: 2553-Part-2-1990 & IS: 2835 - 1987.
III	Any other specific requirements of window	Window frames to be powder coated
18	Sun visor	Roller type to be provided.
19	Rear view Mirrors	Bigger Rear View Mirror to be provided on both sides and sample shall be approved by APSRTC
20	Passenger Saloon area mirror	To be provided
21	Wipers	24V, Electrical- Dual Speed, 2 Nos Blades
22	Driver's partition & Guard rail	Half partition to be provided in SS sq tubes. Engine guard rail to be provided at bonnet area 25 mm dia, 1.6 mm SS round pipe with grade of 304.
23	Step partition	SS pipe 25 mm dia 1.6 mm thick with grade of 304.
24	Steps	First Step from ground: max. 400 mm Remaining Steps Height: max. 250 mm Step Depth : as per CMVR guidelines
25	Front bumper	MS formed readymade / FRP . The bumper shall be fabricated in GI sheet 2 mm thick of size 40x300x40 mm to suite the body width .
26	Rear bumper	GI formed section with 2.00 mm thickness. The rear bumper shall be in GI sheet of 2.0 mm thick-formed channel section of size 50x175x50 mm in single piece with brackets in MSL40x40x6mm and to be fitted to the chassis long members.
27	Towing hook	Both at front & rear to be provided.
28	Battery box	Sliding type to be provided on LH side
29	Tool box	Tool Kit as per CMVR i.e., with suitable size wheel box spanner preferably of min. 450mm length & tommy bar of 1Mtr length with EN8/EN19 steel.
30	First Aid box	As per CMVR Rules and as per approved by APSRTC
31	Roof Lamps	LED lamp assembly of 8 nos (size 390x130 mm) in passenger saloon & driver cabin to be provided in which 2 assemblies shall have in-built night lamps in blue colour and 01 no. LED light assembly in driver cabin. Total: 08

31	Step well lamp	To be provided with aesthetic appearance
32	External Lamps	
I	Headlamps	Halogen in round type with suitable relay as per OEM Design and CMVR requirements.
II	Front direction Indicator	Front direction Indicators to be provided
III	Side direction Indicator	Side direction Indicators to be provided. E1 AMW type indicator light to be provided on both sides at front wheel arch top area.
IV	Side marker lamp	Amber colour side markers to be provided
V	Tail Lamps	Tail lamps as per the OE design or as approved by APSRTC.
VI	Height Marker lamps	LED type height marker lamps E 2 in white color at front and E 2 in red at rear shall be provided.
VII	Fog Lamp (Front and Rear)	Two FOG lamps with Golden Yellow to be provided
33	Fire extinguisher	E2 of totalling 10 Kgs Fire extinguishers to be provided as per CMVR
34	Reverse horn	To be provided
35	Hatrack	NA
37	Stanchions	Four stainless steel tube stanchions in 304 grade of 38 mm OD x 1.6mm thickness as per IS: 6913-1992 should be provided in between the saloon continuous beam and saloon floor as per seat layout plan.
38	Roof grab rail	SS tube of 25 dia 1.6 mm 304 GR in 2 rows with E 24 arm slings
39	Window guard rail	As per CMVR guidelines, 2 rows of WGR shall be provided in SS tube of 20 dia & 1.6 mm thick 304 GR on both sides with SS brackets.
40	Driver seat	Adjustable type HDPE Knitted Driver Seat Assembly for 222"/230"WB of M/s UNO Minda/ M/s Pinnacle or any brand as approved by APSRTC with ELR safety belt (in loose also) driver seat confirming to CMVR requirements
41	Driver Seat Belt	
42	Driver Fan	To be provided
43	Bell switch	Electrical To be provided
44	Battery cut off switch	To be provided(both on dash board & in battery box)
45	Side baggage box	NA
46	Rear Baggage Box	NA
47	Destination Indicators (Qty, Location, size, Make)	2 Nos LED digital destination boards to be provided with proper rigid clamping on top and sides to display in Telugu & English fonts in Amber colour. Size of board at front 1800x220 mm & 900x 200 mm at rear with inbuilt controller. Microcraft / Sumeet or any other source approved by APSRTC.
48	Speakers & PA System	6 Nos to be provided. PA system to be provided with voice announcement system.
49	AIS -140 Compliance	As per AIS 140 compliance
50	USB Charger for driver &	TIM charger & USB for cell charging to be provided at both areas

	Conductor	
51	Retro reflective tape	As per CMVR on all sides. And more over Full body back border covered by Red reflective tape.
52	Colour Scheme	Using PU paints as per APSRTC approved colour scheme.
53	AIS 0153 Features – Fire Safety	Fire detection Alarm system (FDAS) and Fire detection and Suppression System (FDSS) to be provided as per AIS 135 Std.
54	Emergency Lighting system	Emergency Lighting system to be provided as per AIS 0153
55	Warranty	Chassis - 2 years or 3 lakh KM (whichever is later) Body - 2 years or 3 lakh KM (whichever is later)
56	FRONT CENTER OUT SIDE MIRROR	To be provided
57	Chassis type approval certification issued by GoI	Required
58	Hydraulic jack/Mechanical Jack	>8 Ton Hydraulic jack with self-locking provision/ Mechanical screw jack with min. total height of 480 mm in open condition and 295 mm max. in closed condition. Minimum/Maximum height as per OEM design shall serve the purpose i.e., shall lift the vehicle for removal of tyre with any type of approved tyre sizes in open/closed condition.
59	Air intake system	Air filter shall be above the Engine level/under driver seat to intake fresh Air into the engine.
60	Air tanks	should be provided in between rear wheels or in such a way not to cause any obstruction for maintenance of suspension system.
61	CNG cylinders capacity	800 Ltrs to 900 Ltrs of water capacity , chassis shall be supplied with minimum of 50 Ltrs of CNG
62	Engine with suitable mountings on the chassis frame	a) The Engine shall be 6 - cylinder, vertical, in line, water-cooled with Turbo Charger and Inter Cooler confirming to BS-VI emission norms. TATA Chassis shall be with Cummins Engine AL chassis shall be with H-Series Engine Eicher chassis shall be with Eicher Engine
		b) Engine Output: Minimum 180 HP.
		c) Air compressor maximum duty cycle shall be 30% and should be gear driven for all models. Air compressor minimum capacity shall be 230CC water cooled.
63	Cooling system	a) The System shall include Aluminium Radiator with transparent/Translucent De-aeration Tank, Water pump and Viscous Fan of adequate capacity with thermostat of failsafe type to control the coolant temperature in between 85°C to 95°C. The water pump supplied shall be of self-lubricating system type only. The position of the fuse box/electric panel shall not be beside the radiator cap/Coolant top up point.

		Approved radiator makes: Halgona, TATA Toyo, Alkraft, Banco & Modine
64	Pollution & Exhaust Gas (OBD-II NORMS)	The Engine shall meet Bharat Stage-VI OBD-II emission norms applicable at the time of delivery of chassis. The Tenderers shall give a certificate based on their Engine Dynamo Meter Test, the exhaust gas analysis of CO, HC, NOX and PM (Particulate matter) in Gms/KWh. A Photo Copy of the test certificate issued under CMVR rules by the Competent Authority shall be submitted along with the tender.
65	Transmission & clutch	a) Single plate dry type, Air assisted Hydraulic actuated. b) ZF WABCO make of clutch booster (With fork & pin type and push on clutch operating lever) or any other make approved by APSRTC. c) PP shaft of Spicer India / RSB makes, (self-lubricated).
66	Gear box	Shall have synchromesh gear box with minimum 5 forward gears (<u>over drive optional</u>) and one reverse gear.
67	Front Axle	a) The Front Axle shall be of I-beam type made of alloy steel forging with a minimum load carrying capacity of 6,000 Kgs., with Reverse Eliot design. b) Approved makes of AAL/TVSAI/VE or OE make.
68	Rear Axle	a) Fully floating type with Hypoid Gears, with a minimum carrying capacity 9700 kgs. and the Crown Wheel Pinion ratio shall be • Maximum 5.29 :1 , for the chassis with wheel base ranging from 222" to 230" b) Approved makes of AIL(Dhana)/Meritor (AAL)/OE make.
69	Tyres	a) Tyres – 6 nos + 1 Spare tyre shall be provided in a cage type carrier/OEM design carrier. b) 222"/230" chassis shall be supplied with 10 x 20 – 16 PR radial tyres with wheel disc size 7.5" x 20". c) Tyres must be less than six (6) months old as on the date of delivery of chassis. d) Wheel disc make - Wheels India. <u>Approved makes and brands:</u> a) 10.00X20 Steel Radial - JK – JUH3/JUH 3+/JUH5, MRF – Steel Muscle S1R4 R16, Michelin XZE2/XZE3 HD/XYZ3 HD/X Multi Z, Apollo, Ceat. Tyres shall meet GSR 479(E) of MoRTH for new design tyres with Rolling resistance, wet and tyres with rolling sound. VMs shall submit certification regarding tyres provided are meeting AIS:142 norms for rolling resistance and wet grip.
70	Steering	a) The steering position shall be on the right-hand side of the bus. The steering system shall be power assisted gear driven pump and sufficiently rugged in design to withstand peak road shocks without risk of component failure or inadvertent alteration of steering geometry. b) Approved makes: ZF or Rane preferably in equal numbers or any other make approved by APSRTC

		c) Drag link/ Tie rod (Steering ball joints) shall be of grease type only.
71	Suspension	Double acting Telescopic Type Shock absorbers shall be provided at Front & Rear. i) 222"/230" WB chassis shall be supplied with Front & rear weveller suspension.
72	Brakes	a) Brake system either with disc brake or drum brake or combination of both will be accepted. b) Dual line Full Air Brake system shall be provided on all four wheels with Auto Slack Adjusters of approved make MEI/Haldex/WABCO/Knorr Bremse c) Air shall be drawn by compressor from after filter and before turbo charger. d) The Quick release valve/relay valve at front and relay valve at rear. e) Graduated type hand control valve shall be provided for Hand Brake system with actuators operating on rear wheels. The control valve shall be provided on the right-hand side of the driver/on the Dash Board only and must be easily accessible to the driver. f) APDI is not recommended and may provide ASP /APU as per requirement. g) Auxiliary air tank shall be provided for utilizing air for Auxiliaries. h) Polyamide brake pipes/sleeves with identification colours at ends from SP Valve shall be provided for front, rear and hand brake connections. (Tapes and stickers not allowed). i) Brake system must be of fully WABCO or fully Knorr Bremse, but not in combination. j) ABS has to be provided with 4S/3M or 4S/4M configuration.
73	Gradeability	16% to 27%
74	Electrical System	a) The system shall be of 24 Volt DC. Battery-isolator switch (main cable cut off switch) shall be provided, besides providing the remote cut off switch on the dashboard. b) Batteries shall be of 2x12 Volts, minimum 25 plates & 180 AH of approved make for 222" - 230" WB c) Electric wires shall be clamped in a neat form and must not be left haphazardly. The electric units and the electrical system fitted shall not be prone to short circuit problems. d) ECU should be placed in such a location easily accessible to the technicians and away from the dash board to avoid damages in case of accidents. e) Battery cable (325 strands with 0.45 mm strand dia.) of reputed make with suitable length shall be provided. f) Approved Battery makes: Exide, Amco, Amaron. g) Batteries must be less than six months old as on the date of delivery of chassis.
75	Alternator & Self Starter	a) Dynamically balanced Alternator with built in regulator shall be provided with minimum of <u>90 to 100 Amps output</u> . b) The Starter Motor shall be with 4 step relay pre-engaged type, flange mounted with minimum rating of 4.0 KW.

		c) Both these units shall be so located as to prevent ingress of oil or rainwater into them.
		d) Self-Starter & alternator shall be of make Lucas-TVS, Bosch.
76	Instrument panel	Aesthetically designed Instrument panel with backlit light. It should be as per OBD-II norms and all parameters like speed, air pressure, range, fuel, etc should be displayed in digital form.
		The instrument panel should be properly covered at bottom side to avoid ingress of dust and water
77	Noise Level	Shall meet the MOEF notified limit of 82 db tested as per IS:3028 of 1998 for noise reduction system for the noise made by components of the chassis particularly engine, exhaust system etc.
78	Diagnostic tool	2 nos per depot or 1 no for 10 chassis whichever is higher. <i>The same shall be for life time and there shall not be any renewal fee for continuation of the software. The software update also shall be at FoC basis.</i>
79	Vinyl Stickers	Slogans inside and outside of the bus to be provided in vinyl stickers as approved by APSRTC.