TECHNICAL SPECIFICATION FOR AMBULANCE

1. GENERAL

1.1 Ambulance shall be supplied as a complete built-up unit with operating accessories.

1.2 Chassis shall be commercial/Monique type and suitable for the ambulance applications & meet the requirements.

1.3 Ambulance shall have driver’s compartment and patient compartment to accommodate four (4) patients with life-support equipments during transit & seating arrangement for a paramedic technician.

1.4 The Ambulance shall be designed to ensure safety, comfort and avoid aggravation of the patient’s injury & ensure minimum noise and vibrations.

2. VEHICLE PERFORMANCE PARAMETERS OF AMBULANCE

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Speed (KMPH)</td>
<td>&gt;105</td>
</tr>
<tr>
<td>Maximum acceleration time from 0 to 85 KMPH (seconds)</td>
<td>&lt; 45</td>
</tr>
<tr>
<td>Braking System</td>
<td>ABS</td>
</tr>
<tr>
<td>Underbody Clearance (mm)</td>
<td>Min. 200</td>
</tr>
<tr>
<td>Under axle clearance at differential housing bowl (mm)</td>
<td>Min. 150</td>
</tr>
<tr>
<td>Turning Radius</td>
<td>Not greater than chassis OEM standard</td>
</tr>
<tr>
<td>Gross Weight</td>
<td>Not more than 6500 kgs</td>
</tr>
<tr>
<td>Overall Length (mm)</td>
<td>Not more than 6000</td>
</tr>
<tr>
<td>Overall Width (mm)</td>
<td>Not more than 2200</td>
</tr>
<tr>
<td>Overall Height (mm)</td>
<td>Not more than 2800</td>
</tr>
<tr>
<td>Drive</td>
<td>4x4 (All wheels drive)</td>
</tr>
<tr>
<td>Steering</td>
<td>Right Hand Drive</td>
</tr>
<tr>
<td>Floor Height at curb weight (mm)</td>
<td>Not more than 970</td>
</tr>
<tr>
<td>Noise and Sound Level Limits, Exterior (db)</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Pay Load</td>
<td>As per requirement</td>
</tr>
</tbody>
</table>

3. MATERIAL SELECTION AND TREATMENT

3.1 Material used for construction shall be new, unused and free from all defects and imperfections that might affect the serviceability of the finished product. These shall be selected with a view to combine lightness with strength and durability. All equipments, material and articles required under this order are to be new or fabricated from new materials.

3.2 Materials used in the assembly and components shall be of high strength to weight ratio where practicable to effect saving in dead weight and thereby increase the payload capacity. Use of dissimilar materials in contact with each other, which tends towards electrolysis corrosion, shall be avoided.

3.3 The Ambulance is intended for use in the tropical conditions with continuous high humidity and heat and in coastal area. The fact shall be given full consideration while selecting material and for this reason, use of rubber shall be avoided as far as possible. Wherever, it is unavoidable to use rubber the parts made out of it shall be readily available.

3.4 The material used for superstructure shall be non-corrosive and guaranteed against any sort of deterioration, deformity, aging and corrosion for a minimum of ten years. Thos being one of the important criteria of evolution, the exact material to be used, its detailed technical specification and the relevant standards to which such materials conforms should be clearly stated.
3.5 Timber shall not be used in body construction.

3.6 All parts exposed to atmosphere shall be of non-corrosive material. All ferrous fasteners shall be galvanized/chrome plated to avoid rusting over prolonged use.

3.7 The floor of the Ambulance shall be strong; smooth that can be washed without seeping water into the sides or floor and also easy cleaning and loading of the stretcher.

4. WEIGHTS AND DIMENSIONS

4.1 The actual gross weight shall not exceed the maximum permissible limit of chassis as specified in para-2.

4.2 The weight shall be distributed as equally as practical over the axles and tyres of the Ambulance.

4.3 The centre of gravity shall be as kept as low as possible under all conditions of loading.

4.4 The ambulance shall be constructed such that a seated driver shall be able to see the ground ahead of the ambulance and above the horizontal without leaving his seat. The vision in the horizontal plane shall be 90 degree on each side from the straight position on a full forward control.

5. ENGINE

5.1 The Ambulance’s engine shall be HSD (High Speed Diesel) Driven and have horse power and speed characteristics to meet and maintain all vehicular performances specified and which shall be certified by the manufacturer for the said application.

5.2 Fully laden Ambulance shall consistently be able to accelerate maximum speed, as specified, with the engine and transmission at their normal operating temperature at any ambient temperature varying from -5 degree C to 55 degree C.

5.3 The ambulance shall be capable of ascending, stopping, starting and continued ascent on a grade certified by the manufacturer.

5.4 The engine should confirm to emission norms of the designated city as per the New Motor Vehicles Act (BS III/BS IV).

6. ENGINE COOLING

6.1 Engine shall be air/water cooled so that stabilized cylinder head and oil temperature remain within the engine manufacturer’s prescribed limits under all operational conditions and all ambient temperatures between -5 degree C to 55 degree C.

7. FUEL SYSTEM

7.1 Fuel system shall qualify engine manufacturer’s requirements and shall include fuel pump, fuel filtration and flexible fuel lines, well protected from damage, exhaust heat and ground fires.

7.2 Accessible filtration shall be provided for each fuel supply line and a drain shall be provided at the bottom of the fuel tank.

7.3 Gravity feed fuel tanks are not acceptable.

7.4 Fuel tank capacity shall be 65 liters or more.
8. EXHAUST SYSTEM

8.1 The size of exhaust system shall be such that undue backpressure is not generated and under no circumstances, exhaust gases enter the cabin. The system shall be of high grade, rust resistant material.

8.2 Exhaust system shall be designed to protect it from damage that could result from rough terrain.

9. VEHICLE ELECTRICAL SYSTEM

9.1 The vehicle shall be provided with 12/24 volts electrical system starting. The electrical system shall be insulated, waterproofed and protected against exposure from ground fires.

9.2 All the important electrical circuit shall have separate fuses suitably indicated and shall be grouped into a common fuse box located at an accessible position.

9.3 The electrical system shall have negative ground including alternator and voltage regulator. Alternator shall be at 100% of anticipated load at 50% engine speed.

9.4 The circuits shall be so designed that at no stage of operation overloading, overheating or short-circuiting and fluctuation of voltage is experienced. The suitable size wire shall be selected for different circuits considering the current consumption for that circuit.

9.5 Batteries shall be secured and well protected from against physical injury, vibration, and water sprays and engine and exhaust heat. When an enclosed compartment is provided for batteries, it shall be well ventilated and batteries shall be easily accessible for examination, test and maintenance.

9.6 A built in battery charger shall be provided on the vehicle to maintain full charge on all batteries. Grounded AC receptacle shall be provided to permit a drive away plug connection from external electric power supply to battery charger.

9.7 An engine coolant/preheating device shall be provided as an aid to rapid starting and high initial engine performance.

9.8 The effect of electromagnetic field of all electrical systems of Radio sets shall be suppressed so that it does not interfere with functioning of radio sets.

10. VEHICLE DRIVE

10.1 The entire drive train shall be designed to have sufficient capacity to slip the wheels of the static loaded vehicle.

10.2 A transmission cooling system shall be provided and designed so that the stabilized transmission oil temperature remains within the transmission conditions and at all ambient temperatures.

10.3 Front and rear axles shall have adequate capacity to carry the maximum imposed load under all intended operating conditions.

11. SUSPENSION

The suspension system shall be designed to permit the loaded vehicle to:

11.1 Travel at the specified speeds over improved surface.
11.2 Travel at moderate speeds over unimproved surface.

11.3 Prevent damage to the vehicle caused by wheel movement.

11.4 Provide a good environment when traveling over all surfaces.

12. RIMS, TYRES AND WHEELS

12.1 Tyres shall be selected to maximize the acceleration speed, braking and maneuvering capabilities of the vehicle on paved surfaces without sacrificing performance on all reasonable terrains.

12.2 Tyres with cross-country ply rating shall be offered.

12.3 All wheels on the vehicle shall be of the single wheel type with all rims, tyres and wheels of identical size and same tread design.

12.4 Rims, tyres, wheels, and inflation pressures shall be approved by the respective manufacturers as having sufficient capacity to meet the specified performance.

12.5 Size of tyre should be such to meet all vehicular performances and preferably available in India.

13. TOWING CONNECTIONS

13.1 Two tow hooks, capable of towing the vehicle without damage, shall be mounted, at the front and at the rear of the ambulance and attached directly to the frame structure (chassis).

14. BRAKES

14.1 The braking system shall feature service, emergency, and parking brake systems. A brake chamber shall be provided for each wheel and shall be mounted so that no part of the brake chamber projects below the axle. ABS braking system shall be provided.

14.2 Service brakes shall be of the all wheel type with split circuits so that failure of one circuit shall not cause total service brake failure, and shall be able to hold fully loaded vehicle on a 50% grade.

14.3 An emergency brake system shall be provided which is applied and released by the driver from the cab and is capable for modulation, by means of the service brake control.

14.4 The parking brake shall be capable of holding the fully loaded vehicle on grade without air or hydraulic assistance.
15. STEERING

15.1 The chassis shall be equipped with power assisted steering with direct mechanical linkage from the steering wheel to the steered axle(s) to permit the possibility of manual control in the event of power assist failure.

15.2 The power steering shall have sufficient capacity to allow turning the tyres stop to stop with the vehicle stationary on a dry level, paved surface and fully loaded.

15.3 Vehicle shall be designed for Right hand drive system so that driver’s left hand is free for operations controls.

16. CABIN

16.1 The driver’s cabin shall be mounted on the forward part of the vehicle and shall provide, seating for two (2) persons including Driver.

16.2 The cab shall meet the visibility requirements as mentioned above.

16.3 The windshield shall be shatterproof safety glass, and all other windows shall be constructed of approved safety glass.

16.4 The cab shall be weatherproof and shall be fully insulated thermally and acoustically with a fire-resistant material. The cab may be of the unitized rigid body and frame structure type or it may be a separate unit flexibly mounted on the main vehicle frame.

16.5 Driver’s compartment shall have spotlight with rustproof base.

16.6 Patient’s compartment shall be high intensity hitless roof lighting with rustproof base and distributed uniformly.

16.7 Central air-conditioning should be provided in the patient’s compartment with multi outlets to ensure uniform air distribution.

16.8 New wiper motor assembly of 17 watts with new blades and arms shall be provided if not provided with the chassis. The location of wiper motor shall be such that it shall be easily accessible for repairs.

16.9 There shall be a sliding, adjustable, transparent, shatterproof panel window opening of at least 150 sq. in., for visual checking and voice communications between the driver’s and patient’s compartment.

17. INSTRUMENTS, WARNING LIGHTS AND CONTROLS

17.1 All chassis instruments and warning lights shall be grouped together on a panel in front of the driver to provide ready accessibility as well as high visibility for the driver seat.

17.2 All instruments and controls shall be illuminated, with back lighting to be used where practical.

17.3 Warning Lights should be installed at all corners of the front, back and sides of the roof with rustproof chrome base and floodlights at the middle of both sides.

17.4 Electrical siren of 1.6 Kms, range 12/24 volts D.C. shall be provided and fitted at suitable place with controlling system in Driver’s cabin.

17.5 Two rotating beacon lights with Amber lens shall be provided over the top of driver’s cabin.
17.6 The other lights, cabin lights and medical cabinet lights shall be provided.

17.7 All the controlling switches of lights on dashboard shall be provided in Driver’s cabin and patient’s cabin.

17.8 Two fog lamps of approved make shall be provided and fitted on front-bumper with controlling switch on dashboard.

17.9 Adjustable spotlight, mounted in a convenient position to give flood or beam of light at the rear of driver cabin shall be provided.

17.10 Adjustable search light assembly shall be provided at a convenient position on the top of rear body deck with 30 Meters Cable drum with Rexene cover.

17.11 Hooter cum P.A. system shall be provided with a speaker mounted on the top of Driver’s cabin with Rexene cover. The output shall be 25 watts.

17.12 The following instruments, or warning lights, or both shall be provided as a minimum:
   a. Speedometer
   b. Engine(s) tachometer
   c. Fuel level with audio warning
   d. Air pressure
   e. Engine(s) temperature
   f. Engine(s) oil pressure
   g. Voltmeter(s)
   h. Oil temp. Gauge light.
   i. Transmission(s) oil temp.
   j. Low air pressure warning
   k. Headlight beam indicator
   l. Brake Lights
   m. Parking Lights
   n. Trafficator light
   o. Hazard warning light

17.13 The cab shall have all the necessary controls within easy reach of the driver for the full operation of the vehicle. The following cab controls shall be provided:
   a. Accelerator
   b. Parking brake control
   c. Steering wheel, with directional signal control & horn
   d. Brake pedal
   e. Transmission range selector
   f. Electronic Siren switch(es)
   g. Light switches
   h. Windshield wiper and washer controls
   i. Heater-defroster controls
   j. Master electrical switch
   k. Engine start/stop control

18. EQUIPMENT

   The following minimum equipment shall be provided in driver’s compartment/patient’s compartment.
   a. Heater/defroster
   b. Driver’s suspension seat with vertical, fore and aft adjustment, with seat belt
   c. Co-driver and paramedic technician seats with individual retractable seat belts and grip hand rails.
d. Electronic Siren- 1 no.
e. Horn- 1no.
f. Sun visors (for Driver and co-driver)
g. Outside rear view mirrors (both sides)
h. Interior lighting (as per requirement)
i. P.A. System with Microphone- 1 no.
j. R.T. Set (VHF-AM)- 1no.
k. Standard Height Stretcher equipped with mattresses and belt- 2 nos.
l. Curtains on the rear cabin windows (as per requirement)
m. Solution stands clamped on the ceiling- 4 nos.

n. Oxygen tank fixed to the floor complete with regulator and mask (4 nos.)
o. Foldable seats- 1 no. (For medical attendant)
p. Medicine cabinets- 1 no.
q. Light material stretcher- 2 nos.
r. First-aid kit along with splinters and surgical scissors- 1 no.
s. Thermometers- 2 nos.
t. Stethoscope- 1 no.
u. Portable Fully automated external defibrillator- 1 no.
v. Burn-relief kit- 4 nos.
w. Portable oxygen cylinders- 2 nos.
x. Automatic resuscitator- 1 no.
y. Life emergency oxygen pack- 1 no.
z. Disposable boxes- 1 no.

aa. Portable fire extinguisher- 1 no.
bb. Water Gel Blanket (size 6’x5’)- 1 no. and (8’x6’)- 1 no.

19. PREPARATION FOR PAINTING, COLOR AND MARKINGS

19.1 Ambulance body and all attached equipment exterior surfaces, except polished metal parts, shall be thoroughly cleaned, treated, and coated with a firm primer and preservative with rust inhibiting properties, and painted in the finish color. Ferrous metal interior surfaces shall be painted or, when not exposed for painting, shall be treated or coated to resist corrosion. Chassis and chassis frame components shall be preserved and finished in accordance to industry’s standard practice.

19.2 The exterior surface including the wheels shall be manufacturer’s standard gloss white. The ambulance colors, stripe or band and blue markings shall be the same as specified Blue in Indian Standard, Safety Color Code. They shall comply with the tolerances expressed in terms of Munsell hue, value (lightness), and chroma (saturation).

19.3 Following markings shall be made on the body of the ambulance:

a. Manufacturer’s name & trademark
b. “National Fire Service College”
c. Year of Manufacture
d. Engine & Chassis numbers
e. NFSC Emblem
f. Job or Serial No.
g. Chassis supplier name and country of origin
h. Blue luminous strips to be provided at the rear and sides of the ambulance

19.4 Front Markings: The word “AMBULANCE”, mirror imaged, shall be in blue, die cut style letters, not less than 10 cm high, centered above the grille, on the white background. The placement of the word ambulance on the curved surface of the hood or on a flat plastic type bug screen is permitted.
19.5 **Side and Rear Markings:** The word “AMBULANCE” shall be in blue, die cut style letters of not less than 15 cm in height, centered, on each side and rear of the vehicle body. All additional lettering and markings should be below the word “AMBULANCE”, except the units abbreviated identification lettering/number, which may be located on the uppermost white space of the front, rear, and sides.

20. **PRODUCT SUPPORT**

Manufacturer shall ensure:

a. Availability and supply of spares at very short notice, for at least 10 years.

b. Induction Training for selected staff at consignee place or mutually agreed place at supplier’s cost.

c. Any other Technical helps that may be required at the time of Induction.

d. After sales service.

e. Two sets of repair and maintenance tools required for ambulance shall be supplied for each consignee.

21. **MANUALS**

The following literature/manuals along with soft copy shall be provided for inspection and training purpose. All manuals should be in English language:

21.1 **Operation Manual:** This manual should contain technical description of the equipment with lay out drawings, illustration and performance capabilities with instruction to user for commissioning the equipment for use, and use operation with limitations and precautions to be observed normal maintenance and field repairs, lubrication schedule with grades of lubricants to be used, fault finding guide, storage instructions and warning plates against possible wrong use.

21.2 **Parts Manual:** This manual shall contain fully exploded and illustrated details of the entire Chassis, superstructure and all carried sub-assemblies, suitably grouped for easy identification of each and separately demandable spare for replacement as required, will include details of brought out items with part numbers of source of supply.

22.3 **Workshop Repairs Manual:** The manual shall contain fully illustrated instructions on repair and overhaul of all items supplied against this specification including proprietary items fitted/supplied with details of fitment tolerances, special tools to be used, procedure for dismantling major assemblies.

22.4 A complete set of general arrangement drawings showing layout of equipment electrical and structural design shall be submitted along with the ambulance.
<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradeability</td>
<td></td>
</tr>
<tr>
<td>i. at 85 KMPH</td>
<td>1.72 deg. grade</td>
</tr>
<tr>
<td>ii. at 8 KMPH</td>
<td>24.2 deg. grade</td>
</tr>
<tr>
<td>Approach Angle(with bumpers and rear step)</td>
<td>20 deg.</td>
</tr>
<tr>
<td>Ramp Breakover (with bumpers and rear step)</td>
<td>10 deg.</td>
</tr>
<tr>
<td>Departure angle(with bumpers and rear step)</td>
<td>10 deg.</td>
</tr>
<tr>
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<td>20 cm</td>
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<tr>
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<td>Brakeing System</td>
<td>Shall include ABS</td>
</tr>
<tr>
<td>Service brake: Stopping distance (m)</td>
<td></td>
</tr>
<tr>
<td>From 33 KMPH</td>
<td>&lt; 8</td>
</tr>
<tr>
<td>From 64 KMPH</td>
<td>&lt; 30</td>
</tr>
<tr>
<td>Maximum acceleration time from 0 to 85 KMPH (seconds)</td>
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<tr>
<td>Parking Brake (% grade holding)</td>
<td></td>
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