TECHNICAL SPECIFICATION:

SPECIFICATIONS FOR FABRICATION AND SUPPLY OF AERIAL LADDER PLATFORMS OF 54 METERS WORKING HEIGHT

1. GENERAL REQUIREMENT:

1.1 The Aerial Ladder Platforms shall be designed specifically for the purpose of Fire Fighting and Rescue to enable Firemen to go up over and above the other side of any obstruction. It shall comprise of main boom with Telescopic sections and Articulated Booms with a cage mounted at the end of the boom and the entire unit shall be mounted on a Turn Table on a Heavy Duty Diesel Engine chassis of VOLVO make, FM - 9 - 300 hp, 6 X 4, having approx. 5585 MM Wheel Base (as per CMVR 1989) with fully factory built cabin and suitable capacity PTO. The Vehicle Chassis shall comply to BS III (EURO III) emission norms.

1.2 The Aerial Ladder Platforms shall be as per the design, operational stability and structural strength based on the criteria laid in EN 1777 and other norms and standard applicable for elevated raised Platforms used for Fire Fighting and Rescue operations and the certificate to that effect issued by the competent agency shall be enclosed with the Tender. The Vehicle shall be CE marked.

1.3 The Aerial Platforms shall be capable of use at any angle of elevation without any reduction of load capacity of the cage. It shall also rotate 360 degree at any angle of elevation as well as below ground level subject to boom remaining clear of vehicle body and or any obstruction.

1.4 The appliance shall be compact and fast on the road and easily maneuverable in the crowded streets and around sharp corners. The overall dimensions shall not exceed the limits specified herein.

1.5 The working height of the Aerial Ladder Platforms shall not be less than 54 Meters from the Ground and the Horizontal outreach shall not be less than 21.5 Meters.

1.6 A Telescopic Rescue Ladder shall be attached on the right hand side of the booms. The ladders shall be provided with sufficient width and handrails for rescue of the people at any height during Rescue operation.

1.7 The Aerial Ladder Platforms shall be electro hydraulically controlled, permitting precise and easy operations under the most difficult conditions, with ample reserve strength and stability.

1.8 Full safety interlocks shall be incorporated in the design so as to ensure complete safety in operations and long years of reliable and trouble free service, as far as possible the systems shall be fail proof.

1.9 The design of the Aerial Ladder Platforms shall allow a very large safety margin for extreme operating and climatic conditions. The safe working loads ratings shall include an allowance for the weight of water system and the reaction from the monitor jet while operation.

1.10 The vehicle shall have a leveling system to adjust axial and
transverse movement to an angle not less than 8 degrees and it shall be in automatic in nature.

1.11 There shall be a full back up system for all boom movements and outrigger movement in case of failure of main system.

1.12 The Control system of the Aerial Ladder Platforms shall be fully tropicalised and be able to operate in the temperature range up to +60 degree centigrade and in a dusty and Humid condition without reducing the maximum operation limits.

2. CHASSIS:

2.1 The Chassis shall be of VOLVO make, FM-9-300, 6x4, having approx 5585 mm WheelBase (as per CMVR 1989) with full factory built cabin and suitable capacity PTO. The vehicle Chassis shall be right hand Drive and shall comply BS III(Euro III) emission norms.

2.2 The Chassis shall be homologated from the appropriate authority in India in case not already an approved model.

2.3 The engine shall be six cylinders, inline, Diesel with direct injection, turbo charged with intercooler.

2.4 The displacement of the engine shall be 9.4 ltrs and developing 300 hp (220 KW) at 2100 rpm.

2.5 The clutch shall be single plate, dry type, and power assistant.

2.6 The gearbox shall be nine speed synchronized with crawler gear.

2.7 Rear Axle shall be Tandem Bogie type with Hub reduction and differential lock between the wheels and axles.

2.8 Chassis frame shall be ‘C’ Channel section made of high strength steel with cross members.

2.9 The Steering shall be integral power steering with collapsible steering wheel and column.

2.10 The Front Suspension shall be leaf spring type and the rear suspension shall be reverse scamel type with shock absorber in the front.

2.11 The Brakes shall be dual circuit airbrakes, ‘Z’ cam type with parking brakes acting on rear wheels.

2.12 Fuel Tank - Capacity shall be minimum 300 Liters with lockable fuel cap.

2.13 The Chassis shall be provided with 11.00 R X 20 Radial Tyres - 11 Nos. with Spare Tyre.

2.14 The Chassis shall be provided with single day type cab with RED colour made from high strength steel fully trimmed, external panels hot dip galvanized with hydraulic cab tilting mechanism. The Cab suspension shall be provided with coil spring and shock absorber. The cab
shall be provided with adequate ventilation, rear view mirrors, Wind Screen and Windows, adjustable driver seat, Wiper system and along with all other standard fitments.

2.15 The Electrical system shall be 24 Volts with suitable capacity batteries & Alternator for charging the batteries.

2.16 The Chassis shall be supplied with standard tool kit, hydraulic jack of 20 Ton capacity, Operator & workshop manuals.

2.17 The Chassis shall be fitted with gearbox mounted suitable capacity Power Take Off Unit to drive the Hydraulic pump for boom movement.

2.18 The Chassis shall be directly procured by the tenderer confirming to above specifications and shall be got homologated with the appropriate authority in India. The Transportation responsibility of the Chassis up to tenderers manufacturing facility lies with the tenderer. The Chassis shall be insured while in transit.

2.19 The Chassis shall comply with all the provisions and enactment of Motor Vehicle Act 1988 and Central Motor Vehicle Rules, 1989 and any amendment from time to time.

3. The manufacturer should be ISO 9001 Certified Company for the marketing, design, manufacturing and after sales service of aerial Platforms for fire fighting and rescue operations. It should also be an ISO 14001 certified company. The manufacturer must have built and supplied at least 10 Hydraulic Platforms of above 50 metres height to various fire brigades in the world in the past. The manufacturer must have also preferably built and supplied hydraulic Platforms of above 50 metres height to any Fire brigade in India. The manufacturer must have trained manpower in India either directly or through its authorized after sales service partner to take care of maintenance and after sales service of the Platforms and should be able to enter into an annual maintenance contract with the fire brigade. A performance certificate shall have to be submitted along with the tender from a fire brigade, preferably from India. Only those, manufacturers may submit the offer that are themselves manufacturing the hydraulic Platforms for fire fighting and rescue purpose and the offer should come directly from them. The tender should be submitted by the manufacturer or their authorized agent in India.

4. MAIN OPERATING DATA:

Max. working height - 54.0 Meters
Max. height to working cage bottom - 52.0 Meters
Max. height to the top of the ladder - 53.0 Meters
Max. working outreach at 400 kg cage load - 21.5 Meters
Max. working outreach at variable cage load - 23.0 Meters
Max. working reach below the ground level - 5.0 Meters
Safe working load (without water discharge) - 400 Kgs.
Max. nominal water discharge capacity(with adequate supply pressure) - 3800 L/Min
Rotation, continuous - 360°
Transport height (depending on chassis) - 3.80 Meters
Transport length (depending on chassis) - 12.7 Meters
5. MAIN FRAME:

5.1 The main load bearing element of the aerial device shall be the strong main frame, which takes all the loads caused by the operation of the aerial.

5.2 The main frame shall be fixed onto the chassis frame with bolts in such a way that chassis performance and durability are maintained. The front fixing bolts shall be fitted with springs to allow the chassis frame beams to flex when the outriggers are fully down, thus avoiding any stress concentration in the chassis beams. The actual main frame shall be fully welded rectangular steel structure providing high stiffness and thus maximum comfort-ability and operational safety. At each end of the main frame there shall be integrated housings for outriggers.

6. STABILIZING SYSTEM:

6.1. The stabilizing system shall consist of four hydraulically powered outriggers mounted in their housings in the main frame. Each housing shall be fitted with adjustable guides to provide smooth and accurate movement of the outrigger beam. The horizontal beam shall be a completely closed steel profile enclosing the hydraulic cylinder for the horizontal movement and the hydraulic hoses for the cylinder of the vertical movement thus completely protecting those devices from external damage.

6.2. The H-type outriggers shall be chosen for their ability to stabilize the vehicle from behind obstacles and to be placed on raised structures as necessary. Each vertical jack shall be fitted with self-aligning foot plate to spread the load evenly and to allow operation on uneven ground.

6.3. The vehicle must be fitted with automatically operating leveling system that is capable of performing the entire jacking-up and levelling procedure within 30 seconds. A fully manual back-up operation must be provided. As standard feature the stabilizing system shall be able to be used in "one sided" mode requiring only whether the left or the right hand side outriggers to be fully extended horizontally where as the outriggers on the opposite side remain within the width of the vehicle. This feature substantially reduces the width required for setting up and operating the aerial yet it provides full working height and full working outreach when operated on the fully supported side of the vehicle. There shall be two independent automatically operating and self controlling safety systems to prevent an unsafe configuration to be reached when the "one sided mode" is in use. The stabilizing system shall also include a rear axle locking system in such cases where it is required for meeting the stability criteria. All controls for the entire stabilizing system shall be located in dust and water proof locker at the rear of the vehicle. The control levers shall be arranged in such a way that the outriggers are always visible to the operator when operating each side.
separately. All control levers shall permit infinitely variable speed of each function separately or all together for easy and fast stabilizing procedure, also when operated on uneven ground.

6.4. In the middle of the control panel there shall be following additional control devices:
- starting of chassis engine
- stopping of chassis engine
- activating hydraulic pressure
- visual indication for fully extended left outriggers
- visual indication for fully extended right outriggers
- visual indication for applied rear axle locking (if the feature is installed)
- visual indication for main current being switched on
- operating hour gauge
- indications for the fault finding system
- switch for the battery driven back-up for the hydraulic system
- visual indicators for leveling of the vehicle (longitudinal and transversal)

6.5. The locker containing outrigger controls shall be fitted with automatically operating door switch and light for night operation.

7. BODYWORK AND EQUIPMENT LOCKERS:

7.1. The frame for the bodywork shall be made of welded steel profile sections bolted together for easy maintenance if required. All parts of the frame shall be hot dip galvanized for long life. The frame shall be covered by non-slip aluminum plate strong enough to allow free movement of persons on it.

7.2. Equipment lockers shall be welded together of stainless steel plates, primed and painted and finally bolted onto the frame for easy removal if necessary. All lockers shall be fitted with hinged doors, properly sealed to be water and dust proof. All doors shall be fitted with automatic switches activating the lights as soon as the door is opened and also activating the warning in drivers cab to indicate that all doors are not fully closed.

7.3. To provide easy access from the ground level there shall be steps covered by non-slip aluminum at each side of the vehicle. At the end of the steps there shall be railings made of stainless steel to assist when climbing.

8. BOOMS:

8.1. The vehicle shall perform the following functions/operations.
   a. Elevation.
   b. Depression
   c. Extension & housing of telescopic sections, and
   d. Rotation 360 degrees in either direction.

8.2. There shall be two booms, the first boom with telescopic extension providing direct movement and angular movement of not less than 83 degrees, and the second boom with vertical movement of approx. 180 degrees. This configuration shall have to result in compact travelling dimensions yet in extreme versatility in operation. The second boom shall provide an up-and-over capability of approx. 8 m throughout
its vertical movement.

8.3. The main boom elevation and lowering shall be controlled by two hydraulic cylinders that both have their separate safety devices and both can alone carry the entire load. Tail swing not to exceed the measurements of the truck in any direction.

8.4. The booms shall be welded by the unique plasma welding method to provide high durability and extreme accuracy. For high strength and minimum flexing of the boom sections only high tensile strength steel shall be used as load bearing structure.

8.5. All telescopic sections of the first boom shall move synchronized i.e., there shall be no intermediate jerks when the extension / retracting is operated. All sections shall be fitted with adjustable guides to provide smooth and accurate movement.

8.5. Different maintenance objects shall be located well at hand either outside the boom or behind easily removable covers.

8.6. All booms shall be internally and externally primed and painted for long life span.

9. TURNTABLE:

9.1. The turntable shall be fully integrated steel structure welded by computer controlled robots for extreme accuracy and durability. The centre post shall contain slip rings with double pins for electrical connections, 100 mm stainless steel water way and hydraulic pressure and tank lines shall allow continuous rotation of the turntable.

9.2. The centre post shall be mounted inside of the turntable in such a way that maintenance can be done directly from the turntable. The turntable tail swing shall not exceed the vehicle dimensions in any direction.

9.3. Rotation reduction gear with automatically operating braking system shall be installed at the front of the turntable for easy maintenance and adjustment. The hydraulic motor powering the rotation movement shall be fitted directly into the gear for high reliability. At the left hand side of the turntable there shall be the lower control station and at the right hand side the rescue ladder.

10. WORKING CAGE:

10.1. The working cage shall be fixed to the booms with pivoting point at the level of the railing to provide highest possible degree of natural safety. The cage shall be made of tubular steel profile, welded together and painted with special paint with high durability. The dimensions of the working cage shall be 1.0 m (length) x 2.0 m (width) x 1.1 m (height) and it shall be fitted with two inwards opening doors, one shall be located at the rear to enable safe access from the decking in travelling position and the other one shall be located at the front in case of a rescue. Safe working load shall be 400 Kgs. when no water is discharged.

11. WORKING CAGE LEVELING:

11.1. The working cage shall be kept horizontally leveled in any position of the booms. The leveling system shall be controlled by an
automatic horizontal monitoring device with two fully automatic and independent safety circuits in case of an uncontrolled leveling failure. There shall be a master switch for the automatic leveling system, thus it can be isolated and the manually controlled system activated.

11.2. The leveling movement shall be powered by a hydraulic cylinder located well protected inside the second boom. The cylinder shall be connected to a double mechanical linkage of which each alone can carry the entire safe working load.

12. WORKING CAGE SLEWING:

12.1. The working cage shall be turned 45 degrees to each side from its centre position. The movement shall be powered by a hydraulic cylinder with controls in the working cage and at the turntable control panels. The centre position of the cage shall be indicated by a visual indication at both control panels.

13. FOLD DOWN RESCUE PLATFORM:

13.1. At the front of the working cage there shall be a rescue Platforms with automatically operating safety railing to provide additional safety during rescue and fire fighting. The dimensions of the rescue Platforms shall be 1.45 m x 0.45 m.

14. RESCUE LADDER:

14.1. A stable telescopic rescue ladder system shall be attached onto the right hand side of the booms. Due to the telescopic design the ladder forms a direct continuous rescue way with no cross-over Platforms or similar obstacle. The ladder shall be attached onto the boom structure at several points throughout its length resulting in extreme stability even when operated in windy conditions. Extension movement of the ladder shall be automatically synchronized with the telescopic movement of the first boom requiring no separate control devices.

14.2. Both control panels shall be fitted with visual indication for "safe to climb" position of the ladder. There shall be a step at the turntable to provide safe access from the ladder down to the decking. Thus, a continuous way from the maximum height down to the ground shall be provided for high capacity rescue operations. A ground ladder can be attached if so required.

14.3. Telescopic rescue ladder must meet norm EN 1777 clause 3.21 and clause 5.1.4.1.3 for rescue ladder. Test certificate from the manufacturer to be submitted with the tender documents.

15. HYDRAULIC SYSTEM:

15.1. Hydraulic power shall be provided by one double axial piston pump, which shall be driven by the vehicle power take-off. The power need may be about 30...50 KW depending on the size of the unit.

15.2. Without any operation of the aerial device, the pump shall rotate on minimum flow and minimum pressure. When one of the
movements is operated the control valve shall automatically increases the pressure to a pre-set constant level and the oil flow to the amount that is needed for the movements activated.

15.3. The loss of power in the hydraulic system, which normally causes overheating of the hydraulic oil, shall be avoided and also the stresses caused to the vehicle transmission and P.T.O. system shall be minimized. At the same time fuel, consumption and exhaust emissions shall be kept at the minimum.

15.4. By operating several movements simultaneously the oil flow shall increase automatically according to the need in the system thus making all movement speeds independent on each other.

15.5. The constant pressure system with max. pressure setting shall prevent Over loading of the system and its components e.g. cylinders.

15.6. Inside of the turntable and at the lower valve compartment there shall be instant Couplings for the manometer in each pressure line. The manometer shall be fitted as standard equipment.

15.7. The filtration of the oil shall consist of suction strainer in the suction line, pressure filters with visual indicators in each pressure circuit, return filter in return line and air filter on the reservoir thus providing maximum reliability by protecting the hydraulics against foreign particles.

15.8. The hydraulic cylinders shall be double acting with hard chrome-plated piston rods and they shall be fastened by means of self-aligning ball bearings to prevent lateral forces from damaging the seals or piston rods of the cylinders.

15.9. Hydraulic oil tank shall be integrated into the main frame for good protection and transformation of the heat. The tank is fitted with oil level gauge, temperature gauge, suction connections with closing valves for easy maintenance and draining outlet with closing valve.

16. BACK-UP FOR THE HYDRAULIC SYSTEM:

16.1. There shall be a separate battery driven and petrol driven hydraulic pump which shall provide an independent means of power in case of failure of the main engine. The system shall be able to be started from all control panels thus providing an immediate back-up in a case of a failure at an intense fire or similar immediate emergency.

17. ELECTRIC SYSTEM:

17.1. The electric supply shall be taken from the chassis battery, which is kept, charged when the engine is running. Voltage of the system shall be 24 V DC and all circuits shall be fitted with their specific fuses. When the main current is switched on, yellow flashing warning lights located at each outrigger boom pivoting point and underneath of the working cage shall be automatically switched on.

18. SIREN AND PUBLIC ADDRESS SYSTEM:

18.1. There shall be electric siren unit fitted on the roof of vehicle cab. Control panel of the system shall be conveniently located for the driver and it shall includes switches for fast (yelp) and slow (wail)
sounds. When both switches are on, the system shall automatically change the sound after three periods of each fast and slow.

18.2. Command microphone which shall be fitted with push-to-talk switch allow the public address message to override the siren function. Operations shall be controlled by lighted push buttons of different colour.

19. ROTATING BEACONS:

19.1. On each side of the drivers cab roof there shall be rotating beacons in the Red colour. The switch for switching the beacons on and off with suitable signal light shall be fitted inside of the cab in a convenient position for the driver.

20. INTER COMMUNICATION SYSTEM:

20.1. There shall be fully transistorized talk back inter communication system fitted between turntable and the cage.

20.2. The system shall be combined microphone and loudspeaker for hands free operation and shall be located in the cage. The turntable control station shall also be equipped with microphone, which shall be integrated in the loudspeaker with volume control.

20.3. The microphone and the loudspeaker shall be sealed properly and it shall be protected from the ingress of water, dust and humidity.

21. CONTROL SYSTEM FOR BOOM AND ROTATION MOVEMENTS:

21.1. All boom and rotation movements shall be controlled electro-hydraulically by means of servo valves, as because of the servo principle the control function is not sensitive to changes of ambient or oil temperature, thus providing smooth, safe and very accurate movements even in most severe operating conditions. All control movements shall be performed by the remote control system from both control panels.

22. TURNTABLE AND WORKING CAGE CONTROL PANELS:

22.1. The turntable control panel incorporating all control levers and safety system indications shall be fitted with a rotatable arm at the side of the turntable. This feature shall enable the whole control panel to be placed and locked conveniently in its operating position to provide the officer in charge with an excellent view over the different indications of the safety systems. If desired, the control panel shall able to be rotated and locked in a position enabling direct access from the decking of the vehicle into control station.

22.2. The control station shall be fitted with convenient seat to provide comfort even in case of prolonged operation. The Platforms underneath the control position shall be covered by non-slip aluminum plate.

22.3. The working cage control panel incorporating all control levers and safety system indications shall be fitted with an easily removable bracket to enable the panel to be placed whether at the front of the cage or at the side of it as required by the particular operational task. This feature shall considerably increase the versatility of the unit in actual
operation.

22.4. Both control panels shall be exactly alike thus considerably reducing the risk of confusion amongst operators under stress or even panic.

22.5. At the turntable control panel there shall be a change-over switch to select the panel from which the operation is controlled.

22.6. Both control panels shall be fitted with following most important warning, indication and control devices, all marked by clear symbols for easy recognizance.

- visual and audible indication for exceeding safe working load
- visual warning for activation of working cage collision guard system
- visual indication for fully extended left outriggers
- visual indication for fully extended right outriggers
- visual indication for the rescue ladder "safe to climb"
- visual indication for the centre position of the booms
- visual indication for the centre position of the working cage
- starting and stopping of chassis engine
- switch for the battery driven back-up for the hydraulic system
- separate joystick control levers for each movement pair (first boom up/down, telescope sections in/out, cage boom up/down, turntable rotation left/right)
- control lever for cage slewing
- emergency stop button
- overriding of the automatic working cage leveling system
- manual operation for the working cage leveling system
- switches for activating the bleed down system

23. CONTROLS AND INDICATORS IN DRIVERS CAB:

23.1. In addition to chassis standard controls and indicators the following items shall be installed in drivers cab:

- visual warning for the main current being switched on
- visual warning for any of the equipment lockers being open
- visual warning for the booms not being fully in traveling position
- visual warning for the rear axle being locked (if the feature is installed)
- visual warning for the outriggers not being fully in traveling position
- switch with visual indication for rotating beacons (optional)
- switch with visual indication for siren unit
- microphone for the public address system
24. **SAFETY DEVICES**:

**24.1.** All load bearing hydraulic cylinders shall be fitted with lock valves directly integrated into the cylinder structure to prevent the booms, the working cage or the outriggers from retracting in case of a pipe or hose failure.

**24.2.** Retracting of any of the outriggers shall be automatically prevented as soon as the booms have been lifted from their traveling position.

**24.3.** Similarly lifting of the booms from the traveling position shall be prevented until the outriggers have reached the support width and ground pressure.

**24.4.** All boom movements shall be limited at their most extreme positions thus making it impossible for the operator to reach an unsafe configuration by normal means of operation. The movements having direct influence on the stability of the aerial shall be fitted with two separate limiting circuits, the first one stopping that particular movement, the second one deactivating the whole electric and hydraulic system should the first circuit not have worked.

**24.5.** The major movements, lifting of the first boom to its maximum elevation, and extending the telescopic movement or lowering the first boom at the maximum outreach shall be fitted with slow-down devices to provide smooth deceleration of the movement.

**24.6.** Starting of the chassis engine from any of the control panels of the aerial shall be prevented unless the gear is shifted to neutral.

**24.7.** Inadvertent damaging of the drivers cab by the first boom shall be prevented by a system preventing lowering of the first boom and rotation movement when the first boom is near the drivers cab.

**24.8.** An overload warning shall be fitted to give an audible and visual warning in case of exceeding the safe working load.

**24.9.** A collision guard shall be fitted to provide additional safety when operating in darkness or in dense smoke. This system shall stop all movements and gives visual warning when activated.

**24.10.** An emergency stop switch shall be fitted at both boom control panels to provide immediate and complete "freezing" of all systems in case of an unexpected emergency.

**24.11.** The control system shall be fitted with RPM switches to provide additional safety.

**24.12.** There shall be a "bleed down" system which can be operated from working cage and turntable control panels. By means of this system the booms can be lowered and the working cage brought down onto the ground even if no hydraulic pressure is available. In such a case manual rotation is provided by manual means.

**24.13.** The limiting system of the aerial ladder Platforms must meet safety norm EN 954-1 and electromagnetic compatibility must be
certified by EMC test certification. The certification for both must be submitted along with tender documents.

25. WATER WAY SYSTEM:

25.1. The water way system shall be completely made of stainless steel. The nominal diameter of the water way is 100 mm. There shall be one 2½" (68 MM) male inlet with a closing valve at each side at the rear of the vehicle from where the line leads through the centre post in the turntable up into the working cage where the water monitor is mounted. Along the booms, the piping is fitted onto the right hand side in a well protected position between the boom and the rescue ladder.

25.2. The centre post shall be mounted in the centre line of the turntable, provides continuous rotation even if water supply is simultaneously used.

25.3. The piping shall be protected from possible overpressure by means of two relief valves mounted underneath of the turntable.

25.4. On the side of the first boom there shall be a telescopic water pipe, made of stainless steel. Moving sections of this pipe shall be externally ground and chromium plated to provide reliable function and long life span.

25.5. Seals between the sections shall be of low friction type and shall be easily tightened if so required. On the side of the second boom a fixed stainless steel pipe shall be installed and in boom pivoting points flexible, specially reinforced 100 mm pressure hose is used. All hoses shall be fixed to the pipe with reliable span-lock connections.

25.6. Piping shall end at the right hand side at the front of the working cage where the water monitor is placed. A 75 mm valve shall be fitted in the cage to isolate the monitor if required.

25.7. There shall be an additional outlet with 63 mm (2½”) closing valve and coupling for water supply from the cage through an extension hose.

25.8. All Fire Hose couplings shall be 63 MM (2 ½”) diameter instantaneous male and female delivery hose couplings.

25.9. There shall be drain cocks fitted in the piping to enable it to be drained after use.

25.10. On the front underneath of the cage there shall be nozzles of water spray curtain system to protect cage occupants from radiant heat. Control valve of water spray curtain system shall be conveniently located inside of the cage.

26. WATER MONITOR:

26.1. Water monitor shall be connected onto the piping system and it shall be placed at the front of the cage on the right hand side just outside of the railing to utilize to the entire cage floor area in extreme rescue situations. The monitor shall have maximum nominal capacity
of 3800 LPM with no friction loss at the monitor with adequate supply pressure and having a provision of Remote Control.

27. PAINTING:

27.1. Before painting all surfaces of steel structures shall be carefully shoot blasted after which they shall be primed. After the final top paint the thickness of the paint film shall be 100 microns. All booms shall be painted up to the same specifications from inside.

27.2. To provide very high corrosion resistance hollow structures such as steel profiles of the working cage, working cage support, cage boom and outrigger beams and housings shall be treated with anti-corrosion protection "TECTYL".

27.3. The words “Tamil Nadu Fire and Rescue Services” shall be painted on both sides of the vehicle in English and Tamil at suitable places in consultation with the Department.

27.4. The emblem of Tamil Nadu Fire and Rescue Services shall be painted on both sides of the vehicles in Natural colour.

27.5. Paint tones used for standard units shall be:

<table>
<thead>
<tr>
<th>Component</th>
<th>Color</th>
<th>RAL Code</th>
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<tr>
<td>Working cage</td>
<td>white aluminum</td>
<td>RAL 9006</td>
</tr>
<tr>
<td>Working cage support, boom sections, turntable and related cylinders</td>
<td>white</td>
<td>RAL 9010</td>
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<tr>
<td>Mainframe, outriggers and bodywork</td>
<td>red</td>
<td>RAL 3000</td>
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<tr>
<td>Chassis frame touch-ups</td>
<td>chassis original tone</td>
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</table>

28. ACCESSORIES:

4 pc Wooden outrigger ground pads with brackets

2 pc Working range diagrams, one at the turntable, one in the working cage

1 pc Marking of safe working load in the working cage

2 pc Unit type marked at the boom

1 set Warning labels and instruction plates

2 sets Operation and maintenance manuals

1 pc Plug for 24 V working light at the turntable and in the cage

2 pc 40 W working light with universal bracket

1 pc Lifting loop under the working cage, capacity 400 kg

4 sets Fitment for safety belts in the working cage

1 pc Hydraulic pressure gauge

4 pc Locking pins for the outriggers

1 pc Battery operated Public Address system.
LCD Display unit showing all the relevant parameters of operation of the booms. Fault finding system with Display.

1 No. Battery operated Hydraulic Combi-Tool.

Wind speed meter showing the wind speed both of the cage and turntable.

4 Nos. Personal protective Suits (Multi layered) as per the following specifications.

Further Spares required for the maintenance of the Aerial ladder platforms and to be supplied with the following items:

For Chassis:

1. Engine oil filters 2 sets
2. Diesel filters 2 sets
3. Air filters 1 set
4. Fan belts 1 set
5. Fuses 1 set
6. Accessory tools 1 set each

For sky lift platforms:

1. Hydraulic filters - 1 set
2. Fuses - 1 set
3. Fault finding guides
4. Suitable spare sensor-1 set