

PRE QUALIFICATION CRITERIA

1. The manufacturer of Hydraulic Platform should be ISO 9001 Certified company for design, manufacturing and after sales & service for Hydraulic Platforms. The certificates to be submitted with the offer.
2. The Hydraulic Platforms shall be designed as per the designed, operational stability and structural strength based on the criteria laid in EN 1777:2010 or equivalent norms and standards applicable for elevated raised platforms used for Fire Fighting and rescue operations.
3. Manufacturer of Hydraulic Platform shall have their sales & service network in India through their authorized agency / representative / distributor which shall have enough experience in Fire & Emergency Vehicles segment with full fledged manufacturing / fabricating the Fire Vehicles / tenders. To substantiate, Indian agent / representative / distributor shall furnish the authorization letter in original with tender documents.
4. The Hydraulic Platform mounted on the vehicle, if it is not manufactured by the bidder, in this case authorization letter from the platform manufacturer shall be submitted on the letter head of the manufacturing company specifically stating that the bidder is authorized to mount the platform manufactured by them under their supervision and will provide all the technical support during warranty period. They also have to give guaranty for supply of service and spare parts for minimum period of 10 years from the date of supply.
5. The Bidder should demonstrate Combined Fire Fighting and Rescue Vehicle consist of water tank, centrifugal fire pump, hydraulic platform etc. for technical evaluation before opening of the commercial bid at their own cost or else their bid shall be outrightly rejected.
6. The Bidder shall have manufactured & supplied at least 1 no. Combined Fire Fighting and Rescue Vehicle consist of water tank, centrifugal fire pump and hydraulic platform to any Govt./ Semi Govt. organization in India during last 3 years. Bidder shall submit performance certificate from end user along with offer.

Note:

1. Wherever makes of any equipment is given it shall always be read in continuation word "or equivalent"
2. Wherever the numerical is used indicating dimensions of any equipment or material, tolerance of +/- 10% shall be accepted. Except for working height and cage load.
3. Wherever the items / equipment is mentioned having NFPA or EN requirement, for all those equipment, proper certificate regarding the same shall be supplied by the OEM / Fabricator



TECHNICAL SPECIFICATION FOR COMBINED FIRE FIGHTING AND RESCUE VEHICLE WITH HYDRAULIC PLATFORM – 28M

1. CHASSIS: -

- 1.1 The chassis shall be of Reputed make such as Volvo or Bharat Benz or Tata or Eicher or Ashok Leyland or Mahindra or Equivalent and shall be Right hand drive, BS VI STAGE II-A (Euro 6) having wheelbase of Min. 4800 mm with driver cabin. The chassis shall be brand new with the following specifications.
- 1.2 Engine: The engine shall be Four/six cylinder in line, water cooled, Turbo charged, Intercooled, diesel engine, developing Min. 200 horse power.
- 1.3 Gear Box: Manual Transmission with regular clutch system
- 1.4 Cabin: Fully factory-built driver cabin duly painted with instrument cluster, rear view mirrors, Wiper system original driver seat, safety belts.
- 1.5 GVW: Min. 28 Ton as per CMVR
- 1.6 Tool Kit: Standard Tool Kit with 20-ton Hydraulic Bottle Jack.

2. TECHNICAL REQUIREMENTS:

- 2.1 The vehicle shall incorporate a Multi-Pressure Fire Pump, Constant flow high pressure pump, min. 2500 Liters water tank, lockers to carry the standard accessories, and Hydraulic Platform of 28 metres. working height.
- 2.2 The centrifugal pump and constant flow high pressure pump shall be mounted at the suitable location preferably at the rear of the vehicle considering ease of operation and maintenance.
- 2.3 The vehicle shall be designed to be as compact as possible with ease of accessibility to all parts.
- 2.4 The complete vehicle shall be so fabricated that it shall not exceed gross vehicle weight of chassis as per CMVR.
- 2.5 The vehicle shall be capable of performing all the normal firefighting and rescue operations under all climatic conditions.

3. REAR BODY

- 3.1 Suitable bench type seating arrangement with fully upholstered seats and safety belts shall be provided for 4 crew members at the rear deck behind the driver's cabin.
- 3.2 The rear body shall accommodate sufficient number of lockers to keep Suction hoses with couplings, delivery hoses with couplings, accessories water tank, Pump, P.T.O. and aerial device.
- 3.3 The rear body shall be fabricated in continuation and in line. The under frame cross members shall be fabricated from Galvanized rolled channel section of 100 x 50 x 5 mm & overall length of the vehicle shall not be more than 10.0 m.
- 3.4 A full-length runner fabricated from Galvanized rolled channel section of 100 x 50 x 5mm



thick Shall be provided and fixed on the chassis frame by means of suitable thickness MS plate bolted to the chassis frame as per the available bolt holes. A 5/8" dia. 'U' clamp shall be provided where the fixing plate cannot be provided due to non-availability of bolt holes in chassis frame. Each cross members shall be secured to the runner with suitable plates and 5/8" dia. bolt with Ny-lock nut. Or there shall be subframe of suitable size and design shall be provided and same shall be shown in drawing to be submitted with offer.

- 3.5 The superstructure of the cabin shall be constructed out of SS 304 Square Tube of 30X30x1.6mm size welded together by MIG/TIG welding process or from aluminium profile sections of suitable size. The superstructure shall be strengthened specifically on the members where the doors and window frames are to be fitted and also on the other members by providing brackets and the gusset plates securely fitted.
- 3.6 The flooring of the lockers shall be fabricated from SS 304 angles of 40 x 40 x 4 mm thick or from aluminium profile sections of suitable size.
- 3.7 All the steel structure shall be painted with two coats of rust preventive paint.
- 3.8 The complete external panelling of the rear body, lockers, doors shall be of min. 16 SWG aluminium sheet with all joints glued or riveted and beaded.
- 3.9 The complete top deck of the rear body shall be provided with 3 mm thick aluminium chequered sheet rigidly fixed to the super structure members by means of nuts and bolts. The complete top deck panelling shall be easily removable type.
- 3.10 The tenderer shall submit drawing of the rear body along with the tender.

4. LOCKERS

- 4.1 Sufficient number of lockers shall be provided at both the sides of rear body for keeping suction hoses, delivery hoses, accessories, hose reels and other tools.
- 4.2 The lockers shall be arranged in such a manner that the load distribution shall be equal on both the sides.
- 4.3 The size and placement of lockers shall be clearly shown in the drawing.
- 4.4 "The bidder shall provide suitable no. of lockers as per availability of space for keeping accessories, tools as specified in Annexure- A."
- 4.5 The lockers shall be divided into compartments and shelves as per the requirement.
- 4.6 The final design will be decided at the time of fabrication work.
- 4.7 The lockers shall be provided with Aluminium shutters. The aluminium shutters shall be water tight with suitable rubber packing and shall be MCD/FIRECO make.

5. WATER TANK:

- 5.1 A water tank of min. 2500 Liters capacity shall be fabricated and mounted on the chassis. All the welding shall be by latest welding process. There shall be minimum joints in the tank shell and hence plates used for fabrication of tank shall be of maximum size.
- 5.2 The tank shall be mounted on the chassis onto a runner or sub frame in such a manner that, the proper load distribution on each axle is achieved.
- 5.3 The water tank of required capacity shall be fabricated from stainless steel SS 304 and of suitable shape duly mounted on a chassis in a manner keeping in view the proper load distribution on the axles. The load distribution calculation shall be shown in the detailed drawing.

- 5.4 The tank shall be provided with suitable baffle plates to prevent the surge of water while the vehicle is in motion, accelerating, braking in speed and cornering. The arrangement of baffles shall be clearly shown in the drawing.
- 5.5 The baffles shall be arranged in a manner to facilitate the movement of a person throughout the tank for welding, cleaning and general maintenance purpose.
- 5.6 The tank shall be mounted suitably to counteract the stresses caused by chassis flexing.
- 5.7 The water tank shall be fabricated from 4 mm thick SS 304 sides, top, front, rear and baffle plates whereas 5 mm bottom plate. The side plates shall have pressed webs and there shall be reinforced plates provided to the shell of water tank to provide tank chairs. In case of Polypropylene tank the thickness of different plates shall be as per the load requirement and same shall be mentioned in the drawing which shall be submitted with the tender.
- 5.8 The water tank shall be provided with sufficient number of supports on either side for mounting the tank on the runner and mounted on heavy duty rubber metacone mountings.
- 5.9 The water tank shall be fixed to the runner plate with nut and bolt with ny-lock nut.
- 5.10 Suitable lifting eyes shall be provided on the shell of water tank to enable it to be lifted from the vehicle for repairs / replacement as and when required.
- 5.11 "The tank shall be fitted with 100 mm dia. overflow pipe of SS."
- 5.12 The tank shall be fitted with 2X63 mm instantaneous hydrant connection with non-return valve and strainers, closed to the pump panel for filling the tank through 75 mm. bore SS 304 pipe
- 5.13 A draw pipe of suitable size of S.S shall be taken from the tank to the pump suction inlet, incorporating butterfly valve of reputed make. A Flexible connection (rubber bellow) shall be provided to this pipe to take the vibrations.
- 5.14 The water tank with its piping and fitments shall withstand hydrostatic pressure of 0.5 bar.
- 5.15 A digital level gauge shall be provided in the control panel calibrated $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and full (preferably calibrated in litre).
- 5.16 The water tank shall have two manholes of suitable dia. but not less than 450 mm. The arrangement of shall be made to fill the tank from overhead arrangement.
- 5.17 The tank shall be connected with the pump and hose reels and valves shall be provided in such a way that, any of the following operations are possible.
- | | | |
|---------|--------|--------|
| Hydrant | - Tank | - Pump |
| Tank | - Pump | - Reel |
- 5.18 All the piping shall be of stainless-steel SS 304 grade material.

6. PUMP:

6.1 The pump shall be centrifugal type, multi pressure, having output capacity of 2000 LPM at 7 kg/cm², 800 LPM at 12 Kg/cm², and 300 LPM at 35 kg/cm² at 3 meters suction lift at NTP condition. The low-pressure side shall be of single stage and the high-pressure side shall either be single or multi stage.

6.2 The pump shall be of reputed make confirming to EN 1028 standards having the following specifications: -

a) Normal Pressure output: 2000 LPM at 7 kgs/cm²

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- b) Intermediate output: 800 LPM at 12 kgs/cm²
 - c) High-pressure output: 300 LPM at 35 kgs/cm²
 - d) Deep lifting capacity of pump: 7 m depth within 45 seconds
- 6.3 The overall pump shall be constructed from anti-corrosive Aluminium Alloy material. The pump shaft shall be made from stainless steel and all the studs and bolts coming in contact with water shall be of stainless steel. The bearings used in the pump shall be of reputed make.
 - 6.4 The normal and high-pressure impeller shall be mounted preferably on a single shaft and impellers shall be dynamically balanced.
 - 6.5 The pump shall be provided with a self-adjusting mechanical carbon seal.
 - 6.6 The pump shall have the facility to operate on various modes as per the requirement for firefighting.
 - 6.7 Operation of low pressure to high pressure or vice-versa shall be possible by actuation of a single lever/button.
 - 6.8 The Pressure Relief Valve (PRV) shall be provided which shall operate automatically and shall not allow the high pressure to increase beyond set pressure.
 - 6.9 The size of the high-pressure outlet shall be 25 mm connected to a high-pressure hose reel.
 - 6.10 The pump design shall be modular type and for ease of maintenance.
 - 6.11 The pump shall be equipped with 01 No. round threaded suction inlet of 100 mm as per IS:902 and 02 Nos. 63 mm delivery outlets having screw-down type valves fitted with instantaneous couplings as per IS 903. The high-pressure outlet shall not be less than 25 mm and shall either be flange or screw type.
 - 6.12 The high-pressure mode of the pump shall be capable of handling raw water with solid particles like sand up to 3 mm in size.
 - 6.13 The pump housing shall have provision to connect to the internal cooling system if required.
 - 6.14 The pump shall be mounted at a suitable location connected to P.T.O. by propeller shafts and universal and slip joints with a sufficient number of bearings supports.
 - 6.15 All the valves used shall be of reputed make with all the piping of the required size and shall be of SS material.
 - 6.16 The pump with its fitment shall be tested hydrostatically at a pressure of 21 kg/cm² and a certificate to that effect from the pump manufacturer shall be submitted.
 - 6.17 Primer: The pump shall be fitted with a suitable priming system which shall be capable of lifting the water in 45 seconds from the depth of 7 meters (up to pump inlet) at NTP condition. The primer should get engaged by simply pressing the Push button on the control panel and should disengage automatically at a pump pressure of not more than 0.8 Bar. An illuminating device shall be provided on the control panel to indicate the primer engagement/disengagement.

7 PUMP TEST:

- 7.1 The pump with its all fitments will be subjected to Hydrostatic testing on a pressure of 21 bar.
- 7.2 The pump performance test will be carried out by running the pump at constant speed and measuring the discharge at various pressure.
- 7.3 The pump will be subjected to Endurance test for a period of FOUR hours continuous running. The first Three hours the pump shall deliver rated output of 2000 LPM at 7 kg/cm² and next one hour will be 300 LPM at 35 kg/cm².

7.4 During the endurance test the water shall not be replenished in the cooling system and the temperature of the cooling water and engine oil should not exceed the manufacturers standards recommendations for the continuous operation and engine should not show any sign of stresses.

8 CONSTANT FLOW HIGH PRESSURE PUMP: -

- 8.1 This pump shall be reciprocating piston type driven by hydraulic drive system.
- 8.2 The major component of the pump shall be made from light alloy material and stainless steel for corrosion resistance.
- 8.3 The pump shall have variable pressure up to 35 bar at 200 LPM outputs constant flow at nozzles which can be selected depending upon the requirements.
- 8.4 The pressure at the nozzle shall be maintained approx. 35 bar irrespective of height at which the firefighting is required to be carried out up to the height of 60 floors i.e., approx. 180 metres.
- 8.5 There shall be pressure relief valve provided in the system to release the excessive pressure in case of closer of nozzle by fireman for tactical reasons.
- 8.6 The output of this pump shall be connected to high pressure hose reel with selectable valve (Preferably ball valve SS).
- 8.7 The pump and the complete system shall be design for minimum run period of four hours without drop in performance or efficiency.
- 8.8 There shall be hydrostatic drive system provided for driving this pump.
- 8.9 The hydraulic pump shall be driven by vehicle PTO which will be supplied either by chassis manufacturer or by body builder.
- 8.10 The PTO shall be of suitable capacity required to drive the reciprocating pump to meet the desired output criteria as stipulated above.
- 8.11 The ratio of the PTO shall be such that the engine is always running in safe mode as recommended by the chassis manufacturer.
- 8.12 The hydraulic system consists of hydraulic tank, filters, control valves, piping and oil cooler.
- 8.13 All the component of hydraulic system shall be of reputed make.
- 8.14 This pump will be tested for minimum period of one hour at rated output of 200 LPM at a pressure of 35 bar.
- 8.15 The hydro-test certificate of all fittings of this pump system tested at a pressure of 1.5 times the working pressure to be submitted at the time of testing of this pump.
- 8.16 The technical details of hydraulic system shall be submitted with the offer.

9 HOSE REEL (HIGH PRESSURE):

- 9.1 One combined high-pressure hose reels shall be provided and fixed in one of the lockers. This hose reel shall be connected to H.P. outlet of centrifugal pump and to the outlet of constant flow high pressure pump.
- 9.2 There shall be manual or solenoid control valve to select the output of centrifugal pump or constant flow high pressure pump. The buttons shall be provided on control panel.
- 9.3 The hose reel shall be made from anti corrosive light alloy or steel material with bearings / bush.
- 9.4 The design and size of hose reel shall be such that, it shall accommodate 30 meters.
- 9.5 H.P. hose having min. 19.0 mm bore with quick connect couplings. The hose reel shall have

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150 kgs./cm² working pressure.

- 9.6 There shall be additional 60 m. high pressure hose with quick connect couplings having working pressure of 150 kgs./cm² kept in one of the locker.
- 9.7 The HP hose reel shall be provided with High Pressure fog / Jet trigger type gun of reputed make connect by quick connect couplings. The gun shall be made from aluminium alloy or Gun metal of Stainless-steel material with rubber grip handle. The inlet connection shall preferably have leak proof rotating type hose connector. The gun shall be of constant flow type and shall have discharge capacity of 150 LPM approx. The gun shall have facility to set of either spray or jet pattern. The gun shall have ability to work on pressure from 20 kg/cm² to 40 kg/cm² without affecting the discharge pattern. The weight of the gun assy. shall not be more than 3.0 kgs.

10 AUXILLARY COOLING SYSTEM: -

- 10.1 The vehicle shall be provided with Auxiliary cooling system to maintain the temperature of engine within the manufacturer's recommended limit when engine is running continuously in stationery condition if required.
- 10.2 The cooling system if provided shall be INDIRECT OPEN CIRCUIT type.
- 10.3 The heat exchanger tank shall be made from Brass sheet of min. 2 mm thick with copper coil.
- 10.4 The heat exchanger tank shall be mounted below the Radiator in the front. The design of auxiliary cooling system shall be such that, it does not allow the cooling water temp. to increase above recommended limit when the pump is running continuously for a period of minimum four hours delivering full rated output under ambient temp. of 40 degree centigrade.

11 CONTROL PANEL:

- 11.1 An adequately illuminated digital control panel shall be provided near the pump and easily accessible to operator for operating different controls. The control panel shall be integrated with engine management system to control and monitor various important parameters of engine when pump is running.
- 11.2 The controls shall be of reputed make and electronically controlled which include Throttle Control, engine coolant temp, oil light etc. for engine and the following additional items
- 11.1.1 Throttle Control for engine : Preferably Electrical type (Gradual)
- 11.1.2 Pressure gauge : Low pressure: 0 to 21 bar (Digital + Analog) (Glycerine filled)
: High pressure: 0 to 70 bar (Digital + Analog)
- 11.1.3 Compound gauge : Vacuum: 0 to 680 mm of hg in Red.
Pressure: 0 to 10 bar in Black.
- 11.2 The pressure gauges shall be of reputed make Glycerine filled with min 3" dia. panel Mounted.
- 11.3 High pressure hose reel circuit control.
- 11.4 Cooling water circuit control (If required).
- 11.5 Change over lever/button from LP to HP mode located at convenient position.
- 11.6 LED type or digital water level indicator calibrated on full, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{4}$ and empty
- 11.7 Control buttons for constant Flow High pressure pump.



12 POWER TAKE OFF (P.T.O.): -

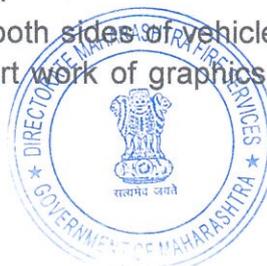
- 12.1 A power takes off assy. shall be brand new and capable of transmitting full torque developed by vehicle engine and transmitted to wheels in first gear shall be provided. If it is clutch depended PTO then it should transmit required torque and RPM to centrifugal fire pump to meet duty point.
- 12.2 "A power takes off assy. shall be reputed make, having suitable ratio and shall be able to transmit torque required for fire pump and hydraulic pump. The details of PTO to be submitted with offer."
- 12.3 The PTO control shall be electrical or pneumatically operated preferably with manual over ride located inside the driving compartment at suitable and easily accessible position.
- 12.4 The PTO assy. shall have a built-in cooling system in case of full torque split shaft PTO.
- 12.5 The driving shafts between the main transmission and the PTO shall be fully universal with provision for lubrication and shall have spline and socket system at another end.
- 12.6 The PTO assy. shall be mounted on heavy duty Rubber mountings. The mounting design shall be submitted at the time of fabrication in case of full torque split shaft PTO.
- 12.7 Complete technical details of the PTO system shall be submitted with the offer i.e. torque calculations, mounting arrangement, ratios etc.

13. ELECTRICAL SYSTEM:

- 13.1 The suitable size wire shall be selected for different circuits considering the current consumption for that circuit. The wires shall be of reputed make only. All the wiring harnesses shall be made as per standard engineering practices to avoid malfunction of the system.
- 13.2 A light bar assembly of Federal Signal or equivalent make having multi colour LED light Red/Blue/White as per Govt regulation to be provide and fitted on the driver cabin. The light bar shall be integrated with two tone hooter system and PA system. The amplifier and command microphone shall be fitted in driver cabin.
- 13.3 The other lights, pump cabin light, locker lights shall be LED type of reputed make.
- 13.4 All the controlling switches of lights on dashboard shall be reputed make.
- 13.5 Two LED type fog lamps of reputed make shall be provided and fitted on front-bumper with controlling switch on dashboard.
- 13.6 Remote controlled adjustable search light, mounted in a convenient position to give flood or beam of light on the driver cabin shall be provided.
- 13.7 LED type Fire light to be provided in the front.
- 13.8 All other lights required as per RTO rules to be provided on the vehicle.

11 PAINTING:

- 11.1 The steel structures of vehicle shall be painted with two coats of Anticorrosive paint wherever required.
- 11.2 The complete external and internal aluminium panelling of driver cum crew cabin and rear body shall be painted with coats of primer.
- 11.3 The complete exterior of the vehicle shall be painted with two finish coats of RAL 3000 RED paint manufactured by reputed company.
- 11.4 The names and Logo and graphics on both sides of vehicle shall be provided as per Fire Brigade requirement. The design and art work of graphics will be decided at the time of



fabrication.

11.5 The "EMBLEM" of the department shall be painted on both sides of vehicle in natural colours at suitable place in consultation with Chief Fire Officer.

12 B.A. SET BRACKETS: -

12.1 Brackets for fixing 4 B.A. sets with its fitments shall be integrated into crew seat.

12.2 The mounting of B.A. set bracket shall be such that, it can allow fireman to wear B.A. set while vehicle is approaching to fire call. Proper padding and harnessing arrangement shall be made in the bracket to avoid damages to the critical parts of the BA set.

13 OPERATING REQUIREMENTS & DIMENSIONS OF FINISHED APPLIANCE:

The Vehicle shall comply the following requirements:

- | | | | |
|-------|---|---|------------------|
| 13.1 | Min. working Height | : | 28 meters |
| 13.2 | Height to working cage bottom | : | 26 meters |
| 13.3 | Max Working outreach with 280 kg cage load
(When outriggers are within body) | : | 10 meters |
| 13.4 | Reach below ground level | : | 6 meters |
| 13.5 | Rotation - Continuous | : | 360 degrees |
| 13.6 | Safe working load in the cage on hard level
Ground with dry monitor | : | 280 Kg Minimum |
| 13.7 | "Safe working load with monitor in the cage
Delivery up to 1000 LPM with 2" water line | : | 100 Kg Minimum" |
| 13.7 | Loading capacity of lifting eye under the
Cage (cage empty) | : | 280 Kg Minimum |
| 13.8 | Operations at maximum outreach with
Full working load permitted in wind speed up to | : | 12.5 Mtr/ Sec. |
| 13.9 | Operating time at full stroke for all operations | : | As per EN 1777 |
| 13.10 | Overall length in traveling position | : | 11.00 mtrs max |
| 13.11 | Overall width of the vehicle | : | 2.50 mtrs max |
| 13.12 | Overall, Height in traveling position | : | 4.0 mtrs max |
| 13.13 | Maximum width of the vehicle when Jacks are fully extended on both sides: | : | 4.00
mtrs max |
| 13.14 | Gross Vehicle Weight | : | Min. 28 Ton |

14 CONSTRUCTION:

The appliance shall be robust in construction; materials used in construction shall be carefully selected for lightness and durability. Use of timber shall be restricted in bodywork and use of rubber shall be avoided as far as possible. Ferrous metal parts shall be treated for anti - corrosion by a method other than electro-plating.

15 BOOMS:

15.1 The vehicle shall perform the following functions/ operations:

- 15.1.1 Elevation
- 15.1.2 Depression
- 15.1.3 Extension & housing of telescopic sections
- 15.1.4 Rotation 360 degree in either direction

15.2 All the operations shall be electro-hydraulically operated with the help of hydraulic cylinders,

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wire ropes, chain etc. The system shall be purpose built to provide smooth take-off, variable speed range and smooth slowdown.

- 15.3 There shall be two booms, the first boom with three two telescopic sections providing direct movement and the other articulated booms with telescopic sections shall provide vertical movement of approx. 170 degrees. The booms design shall provide an up-and- over capability of min. 5 m throughout its vertical movement. Based on the selected outrigger position and cage load, the system selects automatically the maximum outreaches to all directions. The system capacity shall enable various outreach curves for each direction. The outreach control system shall practically be infinitely variable.
- 15.4 The booms shall be box section, with welded construction; welding method shall be of latest technology to provide high durability and extreme accuracy. For high strength and minimum flexing of the boom sections only high tensile strength steels shall be used for load bearing structures.
- 15.5 The main boom elevation and lowering shall be controlled by single hydraulic cylinder that have their separate safety device. The first boom shall be able to elevate in the range of 0 degree to +85-degree angle.
- 15.6 All telescopic sections of the first boom shall move in a synchronized way and there shall not be any intermediate jerks during extension / retraction. Automatic slowdown mechanism at the beginning of the movement as well as end of the movement shall be provided to all boom movements. All the moving sections shall be fitted with adjustable guides/ rollers to provide smooth and accurate movement. Various maintenance points shall be located well at hand either outside the boom or behind easily removable covers.
- 15.7 All booms shall be internally and externally primed and painted for long life span, treated against rust and corrosion.

16 HYDRAULIC CYLINDERS:

- 16.1 The Hydraulic cylinders shall be double acting, fitted with lock valves so as to prevent booms, working cage from lowering or the outriggers from retracting in case of pipe or hose failure.
- 16.2 The cylinders shall be provided with automatic dampers to prevent the pressure shocks and shall dampen the movement when a mechanical stop is reached.
- 16.3 Retraction of the outriggers shall be automatically prevented as soon as the booms have been lifted up from their transport position by way of electrical OR Hydraulic interlock system.
- 16.4 The piston rods of the jack cylinders have to be protected from damage caused by any external impacts.
- 16.5 Lifting of the booms from the transport position shall be prevented before the outriggers are in support position and there shall be a limiting circuit to prevent damage to the Drivers cabin by the first boom when not clear of the cabin.
- 16.6 All the movements shall be automatically limited in their extreme position and the working cage shall be prevented from working outside of the permitted working range in any position.
- 16.7 An emergency stop switch shall be provided on both control panels, which shall switch off the hydraulic pressure of all movements and shall stop the vehicle engine. The unit shall be supplied with a manual Bleed down System and Emergency Hydraulic Back-up System.

17 TURN-TABLE:

- 17.1 "The rotation for the turntable shall be controlled by hydraulic motor with planetary gear system / Worm and gear system and with brakes through oil immersed reduction unit."



- 17.2 The base control station shall be attached to the turntable so as to rotate with it and be accessible in all positions of the turntable.
- 17.3 Bidder can provide as per their standard design but it should be ease for operation.
- 17.4 The fasteners retaining turntable to the slewing ring shall be of proper grade and shall be torqued properly.
- 17.5 The rotation gearbox fastener shall be of proper grade and torqued with proper backlash.
- 17.6 There shall be provision for the manual rotation of turntable in case of failure of hydraulic system.
- 17.7 Pins securing the hydraulic cylinders to boom and turntable shall be properly installed and secured.
- 17.8 The hydraulic hoses, tubing and connections provided in the turntable shall be free from kinks, chaffing or leaks.

18 MAIN FRAME:

- 18.1 The main frame shall be welded, box section, made from high tensile steel plates and shall absorb all the stresses generated by platform and outriggers.
- 18.2 The front mounting bolts of the mainframe shall be spring loaded to allow the chassis frame to flex when the outriggers are fully down to avoid any stress concentration on the chassis frame.
- 18.3 The main frame shall incorporate hydraulic oil tank, outrigger beam housing, boom resting stand and it shall be bolted to the chassis frame and the slew ring support plate shall be welded to the top of the main frame and shall be precision machined.

19 STABILISING / JACKING SYSTEM:

- 19.1 The Jacking system shall consist of hydraulically operated four outriggers mounted in their housings in the main frame. The jack piston rods shall preferably be protected in a closed steel profile.
- 19.2 The Jacks shall be Vertical type construction, each outrigger shall have separate hydraulic cylinders to push the vertical Jack down.
- 19.3 The jack shall be provided with ground pressure sensors, which shall be correctly actuated before the booms are operated to ensure proper stabilization.
- 19.4 Each Vertical jack shall be provided with self-aligning footplate to spread the load evenly and allow the operation on uneven ground up to 15°.
- 19.5 The Jacking shall be able to level the vehicle up to 7 degrees sideways and fore and aft with automatic levelling system with manual overriding system.
- 19.6 The jacking system shall be controlled from control panel at right and left side of vehicle for following operations.
- 19.6.1 Left side jacks down.
- 19.6.2 Right side down.
- 19.6.3 Automatic levelling
- 19.6.4 Outrigger back to transport position
- 19.7 The jacks shall be controlled individually or in pair with lever /joystick in addition to automatic jacking system, and the control panel shall be situated in such a position that, the operator will have clear look to the right- and left-hand side while operating the jacks. The control panel shall be located at the rear side of the vehicle.
- 19.8 Yellow Flashing warning lights shall be provided at the outer most point of the jacks to



identify the position of the jacks during night operation.

- 19.9 Four wooden spreader plates shall be provided for the use, when the vehicle is to be operated on soft ground.
- 19.10 The Vehicle shall be provided with inclinometer (Spirit level gauge) which will measure both fore, aft and Sideways inclination of the vehicle up to minimum 10 degrees.
- 19.11 In addition, the following controls shall be provided on jack control panel:
 - 19.11.1 Starting of chassis engine
 - 19.11.2 Stopping of chassis engine
 - 19.11.3 Outrigger and outreach display with fault-finding system (Optional)
 - 19.11.4 "Operating hour gauge in the display or separately provided at a suitable location."
 - 19.11.5 Switch for the battery driven back up for the hydraulic system
 - 19.11.6 Visual indications for levelling of the vehicle (fore, aft & sideways)
 - 19.11.7 Emergency stop
 - 19.11.8 Controls for the automatic jacking
 - 19.11.9 Engine start / stop button for standby system engine.

20 ELECTRONIC SAFETY AND OUTREACH SYSTEM:

- 20.1 The computer-controlled system shall allow the outriggers to be positioned and to select the working cage load according to working situation. The system shall be capable to select automatically the maximum allowed outreach to front, rear, right and left side. Based on calculations and parameters saved in the system to guarantee exactly the same outreach regardless of the external influences like wind speed and direction, temperature, friction of the cylinders, etc.
- 20.2 "The display units of the system shall show maximum possible outreach and position of the working cage in real-time along with other details as an optional feature".
- 20.3 The electronic system shall be approved according to the valid standards and directives and shall be tested by appropriate testing agency.

21 CAGE:

- 21.1 The working cage shall be fixed to the tip of second boom with proper pivoting point.
- 21.2 The cage shall be made of Aluminium profile, welded together. The dimensions of the working cage shall be approx. 1.8 m (length) x 0.9 m (width) x 1.1 m (height) and it shall be fitted with an inward opening door located at rear left side of the cage. The top railing shall be part of the cage door so that entering into the cage without bending is possible. Another access door for rescue operation shall be located in the front right side of cage with top railing is formed for safe and easy access.
- 21.3 The cage shall be designed for 280 Kg working load and shall be tested to 1.5 times the working load.
- 21.4 The control panel in the cage shall be fitted in such a way that the operator shall see the booms clearly at all the times.
- 21.5 The cage shall be kept horizontally levelled in any position of the booms. An automatic hydraulic device shall control the levelling system with fully automatic and independent safety circuit in case of an uncontrolled levelling failure. There shall be a master switch for the automatic levelling system, so that it can be isolated and then manually controlled system activated. The cage levelling can only be achieved by hydraulic actuator for accuracy and reliability.

- 21.6 The working cage shall have capability to turn 80 degrees to each side from its centre position. The movement shall be powered hydraulically with controls in the working cage and at the turntable control panels. The centre position of the cage is indicated by a visual indication at both control panels.
- 21.7 At the front of the working cage there shall be a drop-down rescue platform with automatically operating safety railing to provide additional safety during rescue and firefighting. The dimensions of the rescue platform shall be approx. 1.10 m x 0.25 m with minimum 100 kg carrying capacity without variation of - 10%".

22 HYDRAULIC SYSTEM:

- 22.1 The Hydraulic power shall be provided by a reliable and adequate capacity Axial Piston pump or constant flow gear pump, which shall be driven by the vehicle power take off.
- 22.2 The filtration system of the hydraulic oil shall consist of suction strainer in the suction line, pressure filters in each pressure circuit, return filter in return line and air filter on the reservoir. All the pressure filters shall have blockage indicator.
- 22.3 All hydraulic cylinders shall be double acting with hard chrome plated piston rods and shall be fastened by means of self-aligning ball bearings to prevent lateral forces from damaging the seals or piston rods of the cylinders.
- 22.4 Hydraulic oil tank shall preferably be integrated or fitted into the main frame and shall have a proper heat dissipation system. The tank shall be fitted with oil level gauge, temperature gauge, and suction connections with closing valves for easy maintenance and draining outlet with closing valve.
- 22.5 There shall be hydraulic oil cooler controlled by thermostatic sensor to maintain the oil temp. within limit during high ambient temp. and continuous operation. The oil cooler shall be located at suitable location for easy maintenance.

23

24 BACK-UP FOR THE HYDRAULIC SYSTEM:

- 24.1 There shall be a separate single cylinder diesel engine with self-starting system, mounted at suitable place, preferably in one of the lockers driving the hydraulic pump, which will provide independent means of hydraulic power in case of failure of main engine of vehicle. The Diesel engine shall have sufficient power to drive all the movements of the booms but at a reduced speed. The Engine shall be able to start from all control panels. The electrical power for starter shall be taken from vehicle battery.
- 24.2 In addition to the above, there shall be battery driven Hydraulic pump, which provides independent means of hydraulic power in case of failure of main engine and standby engine of vehicle. The battery pump can be operated from all control panels.

25 CONTROLS AND SAFETY:

- 25.1 The Electrical supply needed for control system shall be taken from the vehicle battery which shall be charged when the engine is running.
- 25.2 When the vehicle is in operation yellow flashing warning lights mounted on the outriggers shall automatically remain on.
- 25.3 The engine starting and stopping switch shall be provided on all control panels and the engine speed shall be increased to the preset level as soon as any one of the control levers is operated.
- 25.4 All boom and rotation movements shall be controlled electro-hydraulically by means of



proportional valves. The proportional valve shall not be sensitive to changes of ambient or oil temperature, and shall provide smooth, safe and very accurate movements even in most severe operating conditions.

- 25.5 The speed of the first boom for lowering and extension shall be automatically reduced at maximum outreach. The first boom lifting speed shall be reduced before the maximum elevation.
- 25.6 All control movements can be performed by the control system from both control panels. The variable system shall consist two displays, the graphical or LCD display and real time information about the outreach and the cage position and also to show possible movements according to cage position by animated arrows. In the text display there shall be main texts for:
- 25.6.1 Warnings
 - 25.6.2 Emergency situations
 - 25.6.3 Help manual (optional)
 - 25.6.4 Fault finding system
- 25.7 Signal lamps shall be provided for following functions:
- 25.7.1 For the outriggers, in transport position in driver's cab
 - 25.7.2 For the outriggers working position on all control panels
 - 25.7.3 For the P.T.O. engaged in the driver's cab
 - 25.7.4 For the transport position of the booms in driver's cab
 - 25.7.5 For the middle position of the booms on the turntable and cage control panel.
 - 25.7.6 For the exceeding of the safe working load in the cage on the turn- table and cage control panels

26 TURNTABLE AND CAGE CONTROL PANELS:

- 26.1 The turntable control panel incorporating all control levers and safety system indicators shall be fitted at the side of the turntable preferably with a rotatable arm. The control panel shall be placed and locked conveniently in its operating position to provide the operator with an excellent view over the different indications of the safety systems.
- 26.2 The control station shall be fitted with convenient adjustable seat to provide comfort even in case of prolonged operation. The platform underneath the control position shall be covered by non-slip Aluminium plate.
- 26.3 The control panels at turn table and cage shall be exactly alike which will reduce the risk of confusion amongst operators under stress or even panic. Both the control panels shall be provided with weather protection covers/ box.
- 26.4 "The turntable control panel shall have a changeover switch to select the control station from which the operation is performed OR it should be means by Dead man padel".
- 26.5 Both control panels shall be fitted with following warning, indication and control devices, and shall be marked by clear symbols for easy recognition.
- 26.5.1 visual and audible indication for exceeding safe working load
 - 26.5.2 visual warning for activation of working cage collision guard system
 - 26.5.3 visual indication for ground pressure of the outriggers
 - 26.5.4 visual indication for the centre position of the booms
 - 26.5.5 visual indication for the centre position of the working cage
 - 26.5.6 starting and stopping of chassis engine



- 26.5.7 switch for the operating battery driven pump for hydraulic back-up system
- 26.5.8 Starting and stopping switch for standby engine for hydraulic back-up system
- 26.5.9 joystick control levers for each movement
- 26.5.10 push buttons/ joystick for cage slewing
- 26.5.11 emergency stop button
- 26.5.12 overriding of the automatic working cage levelling system
- 26.5.13 manual operation for the working cage levelling system.

27 CONTROLS AND INDICATORS IN DRIVERS CAB:

- 27.1 The following control and indicators shall be provided in driver's cabin.
 - 27.1.1 Visual warning for the main current being switched on
 - 27.1.2 Visual warning for outriggers in traveling position
 - 27.1.3 Visual warning for any of the equipment lockers being open
 - 27.1.4 Visual warning for the booms not being fully in transportation position
 - 27.1.5 Switch with visual indication for rotating beacons
 - 27.1.6 Switch with visual indication for siren unit
 - 27.1.7 Microphone for the public address system

28 SAFETY DEVICES:

- 28.1 All the 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.
- 28.2 Retracting of any of the outriggers shall be automatically prevented as soon as the booms have been lifted from their traveling position. Similarly lifting of the booms from the traveling position shall be prevented until the outriggers have reached the ground pressure.
- 28.3 The levelling system of the vehicle shall give audible warning at cage & ground level if permitted inclination increases due to changing ground conditions
- 28.4 All boom movements shall be limited at their most extreme positions 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 vehicle shall be fitted with two separate limiting circuits, the first one retarding and stopping that particular movement, and the second one deactivating the whole electric and hydraulic system shall the first circuit fail.
- 28.5 All major movements such as 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, and starting of the movement shall also be retarded for smooth acceleration.
- 28.6 Inadvertent damaging of the driver's cab by the main / first boom shall be prevented by a system preventing lowering of the booms and rotation movement when the booms are near the driver's cab.
- 28.7 An overload warning system shall be fitted to give an audible and visual warning in case of exceeding the safe working load in the cage and at the same time boom movements are slowed down and outward boom movements shall be stopped.
- 28.8 A cage collision guard shall be provided when operating in darkness or in dense smoke. The system shall stop all movements.
- 28.9 An emergency stop button shall be provided on both control panels to provide immediate and complete "freezing" of all systems in case of an unexpected emergency.
- 28.10 All the control levers shall be "Dead Man" type and shall automatically come to zero position



when released.

- 28.11 When one of the outriggers has not enough ground pressure, the system shall give an audible and a visual alarm. If two outriggers lose ground contact, unsafe boom movements shall be stopped.
- 28.12 The cab of the vehicle shall be protected from damage by the booms or working cage. Working in front of the vehicle close to the cab shall be possible. When in the cab protection area, the movements of the booms shall slow down and stop smoothly however, the opposite movement of the booms and the cage shall be possible to get out of the cabin protection area. Cab protection system/ mechanism shall be manually overridden by push button.
- 28.13 The booms shall be lowered back to transport position automatically by pushing a single push button as per preset sequence.
- 28.14 The safety system shall bring the working cage automatically to centre position while lowering the boom in transport position.
- 28.15 **“The vehicle shall be equipped with electrical / mechanical sensors for temperature and pressure of the Hydraulic oil. The temperature and pressure shall be shown on every display unit”.**
- 28.16 The vehicle shall be fitted with tilt alarm to give audible & visual alarm on display if the vehicle is levelled incorrectly. The tilt alarm angle shall be adjustable.
- 28.17 The system of the vehicle shall be based on clear and easy to understand symbols. If texts are used on master screens, the operator shall be able to change the language in use. All measure units of master screens shall be changeable to locally used format by operator.
- 28.18 The wind speed sensor shall be fixed in the working cage. The wind speed shall be shown on every display unit. When wind speed is higher than allowed the system shall give audible alarm. The wind speed meter shall not limit the use of the platform.

29 BODY WORK AND EQUIPMENT LOCKERS:

- 29.1 The structure for the bodywork shall be made up of various Aluminium / stainless steel profiles properly fixed together by riveting, bolting or welding.
- 29.2 The complete external panelling of the rear body shall be made from Aluminium sheet
- 29.3 fitted to the structural member either by gluing or riveting.
- 29.4 The complete flooring of the rear deck shall be made from non-skid Aluminium chequered plate of 3 mm thick properly riveted or bolted to the superstructure members.
- 29.5 For the easy access to the rear deck from ground level, there shall be sufficient Nos. of recessed steps on both sides of the vehicle provided with suitable grab handles.
- 29.6 Sufficient Nos. of lockers shall be provided on both side of the vehicle for keeping various accessories and equipment's. The locker shall be so made that load distribution on both sides is equal. All the lockers shall be provided with rolling shutters properly sealed for water and dust ingress. All the doors of the lockers shall be fitted with automatic switches activating the light as soon as the door is opened and also activating the warning light in Driver's cab.
- 29.7 There shall be a bench type crew seat suitable for 5 firemen fitted on the rear deck just behind the driver's cabin. This seat shall be properly upholstered and shall be provided with safety belts.

30 THE WATER SYSTEM:

- 30.1 The waterway shall be completely made of stainless steel/ Aluminium. The nominal diameter of the water way shall be max. 40 mm. There shall be one 40 mm male inlet (as per BS

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standard) The telescopic water pipe shall be provided on the side of booms properly supported and protected with flexible pressure hose on the boom knuckles.

30.2 The water line shall be protected from possible over pressure by means of relief valves mounted underneath of the turntable.

30.3 "A Telescopic water pipe shall be provided on the side of the booms, which shall be made of stainless steel/ Aluminium. Seals between the sections are of low friction type and can be easily tightened if so required. On the other booms a fixed stainless-steel pipe shall be installed and at the boom pivoting points, flexible and specially reinforced pressure hose shall be used. All hoses shall be fixed to the pipe with reliable span-lock connections OR threaded fittings".

30.4 An additional outlet of 40mm with female coupling and closing ball valve shall be provided to the water piping in the cage. There shall be drain cocks fitted in the piping to enable to drain the water from the piping after use.

30.5 On the front side of the cage underneath, a nozzle shall be provided for water spray curtain system to protect the cage occupants from radiant heat. Control valve of water spray curtain system shall be located inside the cage.

31 WATER MONITOR:

31.1 Water monitor shall be connected to the piping system and shall be mounted outside the cage in a suitable position so that the entire cage floor area can be fully utilized in extreme rescue situations.

31.2 The monitor shall be made of light alloy and fitted with jet / fog nozzle of reputed make with maximum capacity of 1500 LPM.

31.3 The Monitor shall have Horizontal rotational movement to left and right side and also vertical up and down movement.

31.4 There shall be ball valve type control valve for the monitor and the monitor shall be manually operated.

32 INTER COMMUNICATION SYSTEM:

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

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

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

33 ELECTRIC SYSTEM:

33.1 The electrical supply shall be taken from the vehicle batteries, which are kept charged when the engine is running. Voltage of the system shall be 24 V DC and all circuits shall be provided with specific fuses depending on the current consumption of that circuit.

33.2 When the main current is switched on, yellow flashing warning lights located at each outrigger and booms pivoting point and underneath of the working cage shall automatically be switched on.

33.3 2x 24 volts, 70 watts, spotlights with swivel mounting bracket shall be fitted at the cage railing in the front side to provide extra safety during night operation. The switch for these lights shall either be provided on the light itself or on both the control panels.

33.4 Two rotating beacon lights shall be provided on each side of the driver's cab roof with multi



the standards stipulated under EN 1777.

45.0 TRAINING:

The supplier shall undertake the training in the operation and maintenance of the hydraulic platform for the staff of the Fire Brigade dept. Maharashtra, (INDIA). The duration of training will be decided in due course.

46.0 WARRANTIES:

46.1 The manufacturer/ supplier shall furnish a warranty for the complete unit including chassis for a period of 12 months from the date of acceptance of the vehicle by Fire Brigade in perfect working condition.

46.2 The manufacturer shall also guarantee for the supply of spare parts & service for chassis and Aerial Ladder Platform including all systems for a minimum period of 8 years from the date of supply of the vehicle.

47.0 R. T. O. REQUIREMENTS:

The vehicle shall be equipped with all the accessories required for registration of the vehicle and shall conform to Motor Vehicle Act 1988 and Central Motor Vehicle Rules, 1989 or any amendment incorporated from time to time.

48.0 INSPECTION

48.1 The Customer or their authorized representative will carry out the inspection and the testing of the vehicle manufacturer prior to dispatch in the following stages. It is obligatory to the supplier to provide all the assistance and equipment for the inspection and testing of the vehicle at their premises.

48.2 The cost for deputation for inspection shall be included in the offer. Stage inspections during the fabrication of the vehicle shall be offered by the supplier to the purchaser at following stages:

Stage-01: Completion of mounting of superstructure, verification of dimensions of lockers, drawers, tank etc.

Stage-02: Completion of installation of assembly and installation of all Equipment and items including pump piping and pump mounting as specified in tender.

Stage-03: Completion of performance test of complete unit & receipt of 28 mtrs hydraulic platform vehicle at site and successful demonstration and operational training to users.

Stage 01 and Stage 02 is applicable for Prototype only. Thereafter only stage 03 inspection will be carried out.



ANNEXURE - A

Sr. No.	Items	Qty.
1.	Delivery hose Type B, ISI 636-mark, size 63mm X 15 mtr length fitted with ISI 903 Stainless steel male and female couplings and copper wire binding.	04 nos.
2.	PVC suction hoses 140mm X 2.5 mtrs. Length, fitted with round threaded male & female couplings, heavy duty, suitable for above pump conf. to IS: 903.	02 nos.
3.	Suction Metal strainer, 140mm size.	1 No.
4.	Basket strainer, 140 mm size.	1 No.
5.	Dividing breaching with control valve made of light alloy/gunmetal	1 Nos.
6.	Collecting breaching 63 mm size made of light alloy	1 Nos.
7.	Suction wrenches for 100 mm suction couplings Universal type	1 Pair
8.	Long line 50 mm circumferences 30 mtrs Long each	1 Len
9.	Short line, 50 mm circumference, 15 m long	1 Len
10.	First aid box for 10 persons	1 No.
11.	Hydraulic jack – 20 Ton	1 No.
12.	Tool Kit.	1 No.

