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Maharashtra Fire Services
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SPECIFICATION FOR DESIGNING CONSTRUCTION, FABRICATION, ERECTION, TESTING AND COMMISSIONING OF FIRE CANON WATER TOWER OF 12 KL

The Directorate of Maharashtra Fire Service receives specification for various fire tenders and special appliances from different Urban Local Bodies. Mostly, these specs have different compositions such as capacity of Water Tank, Foam Tank, Gross Vehicle Weight, Accessories and Various Ancillary Equipment and thus in order to bring the uniformity for all these specifications across Maharashtra, following specification is designed and suggested by Directorate of Maharashtra Fire Services. The aforesaid specification is for "Fire Canon Water Tower of 12 KL". details of specification are as follows.

1.0 GENERAL REQUIREMENTS:-

1.1 The Fire Canon Water Tower vehicle will incorporate a **Fire Pump of High Low Pressure** type having discharge capacity of **6000 LPM @ 10 bar, 300 lpm @ 35bar** pressure, a SS Water Tank of **12000 litres.** Alongwith various types of equipment & accessories as specified in this specification

2.0 CHASSIS

2.1 Suitable Cargo/ Hauleage Chassis of Minimum GVW 35 Tons, Turbo Charged, 6 Cylinders, Engine Power minimum 270 HP, 8 x 2 Wheel drive with Steerable front 4 Wheels, Wheel base 5500 mm - 6100 mm, Cowl Chassis, Tyres- 12+1 spare, Tyre size- 10.00 X 20, Power Steering, Non AC and meeting BS VI Standard. The chassis of Bharat Benz / Volvo / Mahindra / Tata / equivalent make shall be provided.

3.0 BODY WORK , CABIN & LOCKERS

3.1 The driver and crew cabin shall be as per SMART CAB concept used for fire fighting trucks worldwide as per NFPA recommendations. Arrangement shall be engineered such a way that functionality, drivability and roominess of a custom chassis with the serviceability of a commercial chassis shall be maintained. The cabin shall be provided for Driver & officer & extended cabin body shall be fabricated with seating arrangement for 4 crew members. The design of the cabin shall be such that it makes possible vision for the crew and shall ensure adequate ventilation. Two door on each side for cabin with each door giving ready access to the driver and the crew.

3.2 The crew seating area shall be at least 90-91"width and 70" headroom. Custom-built operator console shall be provided for instant accessibility to all warning system controls and radios for both driver and officer. Large opening shall be provided between cabs for good communication and visibility for all crew. Windshield glasses shall have full curved glass at corners to have greater visibility; Night vision lighting shall be with 2 upper and 2 beams each side. Front entry door shall be full opening and low floor steps. The shape of the body shall be well designed aerodynamic to decrease air resistance during travel. Separate two doors shall be provided for crew members with winding type glass.

3.3 The crew cab and the lockers would be of composite construction with sufficient rigidity, reinforcement, and as far as possible 40mm x 40 mm x 2 mm thick GI.CR square tube of sufficient strength will be used for the super structure with Zinc plating. 16 gauge aluminum sheets will be used for exterior paneling work all over & for inner lockers-walls18 gauge aluminum plain sheet / chequered sheet willbe used. 3mm thick aluminum checkered plate (anti-skid) will be used on all lockers floor, cab floors and top roof.

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3.4 The door shall open outwards which shall have lock with double and cab striking plates. Non - slip steps and grab rails with chequered plates and glass sheathed to assist to get in and out shall be provided. All the seat shall be fitted with 100mm thick foam cushion and the driver's seat should be adjustable type. All the glass fitted to the doors and windows shall have winding type regulators and shall be of splinter proof safety type. Wire mesh guard to protect windows and doors shall be provided which shall be externally mounted and quickly dismantled with appropriate wings screw. Rubber mating shall be provided in the Drivers cabin. Sufficient numbers of lockers shall be provided at both the sides for stowage of equipment. The locker shall be arranged in such a manner that the loaddistribution shall be equal on both the sides. The size and placement of lockers shall be clearly shown in drawing.

3.5 There shall be one full width locker provided between the cabin and water tank for storing equipment such as light portable pump. For storing other equipment Roll-in and Roll-out drawers opening in tapered position, vertical hinged walls, vertical slides etc giving very easy and immediate access to all equipment. Drawers should have self- locking system to prevent accidental opening. Suitable arrangement for strapping and clipping of the equipment in the lockers for non shifting of the equipment's, while the vehicle is in motion should also be provided. There shall be lockers provided at the level of suitable size on both sides. Lockers shall provide with aluminium roller shutters MCD or Equivalent.

3.6 The roller shutters should be able to open in any position of the vehicle eve n in rough terrain inside rails shall be provided to support the shutter over entire length of both sides. The roller shutter should be water tight when closed, must be maintenance free from weather and corrosion and can be easily repaired due to inter-changeable links. The lockers shall be having LED lights fitted inside the tracks and in the gutter section too. Grab rail and non-slip steps with chequered plates should be provided wherever necessary. The flooring will be of all chequered plate of 10 gauges SWG.

3.7 The vehicle will be covered on top 10 SWG chequered plate having rain water channel on both sides. Suitable arrangement for storing of four numbers of suction hose i.e. 2.5 mts length shall conveniently be provided on top of the vehicle. Rails shall support over entire length on both sides.

3.8 A suitable box shall be provided to keep all the tools contained in the appliances. Footboard at the rear of the appliances shall be, provided with chequered plates. Suitable non-skid steps to give access to the roof of the appliance shall be provided.

3.9 The officer and driver will be provided by seat which would have foam cushions and will be covered with good quality Rexene.

Crew seat shall have individual seating fitted with brackets for placement of breathing apparatus in an upright position. The seat shall have flip up provision for walk away type so that when the crew disembarks from the vehicle.

4.0 Equipment Stowage Compartments

4.1 The rear equipment lockers superstructure (after the cabin) shall be fabricated in corrosion free aluminium extrusion profile section / Stainless steel framework constructed and panelled with aluminium plate by means of glue without any welding work. The Profiles shall be strong SS -304 – 1.6 mm sheet profiles for strength or aluminium construction (ISO 6063T6), light in weight and intrinsic rectangular design with a distortion insensitive bearing.

4.2 Roof panels shall be made of aluminium padded plates. The roof should be strong enough for being walked-on and must be sufficiently supported. The intermediate walls and shelves shall be constructed from aluminium sheets panelled to the extruded aluminium profile / SS 304 structure tubes by means of glue without any welding work. The outside panelling shall be done from 14 SWG aluminium sheet. Complete flooring shall be of 10 SW G and the inside of lockers shall be done from 16 SWG Aluminium chequered Sheet.

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4.3 Lockers should be provided for secure stowage of all accessories and equipment provided with Fire Vehicle. All equipment should be stowed very scientifically & systematically in the lockers and each pieces of equipment will have its designated location so that at the time of Emergency the required equipment canbe very easily located & removed for use. Every space inside the locker shall be suitably used by means of horizontal & vertical shelves, swing out shelves. Location of equipment (labels) shouldbe provided on lockers for immediate identification. Each equipment should be properly clamped and strapped in the lockers to prevent shifting of the equipmentwhile the vehicle is in motion. The shutter should have smooth operation. Locker shutter will be equipped with electric switch to provide automatic switch on / off of compartment lights. All the space below the rear body and chassis should be utilized for making lockers for storage of equipment. These lockers should be covered with flap type doors opening downwards. Heavy duty self-locking spring loaded floor hinges should be provided on these doors so that these doors when open can be used as climbing steps for access to the lockers above it. Hinges should not any gas cylinder etc its total mechanical part open view. Guide rails over entire lengthon both sides.

4.4 All the compartments for stowage of equipment's shall be covered with Aluminium Roller Shutters. The aluminium shutters shall be of MCD make only. These smooth operating shutters shall be made of extruded aluminium profiles duly powder coated. The shutter doors shall be equipped with electro-magnetic switch on the door tracks to provide automatic switch "On / Off" of compartment lights. All the space on sides of the vehicle, below the chassis frame level shall beutilized for stowing equipment and shall be covered with rollers shutters.

5.0 Stowage System

5.1 Arrangement shall be provided for secure, scientific and systematic stowage of all accessories within the water tower. Each equipment shall have suitable drawers, shelves, swing doors to arrange accessories at its designated location so that it can be easily located during emergency situations. Suitable clamps, brackets, holders etc. shall be provided for major accessories as the need be. The accessories should be properly clamped / strapped to prevent shifting of the equipment while the vehicle is in motion and thereby avoiding damage to the panelling of the vehicle. Suction hoses shall be stowed on the roof top at a convenient location.

6.0 WATER TANK

6.1 A water tank shall be installed on the Fire Tender. The tanks have the following parameters:

Capacity	**12,000 Litrs**
Material of Construction	**SS 304**
Bottom Plate Thickness	5 mm
Side Plate Thickness (Die Pressed Stiffened on Two Sides)	5 mm
Top Plate Thickness	4 mm
Baffles Thickness	3 mm
Number of compartment	Suitable to maximum of 1Mt^3.
Numbers and Size of Manhole	2 x 450 mm
Numbers and Size of Cleaning Hole (Bottom of Tank)	1 x 250 mm
Drain Pipe on Cleaning Hole	50 mm
Overflow Pipe Size	Suitable
Number of Tank Filling Connections	4 x 63 mm
Tank to Pump Line Size	Suitable to pump.

7.0 Design & Plumbing

7.1 The Water Tank shall be designed to carry approx. 2 % excess capacity of the designed capacity. The Water tank shall be so installed as to allow the full flow of water to the pump. The tank will have baffle plates in order to avoid surge when the vehicle is braking, accelerating and cornering. An inspect ion manhole will be provided on top of the tank. The manhole will have a hinged cover so that the manhole will also act as a filling orifice. Cover will be marked with the word "WATER".

7.2 Suitable eyes will be provided on the shell of the tank to enable it to be lifted off the vehicle for repairs when required. A cleaning hole shall be provided at the bottom of the tank. It will be fitted with a drain pipe & valve which will be taken down to a point well below the chassis without reducing the effective ground clearance. The tank will be fitted with an overflow pipe taken down to a point well below the chassis that discharges the water away from the wheels. Hydrant connection incorporating a strainer will be provided for filling the tank. A pipeline will be taken from the tank to the suction inlet of the pump incorporating a quick action butterfly valve. The tank will be connected with the pump in such a manner that pressurization of water tank or water tank pump connection is avoided when pumping water from an outside source of supply.

8.0 TANK MOUNTING SYSTEM

8.1 The water tanks will be mounted on the vehicle on suitable Rigid mounting with suitable number of mounts clamped with chassis by EN-8 U bolts wherever necessary. Tank will be mounted on the chassis in a manner keeping in view the proper load distribution on the axles. The baffles will be arranged in a manner to facilitate easy cleaning of the tanks. The tank will be mounted on full length runner. The Centre of Gravity shall be maintained as low as possible.

9.0 MOUNTING OF SUPERSTRUCTURE:

9.1 Compartment Superstructure shall be mounted on secure brackets of the steel sub frame made from Anti-Corrosive Treated MS 4" section and shall be bolted with the chassis using the high tensile bolts. Use of "U" bolts as well as direct mounting of Superstructure on chassis frame is strictly non-permissible.

10.0 FIRE PUMP (HIGH LOW PRESSURE TYPE)

10.1 Fire Pump: - High low pressure fire pump of Godiva OR Rosenbauer make or any equivalent but complying to EN 1028-1, CE Certified and confirming to following features shall be mounted on the appliance.

10.2 High-Low pressure type fire pump be made of Gun Metal construction shall be mounted at the rear of the vehicle driven by vehicle engine through a power take off of suitable ratio to ensure maximum rated hydraulic efficiency of the pump. The pump shall be compact and of modular design having one 140 mm suction with round threads as per IS 902 with an removable strainer and 6 X 63mm deliveries with hose pressure relief arrangement shall be fitted with instantaneous delivery coupling and as per IS 901. The discharge manifold shall have inbuilt provision for monitor and tank filling piping. The entire high pressure section of the pump shall be made of stainless steel(CF8).The pump shall be of front access design such that maintenance of important components like low pressure impeller, high pressure impeller, mechanical seal etc. can be carried out on vehicle without removing the pump and pumps discharge side piping.

10.3 The low / normal pressure centrifugal impeller shall be made up of gun metal / stainless steel and shall be dynamically balanced. The high pressure impeller of regenerative type shall be made up of stainless steel; both the low and high pressure impellers shall be mounted on a single stainless steel shaft. The pump shaft shall be held in heavy duty ball/roller bearings running in oil bath. The pump shall have a self-adjusting mechanical carbon seal.

10.4 The pump shall be capable of simultaneous high & low pressure operations and operation of high pressure shall be controlled by an easily accessible single changeover lever. There shall be two outlets for high pressure of not less than 1.00" size.

10.5 The pump shall have an inbuilt pressure relief valve to control the high pressure within specified limits and a suitably sized thermal relief valve shall also be to ensure that the pump water temperature does not exceed 60^0C while operating under closed discharge conditions.

10.6 The pump shall be able to perform the following duties –

- Low pressure - 6000 lpm @ 10 bar when tested at a suction lift of 3.0 mtrs at NTP conditions
- Maximum outlet low pressure - 17bar.
- High pressure - 300lpm @ 35bar.
- Deep lift test from 7 meter.

10.7 The entire pump assembly with all its fittings and priming system shall be hydraulically tested at 21.0 bar for not less than five minutes.

11.0 <u>Pump Priming System-</u>

11.1 The pump shall be fitted with inbuilt twin piston reciprocating type priming system capable of priming the pump from 7 meters within 50 seconds at NTP conditions.

11.2 The entire priming system shall be constructed in stainless steel and shall be actuated by an electromagnetic clutch immersed in oil bath of pumps bearing housing. Arrangement shall be made to actuate the primer in Manual and AUTO modes.

11.3 When operating in Manual mode primer should be engaged simply by pressing a single button, only when it is needed.

11.4 When operating in Auto mode, primer must be internally actuated and must automatically re –engage when pressure is lost.

11.5 However, in both operating modes the primer shall disengage automatically at a pump discharge pressure of not more than 0.8 bar.

11.6 The primer deactivation shall be controlled directly by a pump pressure sensing device. Priming system driven by any external belts / chain is not acceptable.

12.0 <u>Smart Pump Control Panel –</u>

12.1 The pump shall be fitted with Pump OEM fitted Control paned comprising following features:

Digital Tachometer.
Digital Pump Hour Meter
Digital as well as Analogue Vacuum (compound) gauge
Digital as well as Analogue Low and high pressure gauges
Pump prime button for AUTO mode
Pump prime button for MANUAL mode
Oil Temperature warning light
Electronic Water tank level indicator
Emergency call bell
Audio Visual alarm for tank empty indication .
PTO Engage lamp in driver's cabin and rear control panel.

12.2 The pump control panel shall be designed keeping in mind the ease of operation and maintenance. The system shall ensure that scheduled operations and preventive maintenance is easily possible. It shall be ergonomically designedto ensure that all controls come to hand easily. The entire area shall be coveredby roller shutters.

12.3 All controls of the system will be spaced properly & marked for easy operation. All valves will be of lever-operated type and will be made of SS with Teflon seats. The following controls shall be provided on rear side of the vehicle near the control panel:

Compound Gauge, Normal Pressure Gauge, High pressure gauge.
Auxiliary Engine Throttle Control
Cooling Water Circuit Control
Hydrant Connection for filling Water Tank
Pump Inlets and Outlets
Water Tank to Pump Butterfly Valve
Pump to Monitor Valve
Operating Instruction Plate

Note: Details of pump such as its make and model with full technical features, supported with catalogues, brochures, drawing, warranty / guaranty etc. shall be attached with the offer. The drawing showing the pump performance curve at low and high pressure shall be enclosed. Authorization letter from pump manufacturer shall be enclosed along with technical bid otherwise bid may be summarily rejected.

13.0 HIGH PRESSURE HOSE REEL

13.1 One electrically operated Auto rewind type high-pressure hose reels of UDOR / DYNAMIC / ROSENBAUER Brand make of 60 mtrs. length of 20 mm ID, CE Certified, at appropriate location of the vehicle to facilitate operation of the high-pressure section of the Fire Pump shall be provided. The hose will be prevented from kink. Bursting pressure of hose will not be less than 100 bar. The high-pressure hose reel will hold 60 meter of hose in one length, terminating in a high-pressure for Jet / Fog gun. Plumbing between the pump and hose reel will have clean and unobstructed waterway of not less than 20 mm throughout without any restriction.

13.2 The Hose Reel shall be compact in size to accommodate in the lockers of the appliance.

Dimensions of hose reel shall be as per below:

Length –not more than 850 mm

Width –not more than 450 mm

Height –not more than 470 mm

Weight - not more than 30 kg (except hose pipe)

14.0 ROUND THE PUMP FOAM PROPORTIONING SYSTEM (RTP)

14.1 RTP shall be mounted directly on the suction tube and volute of the pump in a compact and self contained manner thereby eliminating any excessive piping / plumbing work to accommodate a foam inductor. The assembly shall be easier to operate and accurate proportions of foam shall be induced in the pump suction.

14.2 RTP shall be suitable for all commercially available Natural and Synthetic Foam Compounds. The assembly shall be made up from Gun Metal and should have a stainless steel venture. An infinitely variable control knob to control the induction rate with calibrated markings from 0-180 l/ min. This shall be a purely manual system, which allows the operator full control of the water / foam mix ratio. The system shall be operated satisfactorily at a main pump pressure from 5 to 15 bars. The system should be with minimum no. of moving parts thereby making it highly reliable.

15.0 WATER CUM FOAM MONITOR WITH TOWER:

15.1 One no. imported water cum foam monitor of Akron Brass or Elkhart or equivalent make suitable in salt-water shall be provided on the top at suitable location on a hydraulic arm to create an effective elevation for water flow as water tower having discharge capacity of 1800 lpm to 3800 lpm at 7 bar pump pressure complete with nozzle shall be provided. The monitor shall be capable of traversing through 360° in horizontal plane, +90° & -60°, controlled through paneled and wireless remote control.

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The monitor should be remote operated from minimum 75 meter distance &also having joystick control of the monitor at the roof top, horizontal movement, vertical movement and jet, spray pattern of the monitor. The monitor shall allow control by an operator from either roof top, or from a distance. The hand held remoteshall be provided for remotely operating the monitor. Manual override with self- locking arrangement shall be provided at monitor for horizontal movement, vertical movement & jet, spray. Material of construction: PYROLITE / SS304.

15.2 Further details are as follows:

One no. Pressure gauge near on monitor near to the inlet to be provided.

Horizontal throw at 7.0KG/Cm2

Flow pressure at monitor base flange: Minimum - 65 meters for 3800 lpm

Rotation: 360 Degrees

Elevation: 90 Degrees (+ 75 Degrees; - 15 Degrees)

Monitor shall be provided with the isolating remotely operated Monitors OEM made Valve.

Monitor to be provided with proper support.

The monitor shall have arrangement to convert into stand post type in single button without raising other booms & the levelling jacks, switch shall be placed in driver cab.

16.0 STABILITY RATIO:

16.1 The stability ratio calculations of the water tower system to be mounted on the vehicle, shall be submitted in the tender documents, mentioning the load diagram / force diagram as at the empty tank and tower at maximum outreach position, and this ratio shall not more than 0.5. Sufficient drawings shall be submitted if asked by head of the fire officer or authorized representative on his behalf at any stage of tender.

16.2 Load distribution calculations mentioning suitable chassis shall be submitted in the tender.

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16.3 Pump and PTO with drawings.

16.4 Tank drawings, P & ID (piping and instrument) drawing showing equipment layout, and general arrangement drawing along with transparencies.

16.5 Locker drawings

16.6 Flow diagram

16.7 Electrical system

16.8 Details of monitor from the original supplier

17.0 POWER TAKE OFF UNIT

17.1 Suitable PTO will be of heavy-duty capable of transmitting the full power of the engine to the pump input requirements i.e. Torque and RPM. The PTO unit will match the engine & pump characteristics. A separate lever shall be provided in the main cabin to engage PTO. Necessary support for PTO units, propeller shaft couplings, universal joints etc. will be provided. With both Mechanical and Pneumaticshifting. PTO will be of FIREHAWK OR VAS.

18.0 COOLING SYSTEM:

18.1 Indirect cooling system of open circuit type consisting of a special heat exchanger will be provided on the Chassis to enable full power output to be maintained during the pumping out without overheating and hot water discharged, will be amply dimensioned for both condition.

19.0 CONSTRUCTION DETAILS OF BOOM ARMS-.

19.1 STRUCTURE:

19.1.1 The arms shall be articulated booms type only shall be fabricated of light but stiff M.S. Box section of best quality material. The structure to be fitted with wide pivot bushes and EN-9 pins for booms as well as hydraulic cylinders. The whole assembly is **mounted on heavy duty turn table** with an imported rotary slewing bearing with double row balls minimum slewing torque 15000NM/Static axial load 1500-1600KN, speed 2RPM, Tilting moment 180-200 KN.mtr.

19.2 HYDRAULIC RAM:

19.2.1 Hydraulic cylinders shall be of double acting type having precision honed tubes and induction hardened, deep grounded, chrome plated EN-8 piston rods providing smooth operation, long steel life and resistance against corrosion, within-built safety and proportional valves.

19.3 STABILIZER:

19.3.1 04 Nos. powerful double acting hydraulically operated stabilizers are provided with wide footprint to protect the vehicle from top up down. Over travel is provided in the stabilizers to level the vehicle on uneven ground. The stabilizers are fitted with swivel pads flush with chassis when retracted. The stabilizers shall not allowed to project outside of body width during operation or travel, LED FLASHER shall be provided as the stabilizers in operation position.

19.4 SLEWING:

Slewing 360^0 in either direction is provided by hydraulically through worm gear arrangements made in turn-table, imported slewing bearing as specs mentioned above. Whole structure mounted on high torque heavy duty slewing bearing conforming to manufacturing process EN10204-3.1 suitable for smooth slewing operation.

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19.5 CONTROLS:

Shall be provided at base at suitable position in a compartment to up and the operation of stabilizers.

19.6 SAFETY:

19.6.1 All cylinders provided with inbuilt hose bust cum proportional valve & shall be modular design.

19.6.2 Stabilizer to boom interlocks i.e. booms cannot operate unless stabilizers are employed.

19.6.3 Pressure relief valve to protect the hydraulic system from overload.

19.6.4 Control safety valve for interlocking of boom rotation unless boom lifted rotation does not allowed.

19.6.5 Warning lamp on stabilizer feet to warn oncoming traffic.

19.6.6 Emergency stop switches at base to isolate boom hydraulic function.

19.6.7 Suction strainer and return line filter to ensure supply of clean oil to the pump.

19.6.8 Addition standby hydraulic line for the tower system during failure of the circuit.

19.6.9 Additional battery/hand operated hydraulic power pack shall be providedto restore the system during failure of hydraulic Power take off unit.

19.6.10 Home restore guidance system shall be provided, the system shall be restored in rest position from even far distance.

19.6.11 Standpost or RF monitor convertor: The boom monitor shall have arrangement to convert it into standpost or Roof monitor mode as and when required, without applying jack and without operating other booms, the control shall be provided in drivers cabin so that the monitor can be used as a roof monitor without operating the boom.

20 DIMENSION FOR ELEVATED WATER BOOM:

Maximum working height: 16 mtr. from ground. Acceptable upto +/- 0.5 mtrs.
Minimum outreach of boom: 12 mtr.
Rotation 360 deg. either side with maximum 2RPM
Arm operating angle boom -1st Boom - 80°, 2nd. Boom - 75°, 3rd Boom - 0 to 90°
Fire Monitor fitted: fully automatic electrical controlled water foam type monitor SS / pyrolite with elevation Angle 90 deg, swivel angle +- 360 deg, Depression angle 60 deg. As per mentioned make only in the specs anywhere.
Fog and jet pattern controlled by remote control.
Throw range water 70 to 75 mtr. Foam 50 to 55 mtr, Pressure .80Mpa.
Control 70 mtr. Wireless and manual override lever valve provided at top .
Boom pipe waterline shall be light weight aluminium alloy or SS 304, with soft pipe end connections.
Arrangements to drain waterline after operation.

21 EMERGENCY FLOODLIGHTING ARRANGMENTS / LIGHT MAST:

Four (2) nos. LED Halogen flood lights shall be mounted at suitable place on the tower for giving effective flood lighting during night operation , rescue work , minimum lumens of each light shall be 10000 Lumens, using AC power source.

22. POWER GENERATOR:

22.1 Heavy duty AC power generator shall be mounted at suitable location convenient place to provide continuous power source so that positive AC powerwill be available on board. The system will be very compact light weight and noiseless. The output capacity of generator shall be **5** KVA , 1phase, Power factor 0.8, Aprox. size 455 x 220 x 240 mm, weight not more than 29 Kg including drive. Suitable drive arrangement shall be made through on board PTO.

Note: General arrangement circuit diagram, Authorization letter and catalogue from manufacturer shall be attached with bid document otherwise bid shall be summarily rejected.

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23. VIDEO CAMERA UNIT:

23.1 An infrared day night vision video camera unit with IP-66, weather protection shall be mounted on suitable bracket on monitor which will be used as additional advance information to fireman during fire fighting and surveillance operation of hazardous area. Suitable TFT Colour display shall be mounted at drivers cabin to visualize and recording of the operations. The image capture range shall be 60 mtr distance –FLIER/ HIKVISION / SONY.

24. LADDER GALLOWS:

24.1 Ladder gallows along with aluminium extension ladder of 10.5 mtr. shall be supply and mounted on roof of appliance.

24.2 Aluminium Extension Ladder shall be as per IS 4571. Ladder shall be provided with reflective tapes on the surface of the strings and Head and Heal stickers indicating top and bottom.

25. SPARE PORTABLE PUMP

25.1 A Petrol operated portable pump of Godiva or Rosenbauer or Tohatsu make min. 800 - 900 lpm 5 kg /cm2, shall be provided connected to the water tank with valve arrangement, along with the suction hoses, strainers, wrenches, it should be mounted in the vehicle locker, preferably at the rear side. It shall be on trolley mounted fitted with nut-bolt, so as to remove as and when required. The Weight of pump should not be more than 90 kg. etc. It should be supplied with the Manufacturer's warranty certification.

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26. PIPING & VALVES

26.1 All piping and plumbing will be designed to have minimum pressure drop & achieve the required pressure & flow at various locations. All pipe fitting & valves (except butterfly valves) will be of SS -304 material. All piping will be designed for 10% over the maximum pressures encountered in the piping. The piping will be flanged as far as possible for ease of maintenance. All lines will be hydraulically tested at 1.5 times the design pressure however in no case will the lines will be hydraulically tested below 18 bars. All Piping will be of SS 304.

27. ELECTRICAL SYSTEM & FITTED ACCESSORIES:

27.1 All-important electrical circuits will have separate fuses suitably indicated & will be grouped into a common fuse box located in an accessible position in Driverscab and fitted with means for carrying spare fuses. All the wiring will be monopoleand shall not be exposed to the atmosphere. Conduits will be used wherever necessary.

28 **ELECTRICAL SYSTEM & FITTED ACCESSORIES**:

28.1 All equipment lockers will have individual lights and these will be operated by means of a master switch on the dash board in the driver cabin. All the wiring willbe monopole and shall not be exposed to the atmosphere. conduits will be usedwherever necessary. A trickle type battery charger will be provided for rechargingthe battery in situ. A red pilot lamp indicating when the batteries are being charged from an external supply will be provided.

Following electrical fittings will be provided on the appliance at suitable locations

Hand Lamps	2
Fire bell 250mm	1
Battery operated siren 1km range	1
Fog Lamps	
LED Light Bar with Inbuilt PA System with Multi tone Siren & Hooter in on Unit	
Search Light (min. 1000 Lum.) with 30 meters Cable Reel	1
Spot Light (mounted near driving compartment)	1
Inspection Lamp with bracket	1
LED flasher lights (both side & rear side) Red, Yellow, Blue & white etc.	6
LED WORK LIGHT –operated on DC mounted on top rail each side, @ 500lm Lighting power.	5
LED scrolling or flashing display sign board (scrolling letters will given by Fire Dept)	1
Reverse Sound Hooter, with Additional Lights and Reverse Camerawith Picture Screen in Cabin	1 Set
Separate special Master ON/OFF Switch for all lights together, shall be give on Dash Board	1

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29 BATTERY CHARGER (ISI Marked)

29.1 Trickle charger having capacity of 250 volts having capacity to charge 24 volts battery along with pilot lamp to indicate whether the battery is being charge. This is required to be fitted at appropriate location on the appliance.

30 PUBLIC ADDRESS SYSTEM:

30.1 Battery operated public address system Ahuja or equivalent make having range of the sound of the public address system would be within 500 mtrs & 12 volts power supply shall be drawn from the battery of the chassis should be provided. The PA system should consisting of amplifier, loud speaker and mike shall be fitted inside the drivers cabin in front of the officer's seat. Amplifier and microphone shall be clamped / fixed type in front of officer's seat. Horn unit / loud speaker shall be mounted on roof of the cabin.

31.0 PAINTING AND MARKINGS:

31.1 The entire structure will be prepared by grinding the welded surfaces, priming the finished material with a zinc rich primer.

- Surface Preparation: This would be poly- urethane (PU) based paint.
- Vehicle Exterior Paint: The complete vehicle (all exterior surfaces) & monitor would be painted with at least 2 coats of zinc phosphate primer each of 50 microns DFT & 2 coats of polyurethane finish paint each coat of 50microns DFT. Further improvement on the paint maybe carried out by the manufacturer beyond that mentioned above, to give better protection & surface finish. The entire appliance will be painted with Fire Red paint preferably of ASIAN PPG make using double coat spray painting on the outside. The user's (ULB's) nameand logo will be written on both-sides with yellow colour (in English & Marathi).
- Marking/Name Plates: All the lockers/cabins will be provided with SS Nameplates with letters itched on it boldly indicating the content

31.2 The Vehicle will be clearly and permanently marked with the following :

- Manufacturers Name & Logo
- Year of Manufacture
- Capacity of Pump in LPM
- Capacity of Water Tank in Litres
- Engine & Chassis no.
- Instructions for Driver in cabin

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32.0 DOCUMENTS :

- Following Documents has to be submitted during the bidding process and after the delivery such as

  General layout of the tender

  Equipment layout

  Flow diagram

  Electrical system

  Locker drawings

  User Manual and Instruction Booklet

33.0 ANCILLARY EQUIPMENTS :

- The ancillary equipment as given in the Annexure – A shall be provided along with the vehicle. Depending upon the budget availability, the option at Annexure – B may be looked into.

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34.0 STAGEWISE INSPECTION.

34.1 Advance notice of at least 1 week should be given by the fabricator; however the fabricator must keep the vehicle ready for stage wise inspection before giving such notice. Purchaser (Urban Local Body – ULB i.e. Municipal

Ist stage Inspection	a) Body Structure Inspection b) Testing of Loose (unmounted) Water Tank and hydro testing and sand blasting test
IInd stage inspection	a) Inspection of Panel Work. Hydro b) testing of Pump c) Installation of Pump , PTO & Piping Pre d) finishing inspection. e) Compliance of non-conformities, if any f) Water tower monitor operation test
IIIrd stage inspection	a) Stability (Tilt) test as per IS standard b) Gradient Test for entire vehicle c) Articulation Test for vehicle d) Road Test for full laden vehicle for min 30kms. e) Four Hours Pump Operation Testing, f) Monitor & Hose Reel performance test. g) Complete functions-operations of all systems installed. h) Checking of all catalogues, Operation manual of appliance i) Any Other : Test as may be required for Final Acceptance

34.3 STAGE WISE INSPECTION :-

34.3.1 Each stage wise inspection will be carried out by head of the local fire service or any authorized person by him. It is hereby suggested that there should be minimum three member panel in the inspection team.

34.3.2 Expenses towards lodging boarding of inspecting team members should be born by the Company. To and fro expenses towards the travelling of the team members from the journey place to the works will be borne by the successful tenderer and the offer shall contain all such expenses.

35.0 Approval and Certification towards Chassis and BodyBuild Vehicle-

35.1 After full Body Building, the entire vehicle should be got fully checked, examined and tested from the concerned chassis Manufacturer / Dealer and Test Report to the effect to be got by the Body builder party / Tenderer as follows -

- Gradient Test.
- Stability Tilt Test.
- Articulation Test
- Turning Radius Test,
- Road (Braking, Acceleration & Speed).
- These test needs to be cleared from ARAI (Automotive Research Association of India), Govt. of India, and the Test Reports to the effect to be got from the Body Builder / Tenderer.

36.0 TRAINING

36.1 The successful tenderer has to arrange training for the personnel of fire brigade department in handling, operation and maintenance of the above equipment. The training of minimum 4 sessions either at Fire Station of the concern ULB's or any other suitable location mutually agreeable to Head of the Fire Service of the ULB's and the contractor. The training shall cover operation, handling and maintenance of all the tools equipment and gears listed under this tender.

36.2 All the expenses towards the training shall be included in the cost in addition to training material and the cost of tools and equipment and consumable required at the time of training. The training program shall be chalk out in consultation with Head of the Fire Service or any other officer authorized by the him.

37.0 INSTRUCTION BOOKS:

37.1 Instruction books for the guidance of the user including both operation and normal maintenance shall be supplied for all the equipment in English language. The books shall include an item wise and illustrated spare parts list giving reference numbers of all the possibly swearing parts. The workshop manual and spare parts catalogue of chassis shall also be supplied with vehiclepreferably with soft copy.

38.0 COMPREHENSIVE SERVICE MAINTENANCE CONTRACT (CSMC):

38.1 The Contractor shall offer the vehicle with three years COMPREHENSIVE SERVICE MAINTENANCE CONTRACT which includes the cost of repairing of vehicle at periodic intervals or at the time of break down of vehicle including the supply of original spare parts.

38.2 The CSMC shall be for superstructure as well as for the chassis.

38.3 The servicing of the superstructure and the chassis shall be carried out strictly as per the manufactures recommendations at periodic intervals.

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38.4 During the contract the vehicle shall be checked periodically at the interval of every three months and all the test and checks shall be carried out as per manufacturers recommendations.

38.5 The spare parts used at the time of periodical servicing shall be original and brand new.

38.6 Any break down of the vehicle shall be attended within 72 hrs. from the time of intimation of break down (telephonic / written) to the contractor.

38.7 The servicing and repairing of vehicle including chassis shall be carried out through skilled workers as certified by the manufacturer (within the ULB's District Region).

38.8 All the tools, consumables etc. required for the servicing of the vehicle shall be arranged by the contractor.

38.9 The servicing and repairing of the vehicle shall be carried out either at the fire station or at the fire brigade workshop or at the authorised workshop of vehicle manufacturer.

38.10 The complete servicing of the vehicle shall be carried out well in advance as per the provisions of Motor Vehicle Act and Central Motor Vehicle Rules when the vehicle is due for renewal of mechanical fitness certificate.

38.11 Any break down of vehicle on emergency call or on road shall be attended immediately.

38.12 The complete servicing and repairing of vehicle shall be carried out under the supervision of technical officer of fire brigade department and all the instructions (oral or written) given by him time to time shall be incorporated / attended.

38.13 Any damage to the vehicle due to in proper handling or due to accident shall be attended promptly and the cost on account of such repairs including the cost of spare parts shall be got approved from Head of Fire Service prior to such repairs.

38.14 Any dispute arise out of this contract, Municipal Commissioner / Chief Officer will be the final authority and the decision given by him shall be binding to both the parties.

38.15 The tenderer shall give the details of work to be carried out at periodic interval of three months along with the offer.

38.16 The contractor shall maintain the log book of the vehicle and shall enter all the details of repairs /service of the vehicle carried out time to time and same shall be got certified either from Officer in charge of the fire station or from workshop in charge.

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ANNEXURE – A

Equipment to be supplied with the appliance are as follows:

Sr. No	Description	Qty
1.	Pyroprotect RRL Delivery hoses, Type B, (ISI-636) 63 mm dia X 15 M with Copper winding Gun metal / SS couplings of 63 mm couplings.	20
2.	Pyrporotect RRL Delivery hoses, Delivery hoses, Type B, (ISI-636) 38 mm dia X 15 M with Copper winding Gun metal / SS couplings of 63 mm couplings.	20
3.	Suction hoses 2.5 m length 140 mm dia fitted with Gun metal coupling.	04
4.	Suction strainer for 140 mm suction hose – brass as per IS: 907: 1984	01
5.	Dividing breaching with control 63 mm instantaneous pattern – GM as per IS: 5131:2002	01
6.	Collecting breaching 63mm instantaneous pattern – GM as per IS: 905: 1980	01
7.	Suction wrenches Conventional / Universal for 140 mm suction hose couplings as per IS : 4643:1984	02 pairs
8.	Short Branch pipe GM 63 mm male inlet as per IS: 903: 1993	04
9.	Foam branch – FB5X type, with pick up tube, GM as per IS:2097:1983	02
10.	Selectable flow nozzle, made of aluminium alloy (hard anodized), light weight and easy handling having 63 mm size male instantaneous inlet. Nozzle shall have rubber moulded bumper and pistol grip handle, ball valve with shut off handle. Selectable flow capacity, nozzle flow rate settings of approx. 200-250-350-475-600 lpm at 7 kg/cm2, with good range hollow jet, and dense fog in spray position and having a arrangement of low and medium expansion foam attachment.	02

11	Suction adaptor GM 140 mm female x 63 mm male with lugs	01
12	Adaptor 63 mm male to 38 mm female GM	02
13	Adaptor 63 mm female to 63 mm female GM	02
14	Double Male Coupling 63 mm	02
15	Aluminum Extension ladder 10.5 mtrs with the provision of gallows	1
16	B.A. Sets having working duration of 45 mins capacity with one spare cylinder each as per IS 10245 Part 2	04
17	First Aid box for 10 persons.	01
18	Rubber gloves, marked with IS-4770-1968.	06
19	Basket strainer as per IS-3882-1966	01
20	Spade with wooden handle	01
21	Pick axe wooden handle marked with IS-273-1973.	01
22	Crow bar marked with IS-704-1968.	01
23	Bolt cutter heavy duty	01
24	Sledge Hammer 6.5 kg. IS – 841	01
25	Ropes Terylene Nylon 1" (30mtrs each)	01
26	Ropes Terylene ½ " (30 mtrs. each)	01
27	Fireman Helmet as per IS 2745 (Non-Metal)	06
28	Gumboots (Knee Lenght)	06
29	Ceiling Hook	01
30	Drag Hook heavy duty	01
31	Metal Hooks for Water search use	01
32	Power operated Saw cutter	01
33	Curtain Nozzle (Mayuri) having 2 ½ " instantaneous (flanged) male coupling	01

ANNEXURE – B

Depending on the budget availability of the ULB's, Annexure – B should be looked as an option and instead of should go with Annexure – B as follows.

1. The material of Water Tank can be of MS IS 2062 instead of SS 304.
2. The equipment mentioned in Annexure – A from Sr. No. 01 to 25 shall be reduced to 50% unless it is a single item.
3. The equipment mentioned in Sr. No. --- to -- can be avoided and when funds are available these can be purchased independently