

SPECIFICATION FOR SUPPLY OF FULLY BUILT SMALL FOAM TENDER

1. SCOPE

This standard lays down the requirement regarding design, material, construction, workmanship, finish, accessories and acceptance test of foam tender. The specifications are drawn in line with technical specification of foam tender as per BIS -10460 - 1983. BIS/EN-1028 standards for centrifugal fire pumps are considered for the supply of foam tenders of this type. Pump should be of 3000 LPM at the rate of normal pressure of 10 Kg/cm². Specifications are designed for optimum utilization of the fire engine to facilitate as a composite unit.

2. General:

The fabrication of water tender shall be carried out on a chassis of capacity – not less than 18 ton in weight (4 x 2 wheel drive); minimum 180 BHP – BS VI emission norms chassis which shall be procured by the tenderer at their cost. The appliance shall have water tank capable of carrying 5000 litres of water and foam capable of carrying 1000 liters foam and shall be fitted with a pump at the rear of appliance and driven through the PTO.

3. Chassis:

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| Manufacturer | : Ashok Leyland / TATA / Eicher / Mahindra / Bharat Benz |
| GVW | : Not less than 18 tons |
| Engine horse power | : Not less than 180 BHP |
| Wheel base | : Not less than 4750 mm |
| Emission norms | : BS-VI |
| Steering | : Power steering |

4. Pump:

The pump should be certified to EN - 1028, pump of normal pressure - centrifugal type capable of delivering 3000 LPM @ 10 Kg/cm² at normal pressure. The complete pump assembly and impeller shall be made of gun metal. The pump housing shall have provision to connect normal pressure hose reel & cooling water line. The pump shall be provided with suction inlet of 100 mm dia. for connecting standard suction hoses with internal removable strainer and blank cap. The pump shall be provided with four delivery outlets of 63 mm quick release coupling with blank caps. A suitable size GI pipe shall be provided between pump to monitor with proper flange connection. The pump shall be mounted at rear side of the appliance and shall be convenient to operate with the provision of all gauges & control panel as specified in the EN 1028 specification. Pump shall be of Godiva / firefly / Allied / Rosenbauer make or of any equivalent make with EN 1028 specification.

The pump shall be mounted at the rear of the vehicle connected to PTO by propeller shaft with proper rubber bed and bearing supports. The length of the propeller shaft should be minimum to overcome the problem of sagging in the event of throttling.

The impeller of the pump shall be dynamically balanced. The pump shall have self-adjusting mechanical carbon seal. The pump shall have an inbuilt filter of removable type. The filter made of stainless steel "V" wire mesh and shall have self draining facility while the pump operating. The pump shall have inbuilt pressure release valve (PRV) which operates automatically. The thermal relief valve (TRV) shall be fitted with the pump, which helps to control the temperature with 42 degree centigrade of pump water when both deliveries are shutoff for long time. The pump

shall be modular in design and shall have no gaskets/ packing. The arrangement shall be such that while carrying out the pump maintenance work, none of the discharge piping has to be removed unless required and the pump impellers and the carbon seal can be attended/ removed without removing the pump body. The pump shall be having one suction inlet of 150 mm having round threads confirming to BIS 902 and four No. of 63 mm delivery outlets having screw down type valves fitted with instantaneous couplings as per BIS 903. The delivery valve screw shall have no gland. The pump shall be supplied with one removable type 150mm to 100 mm reducer to fit the 100 mm suction hose.

4.1. Primer:

Auto water ring type primer shall have capable of lifting water at least from 7 m depth with in 30 second shall be provided. The primer shall have to engage and disengage automatically whenever necessary. Throttle control lever shall be fixed at the rear end of the appliance. It shall be connected to engine throttle with proper cable. The cable shall be a non-stuck type for smooth acceleration and deceleration of engine.

5. POWER TAKE OFF UNIT

The PTO shall be of heavy-duty capable of transmitting the full power of the engine to the pump. The performance and ratio (not less than 1:1.40) of PTO unit shall match the engine & pump torque characteristics. A separate lever in the main cabin shall engage PTO. Necessary support for PTO units, propeller shaft couplings, universal joints etc. shall be provided. PTO shall be of VAS Engineering / firefly / Webstar / Hale / bezares india make or any equivalent make. PTO should get engaged and disengaged by an engaging lever which shall be provided in the driver's cabin. A locking arrangement shall be provided to

prevent auto movement of the lever at the time of vehicle movement. The mechanical arrangement shall be through a push pull type of lever which shall ensure smooth movements for PTO to engage and disengage. In addition to this pneumatic operating system to engage the PTO shall be given as an alternate option.

5.1. MOUNTING OF POWER TAKE OFF

Split shaft power take off shall be mounted at a suitable location on the chassis. The power take off shall be mounted on a three point type foundation using rubber /flexible mounts to isolate the PTO vibrations from the chassis and shall be designed to carry the unit weight and torque reactions, to constrain the PTO so as not to move significantly out of position, to allow chassis flexion. In no case welding/drilling shall be allowed on the chassis while mounting the PTO. Suitable sized U bolts may however be used for this purpose. The PTO alignment shall be in line with the existing drive line as far as possible. The new propeller shafts shall be free from welds and a spline and yoke arrangement shall be used. A general layout drawing of the PTO mounting shall be enclosed with the technical offer without which the tender shall not be considered. All the propeller shafts on the throughput side as well as at the pump drive side must be balanced to suitable standards.

6. WATER TANK

A Water Tank shall be installed on the water tender. The tank has the following parameters:

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| Capacity of water | 5000 Litres |
| Material of construction | SS-304 |
| Bottom plate thickness | 5 mm |
| Side Plate Thickness(Die pressed | 5 mm |

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| stiffened on Two sides) | |
| Top plate thickness | 5 mm |
| Baffles thickness | 4 mm |
| Numbers of man holes | 2 |
| Size of the man hole | 450 mm |

The water tank shall be designed to carry approximately 5000 litres of water. The water tanks shall be so installed as to allow the full flow of water to the pump. The tank shall have baffle plates in order to avoid surging when the vehicle is braking, accelerating and cornering. An inspection manhole shall be provided on top of the tank. The manhole shall have a hinged cover so that the manhole shall also act as a filling orifice. Manhole shall be facilitated to seal the water leakage due to surging. Water railings shall be fixed in the sides of the water tank to conduit the water spilling.

6.1. Water tank mounting

The water tank shall be mounted on the vehicle on a sub-frame using rubber metacones. This sub-frame shall be made from anti-corrosive treated MS channel section and shall be bolted with the chassis using the high tensile bolts. 'U' Bolts shall not be used for mounting of tanks on vehicle. The rubber metacones shall facilitate to absorb the jerks and bending torsions in expansion as well as compression mode without high deflection. The manufacturer shall provide complete design data of metacones and sub-frame including the load calculations and metacones quantity sufficiency.

Tank shall be mounted on the chassis in a manner keeping in view the proper load distribution on the axles. The baffles shall be arranged in a manner to facilitate easy cleaning of the tanks. The tank shall be

mounted on a minimum of three cross bearers to counteract stresses caused by chassis flexing. The centre of gravity shall be maintained as low as possible. Inlet piping lines shall be fixed from tank to pump with proper flange connections. Flange connections shall be made on every bends for easy removal and refitting of pipes in case of any maintenance. There shall not be any welding joints in the pipe lines instead of making flange joints. A stainless steel ON/OFF ball valve shall be fixed in the bottom of the tank so that no need to drain the water from tank in the event of repairing on pipe lines & pump. A quick action shut off valve shall be fixed in the suction inlet side of the pump. Flange joints shall be connected with SS bolts.

Suitable eyes shall 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 shall be fitted with a drain pipe & valve which shall be taken down to a point well below the chassis without reducing the effective ground clearance. The tank shall 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 shall be provided for filling the tank.

7. Foam Tank.

A Foam Tank shall be installed on the water tender. The tank has the following parameters:

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| Capacity of foam | 1000 Litres (500 + 500) Two compartments, each having the capacity of 500 ltrs. One compartment for Low expansion foam(Protein foam concentrate) |
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| | and the other one is for medium expansion foam(AFFF concentrate) |
| Material of construction | SS-316 |
| Bottom plate thickness | 5 mm |
| Side Plate Thickness(Die pressed stiffened on Two sides) | 5 mm |
| Top plate thickness | 5 mm |
| Baffles thickness | 4 mm |
| Numbers of man holes | 1 |
| Size of the man hole | 450 mm |

A foam compound tank of 1000 liters capacity (Two portion, each capacity of 500 liters, for low (Protein foam Concentrate) and Medium Expansion (AFFF Concentrate) shall be mounted on the chassis in addition to the water tank and as a separate and distinct unit which can be removed separately for replacement. The foam compound tank shall be of rigid type, and shall be of 5 mm thickness SS-316 material welded construction. The tank shall have a filling orifice of not less than 150 mm diameter with a removable strainer fitted to it. The strainer shall be of such material as shall not be affected by constant contact with foam compound and its total screening area shall be adequate to permit quick filling of foam compound into the tank. The filler cap shall be clearly marked "low expansion foam" and the other one is marked with "medium expansion foam" preferably by pressing, casting or embossing.

The tank shall have its top dished tunneling arrangement and a trough provided to enable easy filling from 20 liters drums. The tank shall

be suitably baffled to prevent surge while the vehicle is in motion or standing on uneven ground or brakes are applied to the moving appliance. The design of the tank shall incorporate a removable sump fitted with a drain valve. The foam compound draw-off tube shall be positioned in the centre of the each sump with shut off valves in such a manner that foreign matter or sludge shall not pass into the compound line. The draw-off tube shall be fitted with a gauge strainer of suitable material, mesh, size, and adequate straining area. The tank top shall be removable and it shall be ensured that the joint between the top and the body of the tank is leak proof. Means shall be provided for automatic venting of the foams compound tank when the foam is being produced or the tank is being filled. This shall not be incorporated with the cap. The device employed shall be as simple as possible and shall not get clogged easily during normal use of the appliance.

The draw-off tube shall be connected to the foam compound proportionator/inductor and pump, as necessary, and automatic flow control valve shall be incorporated in it so as to maintain a constant induction rate of not more than 6 percent with varying foam output. The plumbing for this purpose shall have a clear and unobstructed passage of not less than 50 mm throughout and shall:

- a) be as short as possible;
- b) be capable of being easily dismantled for internal cleaning;
- c) be provided with means of thorough flushing after use; and
- d) not form 'U' bend or abrupt angle at any portion and be capable of being drained easily without dismantling.

8. Foam proportionator:

An automatic proportioning arrangement for foam mixing shall be provided so that pressure induction ratio of Foam Concentrate, Water Solution and flow of water are automatically varied merely by opening and closing of hand lines / valves. The induction of foam in to the stream shall be in accordance with the flow of the pump irrespective of the capacity of the pump. Around the pump proportionator (Suitable for UL & FM standard foam concentrate) shall be fitted between the suction and the delivery of the pump, which will induct foam compound into the water stream with no loss in delivery pressure from the pump. The Proportionator shall comprise of an inductor and selector valve (3% or 6%) which shall have parts calibrated to ensure the correct intake of the foam liquid at the required rate with respect to flow of water and supply solution for the operation of foam making equipment. Besides this, when variable inductor is used in conjunction with the equipment for producing foam, an arrangement shall exist by which proportionate quantity of foam concentrate at the stipulated ratio shall get released and mix with water stream leading to suction side of the pump, which means more flow of water, more quantum of foam concentrate to meet the requirement of the equipment in respect of foam solution being discharges from the outlets of the equipment in operation. As foam concentrate is available in the marked under the brand of 3% and 6% so while carrying out necessary tests, only 3% concentrate is to be used as the entire equipment for induction of Foam concentrated and aeration has been set in relation to the ratio of 3% for feeding the same into the pumps of the tender. Auxiliary Connection: Auxiliary connection for foam pickup tube with strainers and isolation valve shall be provided to enable the foam

compound to be inducted into the pump directly from the drums or outside source.

9. WATER CUM FOAM MONITOR:

Water cum Foam Monitor having discharge capacity of 1800 LPM @ 7 bar shall be mounted on the top of the fire tender in such a manner that it can be operated by a crew member. The monitor shall be capable of traversing through 360° in horizontal plane, elevating from horizontal to 75° and depressing from horizontal to not less than 15° and fully rotation in both directions. The monitor shall be FM Approved/UL listed capable of discharging water to an effective distance of not less than 55 - 60 meters & projecting the foam discharge to an effective distance of not less than 45 - 50 meters in still air conditions when operated at rated pressure. Monitor shall be provided with Jet / Spray type Nozzle. The material of construction of the Monitor shall be Cast Stainless Steel (CF8). Fabricated Stainless Steel Monitors shall not be allowed.

Size : 63 mm

Body : Barrel of SS, Gun metal swivel joint for horizontal & vertical motion manual operation.

Rotation : 360°

Elevation : 90° (+75° & -15°)

Mode : Jet / Spray

10. BODY WORK/ STOWAGE/ CABIN

Enclosed accommodation with a single compartment for six persons with driver and officer in the front and a crew at the rear shall be provided. The driver seat shall be of adjustable type. The design of the cabin shall be such that it affords maximum possible vision. Two hinged doors shall be provided on each side of the appliance for easy access to

driver and crew. All doors shall open outward and hung forward. The locking arrangement shall be with double catch striking plate. Non-slip step and grab rails shall be provided to assist the driver and crew to get in and out. All the seats shall be fitted with 100 mm thick foam cushion. All windows shall have safety glasses and all glasses be fitted with a sliding type. Inside the crew cabin, provision shall be given to keep six numbers of helmets and provision shall be made permanently to hold four number of BA sets so as to wear it easily. In addition to that first aid box, two number of 9 kg Fire Extinguishers and facility to fix the wireless set shall be given. Flooring of the driver cum crew cabin shall be fabricated out of hard dip galvanized MS angles of 40 x 40 x 4 mm thick which shall be properly welded / bolted to the cross members. The complete external paneling of driver-cum-crew cabin including doors shall be of 16 SWG Aluminium sheet with all the joints riveted and bided except the roof top paneling, which shall be of 2 mm thick aluminium sheet. The domes and the corners shall be as small as possible and shall be of 16 SWG Aluminium sheet with all joints riveted to the super structural members. The roof top plates shall be overlapped by 70 mm and riveted in a double row with solid rivets. The complete flooring of the driver-cum-crew cabin shall be fabricated from 3.15 mm aluminium chequered plates rigidly fixed to the under frame cross members by means of nuts and bolts or riveting. Trap doors for topping up of oils wherever necessary shall be provided. Water proofing treatment shall be given to driver's cabin to avoid water leakage inside the driver's cabin.

All the hard dip galvanized MS super structural members and under frame cross members shall be painted with three coats of rust preventive paint. All the under frame cross members shall be painted with two coats of chassis black paint. The construction of cab shall be such that the roof

shall support the weight of two men without damage. A horizontal hand rail shall be fixed in front of the crew member's seat. The hand rails shall be connected with vertical post of the cabin. Access way to driver shall be provided in between the vertical post. Inspection / maintenance hatch of removable type shall be provided in the cabin for gaining access to gear box / PTO.

Each cross member shall be secured to the chassis framed by "U" clamps with aluminium packing block and self-locking nut. Ballato packing of 12 mm thickness shall be provided in between the chassis and cross members. Drag hooks/eyes shall be fitted on each chassis member at front and rear and one towing hitch shall be provided at the rear portion for towing one ton trailer.

The lockers shall be composite construction with sufficient rigidity reinforcement and to be kept as light in weight as possible. The entire structure shall be made of 32x32x1.6 mm square tube of GI 16 gauge aluminum sheet and it shall be used for exterior paneling work all over. For inner wall of the lockers, 16 gauge galvanized iron sheets shall be used. 2.5 mm thick aluminum checker plate shall be used for locker.

There shall be two lockers at the rear of appliance for stowage, in addition to a through & through locker at the front side of the appliance. The lockers shall be composite construction. Non-stuck aluminium shutter doors shall be provided for all lockers. The shutters shall be complying with international standards. The inner walls of the lockers shall be of 16-gauge MS and 3 mm thick aluminum checker plate for flooring. All lockers shall be weather proof and self-draining type. All lockers shall be provided with internal automatic lighting arrangement with the master switch in the cab. Provisions shall be given to hold and secure the equipments in the lockers so as to avoid damage of such things while

movement of the vehicle. The suction hose tunnel shall be provided at suitable location for carrying four numbers of 5 m long, 150 mm diameter suction hose. Standard Brass bell shall be fitted over the crew cabin. See through glass window provision shall be given in driver and officer side door bottom. The MS channels, angles and tubes wherever used for construction shall be treated with hard dip galvanizing.

11. Ladder gallows:

Ladder gallows shall be provided for carrying 10.5 m aluminum extension ladder. The design shall be such that the ladder can be released without difficulty from reasonable access position and shall embody rollers/bearing to permit easy withdrawal by one man. Means shall also be provided for locking the ladders when stored. The ladder gallows shall be CE certified.

12. Alternator unit:

A 230/400V. 50 cycle portable diesel engine driven Generator shall be provided. The generator shall be screen protected, continuously rated, self excited, self regulating class "E" insulation type having an output of not less than 6.5 KVA, 230 /400 V single phase. The alternator shall be equipped with a direct coupled flange mounted exciter which shall keep the alternator voltage constant and provide an approximately straight line voltage characteristic within 5 percent at all loads, and at a pre-set factor between 0.8 and unity.

Controls shall be near the generator which shall consists the following:

1. Four sockets with control switches (MCB's) in single phase line at a min of 15 amp capacity.
2. Digital RPM meter
3. KW meter

4. Ampere meter
5. Frequency meter
6. TPN MCB (32 AMPS)
7. Hand throttle control
8. Automatic voltage regulator
9. Pilot lamp

13. Telescopic light mast

A compact, roof mounted folding type lighting mast fitted with 4 x 100 watts water proof LED lamps shall be fitted rear side of the vehicle. The mast shall be elevated and vertically be extended up to 4.5 m pneumatically from the roof top. The mast shall be installed on the roof of the vehicle. The light mast shall operate in temperatures of - 40°C up to 60° C, with anti-twist lock, with safety valve and drainage outlet valve. The mast will be equipped with a spiraled electrical cable. The folded and stowed height should not be more than 1800 mm. The flood lights on the top should have a minimum electrical rotation of 360° and a tilt of 310° with suitable connections for taking permanent power supply from generator set through an internal spiral wire mounted inside the mast should be provided.

All the functions of the mast, including extension and return to the original position, lights ON/OFF, automatic restore should be capable of being done through a wired remote control. The same remote control must work without wire (wireless mode) through a male / female connector IP68 which keeps the battery under charge, whenever the remote is plugged and there is tension on the power circuit. Every single input given by the user, no matter which, will be confirmed by a visual LED and an additional LED will confirm the battery status. Every single

group of 2 lights when switched on will have a corresponding LED alight on the remote control that will go off only when the lights will be switched off. Every single input given by the user on the remote control will make the whole remote keyboard alight for not less than 15 seconds.

14. Cable winch

An electrically operated cable winch which is having not less than 6.5 ton pulling capacity shall be provided. The winch unit should be complete with minimum 5.5 hp, 12/24 v DC series wound electric reversible motor for pulling operations. The motor and solenoid shall be grounded to the battery. It shall have an automatic load holding brake system to hold the load. For free spooling the clutch design shall be easy to use type with spring loaded pull and rotate system. The gear system shall be 3 stage planetary type for faster line speed and the gear reduction ratio shall not be more than 300:1 for maximum duty cycle, the rope drum shall not be of more than 8 inches diameter and shall be supplied with a minimum of 90 ft heavy duty galvanized EIPS wire rope with replaceable self-locking clevis hook and shall be mounted on the front bumper of the vehicle with suitable strong supports and a four way roller fairlead. Weather resistant clutch housing and solenoid assembly for maximum durability under any weather should be provided. Winch shall be provided with a wireless remote control system for ease of operation.

15. Control panel:

The following control shall be provided at the rear pump operating panel.

- a) Pressure Gauge: 0 to 40 kg/cm²
- b) Compound Gauge calibrated as
 - i) Pressure 0 to 10 kg/cm² (in black)
 - ii) Vacuum 0 to 75cm Hg (in red)

- c) Engine throttle control
- d) Pump hour meter in dash board.
- e) Audio warning arrangements at pump panel for engine temperature exceeding 90°.
- f) LED light on control panel
- g) Tank water level indicator (LED indicator and Glass tube level indicator with drain valve)
- h) Foam level indicator (LED indicator and Glass tube level indicator with drain valve)
- i) Recirculation type cooling water circuit control from pump to PTO and engine cooling system.

The gauges panel shall be covered properly to prevent the gauges getting damaged from sunlight and rain water.

16. Workmanship and finish

All parts of the appliance shall be of good workmanship and shall have streamline finish. All mechanical and other part shall be such that parts normally required to be replaced can be supplied and fit correctly.

17. Painting

The complete super structural members shall be painted with two coats of Red-Oxide primer and two coats of chassis Grey paint. The complete external and internal aluminium panelling of lockers etc. shall be painted with two coats of aluminium primer. To provide very high corrosive resistance in metal structures, it shall be treated with anti-corrosive treatment.

The complete exterior of the vehicle shall be painted with two finish coats of RAL-3000 colour shade (flame red) reputed brand paint for long lasting glossiness. The names and logo reflective stickers of the

department shall be pasted on both sides of vehicle at suitable places in consultation with the department officers.

18. Pump test:

PRIMING TEST: The primer shall be tested with a vertical lift of 7.0 m. The rate at which the priming is done shall not be less than 30 cm/sec. Pump test when tested in accordance with pump specification, the efficiency shall not deviate from the value specified by the pump manufacturer by more than ± 5 percent. However in no case the efficiency of the pump shall be less than 60 percent. The pump shall run for a period of 4 h non-stop delivering the rated output at 10 bar with a lift of 3 m. During the test, the water shall not be replenished for the cooling system and the temperature of the engine oil shall not exceed 115°C or of the engine manufacturer rated temperature for continuous working, whichever is less.

The engine shall show no sign of stress during the test. The temperature of the cooling water (radiator water) tank shall not exceed 85°C. The PTO sump oil temperature shall not exceed 100 percent of the manufacturers recommended temperature for the grade of oil used. The pump casing and impeller shall be subjected to hydraulic pressure of 2.1 MPa to detect leakage, perforation, etc.

19. Warning beacon lights:

1 No of flickering LED Beacon bar light head of Red, Blue and White colour with Hooter & P. A. System shall be mounted on top of the driver cabin. The size of the beacon bar light shall not be less than L-1200 x W-300 x H-120 MM. 2 no Dual Red-White and 2 no Dual Blue-White Scene-Lighting LED blinkers with inbuilt flasher shall be installed on each sides of the body. 2no of blue-red combination flickering lights shall be fitted in the radiator grill. Two big square size (blue-1 No& Red-1 No)

flickering light shall be fitted in rear side of the appliance. The blinkers shall have an option of minimum 12 watt spot lighting along with blinking for low light visibility. Blinkers and Beacons shall have minimum 6 no of flash patterns. Blinkers and Beacon shall have Aluminium Base with Polycarbonate Cover. The lights shall be SAE Certified from NABL approved authorities.

20. Accessories:

The following accessories shall be provided in addition to those normally fitted on modern commercial vehicles:

- a) Fire bells — 250 mm diameter brass fire bell shall be mounted externally and shall be capable of being operated from within the driving compartment. The bell shall be of the hand operated type.
- b) Head lamps — Two.
- c) Fog lamps — Four (Not less than 55 W).
- d) Reversing light with industrial truck buzzer— Lamp suitably situated to assist reversing.
- e) Stone guards — Situated on the windshield glass and side window glasses
- f) Wind screen wipers.
- g) Siren — Battery operated. BIS 950: 2012.
- h) Search light — Adjustable to give flood or beam light, mounted in a convenient position but capable of being readily disconnected and mounted on a tripod away from the appliance, complete with tripod and with not less than 30 m of TRS cable on a reel mounted on the appliance
- i) Spot light — Adjustable, mounted in a convenient position on the near side of the driving compartment.

- j) Inspection lamp — protected type on wander lead with plug. A socket shall be provided in the control panel in the driver's cab for plugging in the lamp.
- k) Tail lamps — Two of combined stop and tail.
- l) Rear reflectors.
- J) 3M Reflector tapes (Red colour for rear side, Amber colour for both sides and white colour for front side).
- k) Reverse camera with screen on dashboard

21. MARKING

Each appliance shall be clearly and permanently marked with the following information:

- a) Manufacturer's name, or trade-mark, if any;
- b) Serial number of the pump body and year of construction;
- c) Capacity of pump, in l/min;
- d) Capacity of water tank, in litre;
- e) Nominal speed, in rev/min;
- f) Transmission ratio of the pump gear;
- g) Working pressure, in kg/cm²;
- h) Direction of rotation of the pump shall be indicated by an arrow and this shall be permanently marked on the pump body.
- i) Weight of the appliance in both laden and unladen condition

22. Test of Acceptance of Fire Fighting System

Physical dimensions, performance and weight check of equipment as given under different items above shall form part of test of acceptance. The appliance shall be inspected in different stages before mounting of the complete unit to the chassis and after mounting of the complete unit on to the chassis. Stage inspections will be carried

out from the department during each stage of fabrication. All necessary arrangements shall be arranged by the supplier at the fabrication yard for the proper conduct of such inspections as and when required by the department.

Inspection will be as under:-

- a) Finishing inspection.
- b) Compliance of specification
- c) Water & foam throw range test as per standards
- d) Pump Testing
- e) Complete functions-operations of all systems

The stability of the appliance shall be such that when under fully equipped and loaded condition (but excluding crew), if the surface on which the appliance stand is tilted to either side, the point at which over-turning occurs is not passed at an angle of 27 degrees from the horizontal. Vehicles shall be tested for articulation (200 mm alternate gradients & will not show any signs of stress during this test. Also the clearances in the wheel wells shall be checked for tolerances. Water proofing shower test shall be confirm to IS 11865 and Gradient test.

23. RTO REGISTRATION

Final RTO registration of the vehicle in the name of 'Director, Tamil Nadu Fire and Rescue Services, Chennai' shall be arranged by the supplier after the vehicle is delivered at the headquarters. The vendor shall bear all registration related fees and expenses of completed vehicle and submit all relevant documents to department after registration.

24. WARRANTY

The Superstructure, pump, PTO, tank and other construction shall be under warranty for a period of minimum five years from the date of supply of the vehicle against any manufacturing defects. The supplier shall give the guarantee for the supply of spare parts for the super structure, fire pump, PTO etc. for the period of 15 years from the date of supply of vehicle.

25. COMMISSIONING AND TRAINING

The manufacturer's representative shall impart successful commissioning and the training to the fire brigade personnel regarding operation, handling, use and maintenance of the appliance. Operating manual shall be given along with each vehicle in both tamil and English language.

List of equipments and tools to be supplied along with each vehicle

| S. No | Items | Qty |
|--------------|---|------------|
| 1 | Suction hose 150 mm dia 5 mtrs | 02 |
| 2 | Metal strainer | 01 |
| 3 | Basket strainer | 02 |
| 4 | Universal suction hose wrench | 02 |
| 5 | Dividing breaching(Gun metal) | 01 |
| 6 | collecting breaching(Gun metal) | 01 |
| 7 | Petrol Driven Power Saw Bar length: 24inch, Power: Not less than 85 cc, two stroke. Maximum power speed: 9600 RPM, Weight; not more than 8 kg, spare chain: 1 | 01 |
| 8 | 100 ft long 16 mm diameter BOB rope | 01 |

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| 9 | 40 ft length 12 mm diameter BOB lashing lines | 02 |
| 10 | Spades with wooden handle basket size 200 x 290 mm | 02 |
| 11 | D handle Shovel Total length : 25 inch Basket length: 8.3 inch Basket width : 6.1 inch | 01 |
| 12 | Lock cutter (Weight - 4 kg, Dimensions LxWxH - 79x24.8x 4.4 cm) | 01 |
| 13 | Firemen axe 2.25 kg | 01 |
| 14 | Pick axe standard size | 01 |
| 15 | Picks, with handle standard size | 01 |
| 16 | Axes, felling standard size | 01 |
| 17 | Crow bars, 1 m long | 01 |
| 18 | Sledge hammer 10 kg | 01 |
| 19 | Electrical shock proof hand gloves in pairs. A) Made as per confirming to IS 4770/ EN 60903 / ASTM 120 D type 4 B) Approved from ERDA – Electrical Research & Development Association C) Accredited by the NABL, Govt. of India & INTERTEK (ASTA), UK. D) Working Voltage: 17000 volts (RMS). Test certificate of gloves shall be supplied during delivery. | 01 |
| 20 | Shears, bolt cropper, large with handle, 900 mm | 02 |
| 21 | Extension truss type aluminum Ladder 10.5 m as per IS: 4571 & CE standard, the ladder OEM serial number & manufacturing year shall be mentioned in the supplied ladder. [King / AJAX / simplex]. Tipping Type Ladder gallows shall be provided on the roof suitable for fixing a 10.5 m heavy duty trussed aluminium extension ladder. The design shall be such that the ladder can be released by one person only without difficulty from a reasonably accessible position and the person is not required to climb on the roof top to remove the ladder. The ladder gallows shall be CE certified. The bidder shall mention the name of OEM of offered ladder and its gallows with the offer. | 01 |

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| 22 | Rope Ladder (10 M) | 01 |
| 23 | Portable Hand-Held LED Search Light Lumens not less than 10000 | 01 |
| 24 | First Aid Box for 10 Persons to be suitably kept at cabin. | 02 |
| 25 | Long line rope [Manila rope], 25 mm circumference, and minimum breaking strength: 23 KN, 50 m long, attached with quick release karabiner at one side. | 01 |
| 26 | Long line rope [Manila rope], 40 mm circumference, and minimum breaking strength: 23 KN, 30 m long, attached with quick release karabiner at one side. | 02 |
| 27 | Fire hook with non-metallic hand grip | 02 |
| 28 | Fire beater with non-metallic hand grip | 02 |
| 29 | Fire rack with non metallic hand grip | 02 |
| 30 | Fire resistant blanket - Aluminized fire blanket made of aluminized fiberglass, stitched on all four side with Kevlar thread, Leather loops & eyelets, temperature resistant up to >500 degrees, With Metallic eyelets in all side corner and in middle and Size – 2 x 2 M. | 02 |
| 31 | Fire resistant blanket non-asbestos high temperature resistant fabric with metallic eyelets, non-asbestos clothing, stitched on all four sides with flame proof threads, temperature resistant up to >600 degrees, With metallic eyelets in all side corner and in middle, 1.2 mm thick, Size – 2 x 2 M. | 02 |
| 32 | Temperature resistant tight fight hand gloves, made of Kevlar material | 02 |
| 33 | Tool Kit box with the following tools: Fixed end "D/E" spanner set (size from 6mm to 30mm): 02 Sets Ring spanner set (size from 6mm to 32mm) : 02 Sets Box spanner (Tubular spanner) Size: 8-10mm,10-12mm,12-14mm,14-16 mm: 02 No each. Combination cutting pliers (Size: >150 mm): 2 no pliers: 2 no Screw driver set insulated (long screw driver, short screw driver, star screw driver – 3 no each) Tool box (Suitable to carry all above tools)- 2 no Oil can medium size: 2 no | 01 |

| | | | | | | | | | | | | |
|-------------------|---|-------------------|--|----------|-----|-------|--------|----------------|-------|----------------|-------|----|
| 34 | <p>Safety Harness (IS 3521 :1999) DESIGN - One dorsal attachment D-ring for fall arrest, Adjustable leg straps. Adjustable chest straps, Sit Strap, Made up of elastic webbing for more comfort & impact resistant. WEBBING –Material: Polyester, Width: 44±1mm, Breaking strength: 23 KN STITCHING THREAD - High-tenacity polyester. METAL COMPONENTS – Material: Aluminium, Plating: Black anodized, Finish: Matt. VITAL TEST COMPLIANCE - Static Strength: 15 kN or 1,530 kgf for 3 Minutes at each attachment element, WEIGHT - 1006 gm ±10 gm</p> | 02 | | | | | | | | | | |
| 35 | Bosch demolition hammer 1900W with min 60 joules impact energy | 01 | | | | | | | | | | |
| 36 | Safety goggles | 01 | | | | | | | | | | |
| 37 | Mattocks standard size | 02 | | | | | | | | | | |
| 38 | Foam making branch pipe with pickier tube 5X | 01 | | | | | | | | | | |
| 39 | Foam making branch pipe with pickier tube 2X | 01 | | | | | | | | | | |
| 40 | Foam generator medium with inline indicator | 01 | | | | | | | | | | |
| 41 | Mega phone battery operated(Reputed make like Ahuja or equivalent) | 01 | | | | | | | | | | |
| 42 | Fire Extinguisher (Stored Pressure DCP - 9Kg, 4.5Kg – Co2, 9Liters Stored Pressure Foam) | 03 | | | | | | | | | | |
| | <table border="1"> <tr> <td colspan="2" data-bbox="277 1602 732 1640">Life Buoy IS:5326</td> </tr> <tr> <td data-bbox="277 1640 732 1692">Material</td> <td data-bbox="732 1640 1114 1692">PVC</td> </tr> <tr> <td data-bbox="277 1692 732 1745">Color</td> <td data-bbox="732 1692 1114 1745">Orange</td> </tr> <tr> <td data-bbox="277 1745 732 1797">Inner Diameter</td> <td data-bbox="732 1745 1114 1797">40 cm</td> </tr> <tr> <td data-bbox="277 1797 732 1850">Outer Diameter</td> <td data-bbox="732 1797 1114 1850">85 cm</td> </tr> </table> | Life Buoy IS:5326 | | Material | PVC | Color | Orange | Inner Diameter | 40 cm | Outer Diameter | 85 cm | 06 |
| Life Buoy IS:5326 | | | | | | | | | | | | |
| Material | PVC | | | | | | | | | | | |
| Color | Orange | | | | | | | | | | | |
| Inner Diameter | 40 cm | | | | | | | | | | | |
| Outer Diameter | 85 cm | | | | | | | | | | | |

| | | | | |
|----|---|----------|--|---------|
| | Shape | Round | | |
| | Usage | Swimming | | |
| | Pattern | Plain | | |
| 43 | Life Jacket 2mm Neoprene life vest (Reputed make like Aropec or any equivalent) | | | 06 |
| 44 | Traffic Cone | | | 10 |
| 45 | Cordon tape | | | 100 mtr |
| 46 | Foam making branch pipe with pick up tube -5X | | | 01 |
| 47 | Medium expansion Foam generator with inline inductor having diameter of 80 mm with Minimum 4 nozzles. Nominal flow: 600 LPM, Minimum foam expansion ratio: 1:35 to 1:60 | | | 01 |
| 48 | AFFF 3% concentration shall confirming to IS:4989-2018 & UL-162 in 20 ltrs can | | | 50 cans |