

TECHNICAL SPECIFICATION FOR COMBINED FOAM TENDER
AS PER BIS - 10460 - 1983

01. **GENERAL REQUIREMENTS:**

1.1 The appliance shall incorporate a fire pump of 2250 LPM capacity, a water tank of 4500 liter capacity, a foam tank of 800 liter capacity and connected equipment for foam production and also supplementary extinguishing agent.

1.2 The foam tender shall be fabricated in a manner so as to conform to the following characteristics:

- a) Gross vehicle weight not less than 8.5 ton including crew, water and equipment.
- b) Maximum speed on level road, fully laden, 72km/hrs
- c) Acceleration from a standing start through the gears, fully laden, 64 Km/h in 55sec.
- d) The appliance shall be capable of being started from rest on a gradient of 1:4.
- e) When traveling at 48 Km/hrs on a level dry surface, the footbrake shall be capable of stopping the vehicle within a distance of 15 mtr. from the point at which the brake is applied. The hand brake shall be capable of holding the fully laden appliance on a dry surface gradient of 1:4 when in neutral gear.
- f) The appliance shall have the following overall dimensions.
 - a. Wheel base - Not more than 4500mm (125")
 - b. Turning circle - Not more than 20mtr.
 - c. Road clearance - Not less than 260mm
 - d. Overall width - Not more than 2.5 mtrs.

The appliance shall be capable of delivering not less than 2250 LPM of water/foam solution converted into foam through a combination of monitor and side lines and not less than 1150 l/m of water/foam solution converted into foam through side lines alone when the monitor is not in use or not less than 1150 l/m of water/foam solution converted into foam through the monitor alone. The monitor and the hand lines should employ the self aspirating type of foam production system where aeration is done at the branch pipe.

The foam induction may be automatic or manual, if one branch is in operation, all further addition and removal of branches shall automatically adjust the rate of foam compound induction within a variation of 0.5 %, ratio not exceeding 6%.

A hose reel service shall be provided on the appliance. In addition to water carried on it, it should also be possible to use water from a hydrant or a static supply.

The supplementary agent used for fire fighting shall be dry chemical powder and Co2. The total quantity of dry chemical powder shall not be less than 100 Kg and shall conform to IS: 4308-1982 (latest specification/ latest amendment to be referred). The dry powder system shall comply with the following minimum requirement-

The dry powder system shall comprise of two self contained units, each having a capacity of 50 Kg of dry powder one on each side of vehicle with suitable length (not less than 15 mtr.) of high pressure discharge tube fitted with suitable discharge facility. The expellant employed for dry powder units shall be Nitrogen. The expellant employed for the dry powder units shall be nitrogen. The capacity of the nitrogen cylinders employed for this purpose shall be adequate to ensure complete discharge of the dry powder contents at a rate of not less than 2.25 kg/s from each units. A well-designed pressure control system shall be provided to regulate the pressure of nitrogen gas and maintain a constant powder discharge pressure throughout the operation of the unit.

There should be two Nos. CO2 Extinguishers of 22.5 Kg. capacity conforming to IS: 2878-2004 (revised specification/latest amendment) one on each side of vehicle with suitable length (not less than 15 mtr.) of high pressure discharge tube with horn.

The unit shall be designed to be as compact as possible, compatible with ease of accessibility to all service parts. The pump and the foam making equipment controls shall be so arranged that one man can operate foam or water lines from the pump control panel. Lever type valve controls shall be preferred throughout unless these are impracticable in any case.

02. MATERIAL SELECTION AND TREATMENT:

2.1 The choice of materials to be used for the construction of the appliance shall be made with a view to combine lightness with strength and durability.

2.2 All parts which forms water ways or come into contact with foam solution shall be corrosion-resisting materials or suitably treated with corrosion resistant compound. All metal exposed to atmosphere shall either be of corrosion resisting material or treated suitably to resist corrosion. Lubricating nipples shall be provided wherever necessary.

2.1 The appliance is intended for use in tropical condition with constant high humidity and heat. This shall be given full consideration while selecting the materials and for this reason use of rubber or other similar materials shall be avoided as far as possible. When it is unavoidable, the parts is made out of these materials shall be easily replaceable and shall be easily available.

03. **DESIGN AND CONSTRUCTION:**

- 3.1. Engine: The engine shall be provided with a cooling system to permit its continuous stationary running without overheating. Indirect cooling system shall be incorporated, which shall be of the open circuit type discharging water to the waste. Arrangements should be made to divert the cooling discharge water to water tank if necessary.
- 3.2. The operating temperature of the engine cooling water shall preferably be thermostatically controlled. Suitable gauge for cooling water and glow lamp for lubricating system shall be provided in the drivers cab and on the pump panel. This shall be marked with operating temperature.
- 3.3. The external filter shall be with lubricating system and tubular dipstick to gauge the level of the oil in the oil sump shall be provided.

04. **ELECTRICAL SYSTEM**

- 4.1 A trickle type battery charger shall be provided for recharging the battery in situ. A red pilot lamp, indicating when the batteries are being charged from an external supply, shall be provided.
- 4.2 All important electrical circuit shall have separated fuses suitably indicated and shall be grouped into a common fuse box located in an accessible position in drivers cab and fitted with means for carrying spare fuses. The wiring shall be single pole and shall not be exposed to the atmosphere. Conduits shall be used wherever necessary.

05. **WATER TANK:**

A water tank of not less than 4500 liter capacity shall be mounted on the chassis. It shall be fabricated out of mild steel sheet of minimum 5mm thickness. It shall be treated for anti-corrosion with epoxy paint and shall be suitably baffled to prevent surge when the vehicle is breaking, accelerating or cornering. The baffle shall be arranged in such a manner to facilitate the passage of a man throughout the tank for cleaning purpose. It shall be rectangular in shape and mounting of the tank shall permit full contents of the tank to flow into the pump.

The tank shall be fitted with two filling orifices, a drain cock, manhole and a cleaning hole. The filling orifice shall be of not less than 250 mm diameter and shall be fitted with a manhole cover of 45 cm dia. minimum and a filter cap clearly marked water preferably cast in metal. In addition, 63mm instantaneous hydrant connection, incorporating a strainer, shall be provided close to the pump panel control for filling the tank through 75mm dia. pipe or feeding the hose reel equipment. A 100mm dia pipe line shall be taken from the tank to the suction inlet of the pump incorporating a 100 mm quick action spherical type valve. Separate valves for performing different functions shall be provided to control the flow of water. Drain plugs or cocks shall be provided wherever necessary.

The tank shall be fitted with a 50mm dia. overflow pipe. Dial gauge water level for the tank shall be provided preferably in the drivers cab or a visual level gauge of the glass tube shall be provided at the control panel calibrated $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and full.

The tank shall be connected to the pump and hose reel in such a manner that pressurization of water tank or water tank pump connection is not possible when pumping water from an outside source of supply.

06. **HOSE REEL:**

One hose reel shall be provided at the rear of the appliances with 60m length of 20mm bore hose and terminating with a control branch and 5mm nozzle. The reel shall be fitted with over brake or locking device.

07. **PUMP:**

The pump shall preferably be made of any suitable alloy, compatible with all types of synthetic and protein foam compound, with stainless steel suitable for use with brackish water. The pump shall be capable of delivering not less than 2250 lpm of water at a pressure not less than 7 kg/cm².

The pump shall preferably be rear mounted with pump control panels located nearby. The suction inlets and delivery outlets of the pump shall be fitted near the pump control panel, blank cap shall be provided for the suction inlet of the pump. The four outlets of the pump shall terminate in 63mm female instantaneous coupling incorporating a blank cap.

08. **PRIMER:**

The primer shall be Exhaust Ejector / Water Seal type and shall be capable of lifting water from a depth of 07 mtrs with in 30 sec.

09. **FOAM EQUIPMENT:**

A foam compound tank of 800 liter capacity 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 preferably be of stainless steel welded construction. The tank shall have a filling orifice of not less than 150mm diameter with a removable strainer fitted to it. The tank shall have its top dished tunneling arrangement and a trough provided to enable easy filling from 20 ltrs drums.

Means shall be provided for automatic venting of the foam compound tank when foam is being produced or tank is being filled. Provision shall also be provided for drawing foam compound into the foam producing system from an external source through a pick-up tube while producing foam.

Round the pump proportionate inductor arrangement shall be provided where induction ratio of the foam compound/water solution and flow of water are automatically varied as desired merely by opening and closing the monitor or hand lines. The system shall be reliable and shall not require frequent calibration checks.

10. **FOAM MONITOR:**

A foam monitor shall be mounted on the top of the appliance in such a manner that it can be manually operated by a member of the crew. The monitor shall be capable of traversing through 360 ° in a horizontal panel, elevating from horizontal to 45 ° and depressing from horizontal to not less than 15 ° and fully rotating in both directions.

The aggregate foam discharge shall not be less than 13500 l/m through a combination of monitor and up to 2 hand lines or 7000 l/m through monitor only. The monitor shall also be capable of projecting the foam discharge to an effective distance of not less than 35 m in still air.

11. **HAND LINES**

11.1 Two hand lines on either side of the appliance in case of rear mounted pump shall be provided. These shall terminate in foam making branch pipes, fitted with spray or jet attachment, and preferably also fitted with hand control. Each foam making branch pipe shall be capable of not less than 500 ltr./m of water foam solution with an expansion not less than 8 and minimum throw of 25 mtr. when either all the handles only are used simultaneously or at least one of them is used in combination with the monitor.

11.2 The hand line shall be stowed in quick released clamps or lockers as close as possible to the pump operating panel. The hoses for the hand line shall have an internal diameter of 63 mm. These shall be of the reinforced rubber lined or similar type and be in lengths of 30 mtr. each and conforming to type 2 of BIS 636-1979 (latest specification/ latest amendment to be referred).

12. **CONTROL PANELS**

12.1 Adequately illuminated control panel shall be provided and positioned as follows:

a) Rear mounted pump- one control panel at the rear appliance

12.2 The control (s) shall include the following:

a) Throttle control for engine

b) Pressure gauge 0 to 1.75 MN/mm²(17.5kgf/cm²)

c) Compound gauge calibrated as under

Vacume – 0 to 75 cm Hg, preferable in black

Pressure – 0 to 0.6 MN/mm² (6 kgf/cm²), preferable in black

d) Primer control (if the primer is not fully automatic)

e) Gauge for cooling water and glow lamp for lubricating system

f) Cooling water circuit control

12.3 The following shall also be provided at a convenient position near the control panel (s) :

a) Control for using monitor

b) Water level indicator

c) Hydrant connections

d) Control for using auxiliary foam compound pick up tube and

e) Control(s) for flushing out the foam making equipment and its plumbing

13. **BODY WORK AND STOWAGE**

- 13.1 Enclosed accommodation for six people shall be provided in the driver's cab-cum- crew compartment including the driver and the In- charge of the crew. Two doors, one on each side shall be provided on the drivers' cab-cum-crew compartment. The doors shall be hinged opening outwards and shall be hung forward and shall have carton locks and flush type handles.
- 13.2 The cab and lockers shall be of composite construction with sufficient rigidity and reinforcement and shall be kept as light as possible. Pressed sections of sufficient strength shall be used for the super-structure.
- 13.3 Lockers shall be provided for secure stowage of all equipment given in Appendix- 'A'. the height of the lockers from the bottom to the top of the opening shall be not less than 60mm and depth not less than 600mm.
- 13.4 All lockers shall be provided with internal automatic lighting arrangements with the master switch in the cab. The doors of the side lockers shall not be hinged at the bottom.
- 13.5 Hose tunnel shall be provided to carry four 2.5mtr. Lengths of suction hoses in convenient location. The tunnel should be slopped in such a way, such that these allow the water or contents left in the hose after use to flow out.
- 13.6 A suitable compartment opening in the rear and with hinged door opening outwards shall be provided for portable lamps
- 13.7 Lockers accommodating delivery hoses shall have proper belt lining and brackets in order to avoid chaffing of hoses while the vehicle is running at maximum speed.
- 13.8 Proper bracket system for items 4 to 23, 25 to 35 and 37 and 38 etc. shown in appendix-'A', shall be provided in lockers/in a way to hold the equipment to stow items secure, while vehicle is moving.
- 13.9 Non-ferrous metal bracket shall be provided for breathing apparatus set at a suitable place.
- 13.10 All portable extinguishers shall be kept in one lockers fastened with straps and securely place on bottom brackets.
- 13.11 Where called for, provision for wireless equipment to suit requirement shall be made; the control panel of the wireless equipment shall be located in the driving compartment.
- 13.12 Spring loaded towing hitch made mild steel shall be provided at the rear of the chassis fitted on a sub-frame securely fixed on main chassis frame.
- 13.13 The construction of the roof shall be such that it will support weight of 75 kg without damaged.
- 13.14 Crab-reels and non slip steps shall be provided wherever required to assist the crew to mount and dismount and to give access to the roof of the appliance.
- 13.15 No part of the body work shall reduce the road clearance to less than 230mm or increase the width of the vehicle to more than 2.5 m. there shall be sufficient clearance in wheel arches and wings to permit the skid change when necessary. The highest part of the appliance with the extension ladder mounted on the appliance shall not exceed 3.35 mtr. from the ground.