

CRASH WATER/FOAM TENDER

QRs/SPECIFICATION FOR CRASH WATER/FOAM FIRE TENDER

PURPOSE :

The water cum foam Crash Fire Tender shall be highly specialized for Aerodrome Rescue and Fire Fighting. Vehicle capable of reaching to the Aircraft crash site as per ICAO standard.

APPLICABLE STANDARDS:

Design construction features, materials and equipment and interpretation of Terminology of specification of Air Field crash tender shall be in accordance with :

- a. Airport Service Manual- Part- I, DOC No. 9137-AN 1899 with latest applicable amendments.
- b. Indian Standard IS 951 =2003 (Functional requirement for Airfield crash tender)
- c. National Fire Protection Code 414 edition 2012.
- d. Euro Norms with respect to emission level.
- e. Chassis: 6x6 chassis.

BASIC REQUIREMENTS:

- a. Capacity of water tank: 6500 Ltrs.
- b. Capacity of Foam tank 800 Ltrs or 12% of water capacity.
- c. Auxiliary Foam Compatible: DCP (150 Kgs)
- d. Overall Size should match the vehicle requirement
- e. Drive: All Wheel Capability (Configuration 6x6)
- f. Gross vehicle Weight : 33000Kgs Max uniformly distributed.
- g. Centre of Gravity: kept as low as possible
- h. Tilt Angle/Stability: 28/30 degree on static condition in both ways
- i. steering: Right Hand Steering is mandatory.
- j. Angle of Approach: 30 Degree Min.
- k. Angle of Departure: 30 Degree Min.
- l. Inter axle Clearance Angle: 12 degree Min.
- m. Ground Clearance: at least 600 mm.
- n. Under axle clearance FA/RA: at least 350mm/350mm.
- o. Slide Slope: 20% on both sides.
- p. Grad ability: 35% of dry pavement of minimum speed of 1.6 Km/Hr.
- q. Turning Circle Radius: 12M max.
- r. Ford ability: 608 mm.
- s. Articulation: 300mm.
- t. It shall be possible to operate the monitor and the two hand lines at the pump delivery pressure of 10 kgf/ Cm<sup>2</sup>.

MATERIAL SELECTION AND TREATMENT

- 4.1 The choice of materials to be used for construction of the appliance shall be made with a view to combine lightness with strength and durability.
- 4.2 i) Timber shall not be used in body construction.
- ii) The body shall be constructed of materials that provide the lightest weight consistent with the strength necessary for off pavement operation over rough terrain and when exposed to excess heat. The body may be unitized with chassis rigid structure type or it may be flexible mounted on the vehicle chassis. It shall also include front and rear fenders or wheel wells, body panel shall be removable where necessary to provide access to the interior of the vehicle.

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- iii) Access doors shall be provided for those areas of the interior of the vehicle which must be frequently inspected.
- iv) The working deck of the vehicle shall be adequately reinforced to permit the crew to perform their duties in the turret area, water tank top fill area, foam liquid top fill area and in other areas where access to auxiliary or installed equipment is necessary.
- v) Hand- rails or bulwarks shall be provided where necessary for the safety and convenience of the crew. Rails and stanchions shall be strongly braced and constructed of a material, which is durable and resists corrosion,
- vi) Steps or ladders shall be provided for access to the top fill area. The lowermost steps(s) may be extended below the angle of approach or departure or ground clearance limits if it (they) is (are) designed to swing clear. All other steps shall be rigidly constructed. All steps shall have a nonskid surface, with a least 150 mm toe room. Lowermost step(s) shall be no more than 558 mm above ground level when the vehicle is full laden. Adequate lighting shall be provided to illuminate steps and walkways.
- vii) A heavy duty front bumper shall be mounted on the vehicle and secured to the frame structure.

4.3. Paint finish shall be 'Fire Red' in colour as per IS 2932 and shall be resistant to damage from firefighting agents.

**4.4 Cabin**

- i) The cabin shall be mounted on the forward part of the vehicle and shall provide seating for 5 persons including driver (two adjustable seats and a long fixed seat for 3 crew member). In addition there shall be instrument panel and equipment as specified without any hindrance to crew.
- ii) The cabin shall meet the visibility requirements of the wind. Shield shall be of shatter proof safety glass and all other windows shall be constructed of approved safety glass. The cabin shall be provided with wide gutters to prevent foam and water dripping on the wind shield and side windows. There shall be enough space to keep and to enable the crew except driver to put on protective clothing and breathing apparatus (B.A.) set while on way to a call. The doors in the cabin should be operable at 90° for easy ingress and egress of crew.
- iii) The cabin shall be weather proof and shall be full insulated thermally and acoustically with a fire resistant material.
- iv) The cabin roof shall be covered with aluminum chequered sheet in such a way that the entrapment of rain water/foam solution on cabin roof is totally avoided by providing necessary gutters for draining.

**4.5 Brakes**

- i) The braking system shall feature service, emergency and parking brake system. Service brakes shall have power actuation through air, hydraulic or air over hydraulic.
- ii) Service brakes shall be of all wheel type with split circuits so that failure of one circuit shall not cause total service brake failure and shall be able to hold fully loaded vehicle on a 50 percent grade.
- iii) The services brakes shall stop the vehicle within 10.7 m from 32 kmph and within 40 m from 64 kmph on a dry hard appropriately roadway level, free from loose materials and sufficiently wide roadway without any part of vehicle leaving roadway.
- iv) The service brakes shall provide one power assisted stop with the vehicle engine inoperative or the stopping distances specified above for each vehicle class.
- v) An emergency brakes system shall be provided which is applied and released by the driver from the cabin and is capable for modulation by means of the service brake control.
- vi) The parking brake shall be capable of holding the fully loaded vehicle on a 20 percent grade without air or hydraulic assistance.

4.6 The appliance is intended for use in tropical conditions with constant high humidity and heat. The use of rubber and similar materials shall be avoided.

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4.7 All parts which forms water ways or come in contact with water shall be of corrosion resisting material or suitably treated for corrosion resistance. All metal pipelines shall be hot dipped /galvanized. All metal parts exposed to atmosphere shall either be of corrosion resisting material or treated suitably to resist corrosion. All metal fasteners shall be galvanized /crome plated to avoid rusting.

5. ENGINE:

- a. Engine: turbo charged air -cooled 4 cycle Diesel Engine/EURO-IV Bharat Stage, emission ratio compliant (latest design).
- b. Engine Output: sufficient to perform output requirement specified herein should not less than 400BHP at 2100 rpm (min).
- c. Acceleration: 80Km/hr in 40 seconds. The acceleration time shall be achieved on ambient temperature varying from 0-50°C and at elevation up to 600 M without engine pre-heating.
- d. Top Speed: 100 to 120 Km/hr.
- e. Response Time: 120 second for a distance of 2.8 Km with three 90 degree turn.
- f. Cooling System: To avoid overheating of engine under tropical condition.
- g. Fuel tank Capacity: The fuel tank shall be not less than 200 liters capacity.
- h. Engine starting System: 24 volts and minimum 30 Amperes.
- i. Positive Operation of Radio Equipment: By way of radio separation of electrical system.
- j. Recharging of Battery: Both in battery charger while mobile and AC receptacle on ground.
- k. Exhaust: To be located far away from pump operating position.
- l. Service Brake: All wheel type with split circuit.
- m. Towing eye/hook:2 at front and 2 at rear
- n. Power take off: Engine department. Power to be operated by vehicle engine through suitable power take off.
- o. Transmission: Fully automatic transmission with torque converter.
- p. Steering: Ram-assisted power steering system. A steering mechanism shall be so designed as to permit manual steering sufficient to bring the vehicle to a safe stop in the event of failure of power assistance. The power steering shall have sufficient capacity so that more than 7kg pull is required on the steering wheel in order to turn the steering wheel from lock to lock with engine running.
- q. Wheels: single wheel type
- r. Tyres: with tubes or tubeless
- s. Crew cabin: driver+5
- t. Access doors: easy accessible to engine, pump, foam proportional system, battery storage, fluid reservoir.
- u. Extension Ladder: 2 section 10 M light alloy
- v. Ground sweep/under truck nozzle: 6(3 in front of front axle+1 behind the front axle+1 in front of 1<sup>st</sup> rear axle +1 in between the rear axle) with foam solution discharge to protect under side of the vehicle. The throw of the nozzle shall be 6M.

6. WATER TANK

- a. Capacity: 6500 ltrs(according to NFPA 414 should be provided)
- b. Filling: self-refilling from pump
- c. Water tank shall have rated capacity as per class and the tank outlets shall be arranged in such a way that 85 percent of rated capacity can be used if the vehicle is standing on:
  - a) 20 percent side slop, and
  - b) 30 percent ascending/descending slope

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Tank shall be made of stainless steel with epoxy coating, tank with suitable longitudinal and traverse baffles, which shall permit easy access for internal inspection. The tank shall withstand hydrostatic pressure of 0.3kg/cm<sup>2</sup>

- e. Tank shall be provided with hinged lid, a top filling hole with filter of 450 mm size and drain hole of not less than 63mm dia with a quick action spherical type valve at the bottom. The manhole shall be quick opening type and shall be clearly marked "Water"
- f. Baffle plates: longitudinal and transversal are required.
- g. Over -flow piping 100 mm dia minimum shall be arranged in such a way that it release pressure on overflowing without wasting water during vehicles maneuvers.
- h. Filling capacity: 2 seats of water filling connection in standard 63 mm instantaneous coupling, one on left and another on right with strainers and non-return valve.
- i. The water tank shall be separate from crew compartment, chassis, engine and easily removable, and shall be mounted on chassis in a manner that the torsional strains during movement are minimum .
- j. A direct filling connection shall also be provided to fill the tank from open source of supply and shall be of sizes, so as to fill the tank in 2 min at 5 kg/cm<sup>2</sup> pressure.
- k. Arrangement of lifting the tank without damage should be provided for repair and maintenance, etc.

**7. FOAM SYSTEM:**

- a. Material of Tank: Tank shall be made of stainless steel. The tank with its fitment shall be able to withstand hydrostatic pressure of 0.3 kg/cm<sup>2</sup>
- b. Capacity of Tank 800 Ltrs or 12% of water capacity.
- c. The tank shall be separate and distinct from the body flexibly mounted on chassis to receive minimum torsion forces during vehicles movements and easily removable as a unit and should be suitably baffled to prevent surging.
- d. The manhole of the tank of 450 mm diameter shall be used for foam filling and shall be clearly marked 'FOAM'. Means shall be provided for automatic venting of the foam compound tank when foam is being produced or tank is filled.
- e. The foam compound tube shall be positioned in such a manner that foreign matter or sludge shall not pass into the compound lines. The tube shall be fitted with gauze strainer of corrosion resistant material.
- f. Drain hole at the bottom of sump and a liquid induction connection shall be provided in the tank .
- g. Spillage/surging/frothing: not allowed during accelerating/braking/concerning.
- h. Foam quality standard: AR-AFFF as per IS 4989(Part IV) specification and foam expansion ration shall be 1:8
- i. foam production: Uninterrupted during creeping, moving.
- j. Foam proportioner" Induction rate 3% ,6% or 8% pre adjustable standard setting .
- k. Filling hole with a trough on top shall be connected with a pipe reaching at the bottom to avoid aeration in the liquid.
- l. An external filling connection which can be approached at ground level shall also be provided to receive supply in tank with the help of foam pump.
- m. All pipelines shall be made of corrosion resistant material and dissimilar material that produces galvanic corrosion should not be used.

**8. PUMP DATA:**

- a. The water pump shall be made of bronze/gunmetal.
- b. delivery/discharge rates: Total discharge from monitor and two side lines shall not be less than 4000 ltrs/min. at pressure of 8.5 kgf/Cm<sup>2</sup> and 3 m static lift pump shall also be capable of minimum output of 4000 ltrs/min at a pressure of 10.5 to 12.5 Kgf/Cm<sup>2</sup> to suit monitor output for same suction.

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Type: Multi stage centrifugal pump, midship mounted, Pump control panel shall be located on either side of appliance in addition to the one provided in cabin.

- d. A mechanical seal/gland shall be provided capable of running dry up to 1 minute without any damage.
- e. Primer provided along with pump shall have automatic engagement (Water ring) /disengagement provision. It shall have a suction lift of 7 mtrs within 30 sec with 125/150 mm dia suction pipe.

**9. PUMP DRIVE:**

- a. The pump drive shall permit operation of pump and simultaneous operation of vehicle and shall not be affected by transmission ratio or clutch operation. The design of drive system shall prevent damage and minimize lurching of vehicle during simultaneous operation, and shall be capable of absorbing maximum torque delivered by engine and vehicle, without causing any stalling of engine and fluctuation of pressure.
- b. The drive shall permit discharge at rated capacity of pump during vehicular speed from 1.6 to 8 kmph in forward as well as rear gear.

**10. MONITOR: ROOF MONITOR WITH SUITABLE CONTROL PANEL**

- a. Location: Roof of the cabin.
- b. Operation: Electro pneumatic manual control by either driver or crew members.
- c. Monitor shall be capable of traversing 270° horizontally and elevating not less than 45° from horizontal axis and depression of 15°.
- d. Monitor shall be capable of discharging total rated water tank quantity in not more than two to three minutes, and shall have a means provided for defective pattern of foam dispersal. The dispersal. The discharge rate of monitor shall not be less than 3000L/min with expansion ratio of 1:( 8-12).
- e. Range of throw shall be as follows:  
 Straight stream at 45° elevation not less than 60m Disbursed stream at 15° depression  
 Far point -----18m  
 Width ----- 6 m  
 Near point ----- 12 m

**11. HANDLINES**

- a. Numbers: 2 for water (one on each side)  
: 2 for DCP (One one each side)
- b. Discharge rates: Minimum 500 ltrs/min for water foam solution at pressure of not exceeding 8.5 kg/Cm<sup>2</sup> and 2.25 kg/sec for DCP
- c. Control: Pneumatic ball valve type from each cabin + additional manual control .
- d. Hose reel Hose: Hose reel Hose inside dia not less than 19mm, Length not less than 60M and throw of 20 M range.

**12. DRY CHEMICAL POWDER SYSTEMS ( SUPPLEMENTARY EXTINGUISHING AGENT)**

- a. No. of cylinders : 2 (One on each side)
- b. Capacity: 75 Kgs each
- c. Location: Suitably mounted in the storage locker.
- d. Propellant gas: Dry Nitrogen in cylinder
- e. Discharge Rates: 2.25 Kgs/sec.
- f. DCP type: Foam compatible Dry Chemical Powder.

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13. CONTROLS IN CABIN

- a. Engine throttle control
- b. Pressure gauge (25kgf/cm<sup>2</sup>)
- c. foam tank pressure valve control(Foam tank valve control)
- d. Monitor operation pneumatic pressure air control
- e. Auxiliary air control.
- f. Self defence foam nozzle control
- g. Engine revolving control – RPM meter
- h. Engine temperature lubricating oil temperature gauge.
- i. Engine oil pressure gauge
- j. Battery charging meter- Ammeter
- k. Air pressure gauge for braking system
- l. Fuel tank content gauge
- m. Odometer
- n. Speedometer
- o. Engagement indicator (power take off)
- p. The water tank, foam tank, monitor, sideliners and self defence nozzle shall be pneumatically controlled ball valves for operations and control from within the cabin.

14. ADDITIONAL ACCESSORIES FITTED ON VEHICLE

- a. Siren: Electrically operated 24V
- b. Fog temp: Two nose on front side
- c. Reversing light: To assist reversing
- d. Airfield obstruction marking lamp
- e. Revolving beacon light
- f. Wind screen wiper
- g. Search light
- h. Spot light
- i. VHF telephone set
- j. Trafficator
- k. Trickle battery charger (with quick release plug/socket arrangement, 5m HT cable, 10MLT end high current cable) .
- l. Public Address System.
- m. External compressed air supply system mounted on rear side.

15. ADDITIONAL ACCESSORIES (KIT)

- a. PVC suction hose 100mm dia 2.5 mtr length –IS 2410, Qty -4 Nos.
- b. Suction strainer (foot valve strainer), IS 907, Qty 1 Nos.
- c. Suction basket strainer, 3532, Qty 1 Nos.
- d. Suction wrenches, IS 4643, Qty 1 No.
- e. Non percolating permaliner type rubber hose 63mm and 30 mtrs long with alloy coupling, IS marked, IS 636, type-B Qty-10 lengths.
- f. Multipurpose control branch pipe with male instantaneous coupling, Qty-2 Nos.
- g. Self-contained portable emergency light working on rechargeable battery, Qty 2 Nos.
- h. Quick release knife-IS 5486, Qty-6 Nos.
- i. 16mm diameter made by polypropylene rope length 30 M, Qty- 1 Nos.
- j. Portable first aid box, Qty-1 No.
- k. Foam making branch pipe FMB (10X). Qty 2 nos.
- l. 3 layer Fire Proximity suit (aluminized) with helmet (IS-2745), hood, gloves & boots, DIFR Approved, Qty-1 No.
- m. Rubber gloves (22000v resistance)IS:36500, Qty-2 pairs.

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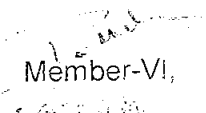

- o. Fireman helmets, Qty 6 Nos.
- p. Fast Battery Charger, Single phase, 12-24 V/60AMPS
- q. Axe standard insulated for 20000 V-2 Nos. axe serrated for 20000 V-2 Nos.
- r. Bolt cutter – 2 Nos.
- aa. Wrench adjustable – 2 Nos.
- ab. Ex-hand search light with charger- 1 No.
- ac. Fire blanket 160x200 cm-2 Nos.
- ad. Multipurpose petrol driven circular saw -1 Nos.
- ae. Collapsible stretcher
- af. Portable water mist extinguisher-10 Ltrs capacity – 1 No.
- ag. Standard tool kit – 1 No.
- ah. Compressed Air Breathing Apparatus set positive pressure 45 min duration complete with 4 spare cylinder as per IS 10245 part-II -4 set.
- ai. Medical First Aid Kit – 01 set.
- ai. Special DCP Fire extinguisher for metal Fire-5 Kgs Capacity : 02 Nos.

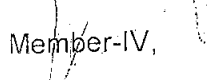
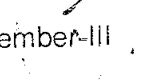
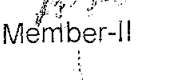
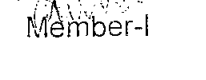
15. SPECIAL FEATURES:

- a. Automatic lubrication system
- b. 2x250 high pressure- Sodium lamp with remote control.
- c. Rescue tools
  - i) Hydraulic Cambi-Tool-01 No.
  - ii) Self-rescue automatic escape (standard size ): 01 No.
  - iii) Shovel, Spades, Pick Axe with handle, Axes Crow Bar 1 Meter long, Hammer -10 Kg. Sledge Hammer -01 No. Each.
- iv) Long line 100 m size 50mm circumferences.
- v) Rescue saw for laminated glass, metal and wood with charger and replaceable spare blades
- vi) Hydraulic door opener-01 No.
- vii) Safety Belt – full body harness with hook & rope -02 Nos.
- viii) Rescue Rams with accessories -01 No.
- ix) Hydraulic cutter – 01 No.
- x) Hydraulic spreader with pulling chains and adaptors-01 No.
- d. External power supply drive end plug for 220 v.
- e. Material use of ABS (acrylic based synthetic plastic) for weight reduction of accessories fittings.

16. ACCEPTANCE TEST:

- a. **Stability Test:** at manufactures works with full load and appropriate usage condition.
- b. **Performance Test:** at manufactures works with creation of full facilities road test for Acceleration, maximum speed and braking efficiency, articulation check for all axels to verify and ensure structure soundness.
  - Pump test to check rated output at varying pump pressures and to check increase in the temperature of engine oil and lubrication oil.
- c. **Primer Test:** to check time required (30 seconds) for vertical lift of 7M using 125/150mm dia suction hose.
- d. **Foam induction/discharge rate** confirming to IS specification.
- e. **Expansion rate- 1:8**

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17. MANUFACTURERS MARKING ON METALLIC PLATE


- a. Manufacturers name and trademark
- b. year of manufacture
- c. Pump Capacity (Ltrs/Min) and Pump No.
- d. Water tank/foam tank capacity
- e. Chassis model and serial No. and suppliers address
- f. Instructions plate on each control panel for each reference of the driver/ operator.

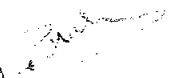
18. GENERAL CONDITION:

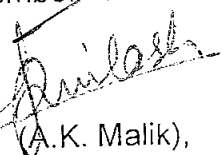
- a. Supplier should supply 1 set of manuals as follows along with tender
- b. operators manual with technical disciplines, layout drawings, illustrations, performance, capabilities precaution, maintenance airfield repair instruction on lubrication schedule period, fault finding notes, storage and warnings .
- c. Parts manual with illustrated details of superstructure/sub. Assemblies, spares for each units, brought out item and sources of supply.
- d. Repair manual fully illustrated repair/overhaul illustration, tolerance for fitting tools and procedures for dismantling and reassembly.
- e. General arrangement drawings showing layout of equipment, piping, fluid flow control, electrical/structural design.
- f. Spares parts list (with cost) for 2 years maintenance support.
- g. Details of tools for maintenance/repairs/overhaul.
- h. The manufactures shall guarantee the materials, workmanship and operation for a period of 24 months from the receipt of equipment.
- i. Practical operation training to certain assemblies of specialized nature to be arranged
- j. The supplier shall provide a list of customers with details to whom such equipment was supplied during past 3 years.

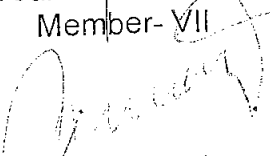
  
 (Balwant Singh )  
 Inspector/SSB  
 Member- IX

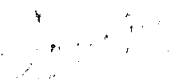
  
 (S.K. Tyagi)  
 AC(MTO)/ITBP  
 Member- VIII

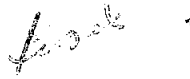
  
 (Sanjeev Kumar)  
 Team Comdr/NSG  
 Member- VII


  
 (Raj Kamal Malik)  
 AC/NDRF  
 Member- VI


  
 (A.K. Malik),  
 DO(FPW)/Delhi Fire service  
 Member- V

  
 ( B.S. Kaurav)  
 DC(MT)/BSF  
 Member- IV

  
 (J.S. Chauhan )  
 DC/CRPF  
 Member- III

  
 (Dr. M. M. Gosal)  
 S.SA, BPR & D  
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 (J.S. Yadav)  
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 ( A.Y. PRIYA )  
 Dy. Inspector General/Fire  
 Presiding Officer

