TECHNICAL SPECIFICATION FOR 2OOO – KG DRY POWDER TENDER FOR FIRE BRIGADE USE AS PER IS: 10993 -1984

01. SCOPE

1.1 The scope includes supply of chassis and fabrication of DCP tender for fire brigade use fully built with all accessories mentioned in the specification with other fittings and accessories. The DCP tender shall be fabricated on TATA Chassis model No. 1613/42 LPT / ASHOK LEYLAND 1616 / equivalent model of ISUZU / VOLVO complying with BS IV or latest emission standards at the time of delivery, Power Steering, Engine Exhaust Brake and cowl. The chassis shall meet the functional requirements of fire fighting operations. The DCP tender shall be as per IS 10993 -1983 reaffirmed 2000/2005 wherever further details are specified.

1.2 This standard lays down requirements regarding materials, design and Construction, workmanship and finish, and accessories and equipment for dry powder tender of 2000 kg capacity for fire brigade use.

02. GENERAL REQUIREMENTS

2.1 The appliance shall have a dry powder unit to contain 2000 kg of dry powder in two vessels. The dry powder unit itself shall have the expellant gas assembly to discharge powder through 2 hose-reels fitted with trigger type pistol grip nozzle and/or a monitor.

2.2 The appliance shall be fabricated in a manner so as to conform to the following requirements:

a) The gross vehicle mass, including crew, dry powder and equipment, shall be not less than 8500 kg.

b) The maximum speed of the appliance on level road, when fully laden, shall be 72 km/h.

c) The acceleration of the appliance form a standing start through the gears, when fully laden, shall be 63 km/h in 55 seconds.

d) The appliance shall be capable of being started from rest on a gradient of 1 to 4.

e) When travelling at 48 km/h on a level dry surface the foot brake shall capable of stopping the vehicle within a distance of t15 m 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 in 4 when in neutral gear.

f) The appliance shall have the following overall dimensions:

Wheel base	Not more than 4500 mm
Turning circle	Not more than 20 m
Road clearance	Not less than 230 mm
Overall width	Not more than 2500 mm

2.3 The appliance shall be fitted with a towing arrangement at the rear of adequate strength to carry 1-tonne trailer. The unit shall be well balanced on the chassis and shall have centre of gravity as low as possible. The overall height shall not exceed the permissible limits.

03. MATERIAL SELECTION AND TREATMENT

3.1 The choice of the materials to be used in the construction of the appliance shall be made with a view to combining lightness with strength and durability.

3.2 The appliance is intended for use in tropical conditions 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; where it is unavoidable, the parts made out of these materials shall be easily replaceable and easily available.

3.3 All metal parts exposed to atmosphere and coming in contact with the powder shall be either of corrosion-resistant material or treated suitably to resist corrosion.

3.4 Ferrous metal shall not be used for chromium-plated fittings, and the plating of all such fittings shall be of extra-heavy quality.

04. DESIGN AND CONSTRUCTION

4.1 Engine

4.1. The BS IV engine shall be of compression ignition type and shall be capable of driving the fully laden appliance form starting-up without any preliminary running period even under abnormally cold atmospheric conditions. Means shall be provided to ensure reliable and quick starting of the engine.

4.1.2 Suitable gauges for indicating temperature of water and for oil pressure, appropriately marked with normal operating ratings, shall be provided on the instrument panel in the driver's cab. The engine lubricating system shall be provided with an accessible external filter. Means shall be provided to gauge with reasonable accuracy the level of oil in the sump, preferably by a tubed dip-stick.

4.2 Electrical System

4.2.1 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.

4.2.2 All important electrical circuits shall have separate fuses, suitably indicated which shall be grouped into a common fuse-box located in an accessible position in the 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.

4.3 Body Work

4.3.1 Enclosed accommodation for six persons shall be provided in the Driver-cab-cum crew compartment including the Driver and the in-charge of the crew. Two doors on each side shall be provided on the Driver-cab-cum-compartment. The doors shall be hinged opening outwards and shall be hung forward and shall have catch locks and flush type handles. Battery charger 5 Amps 24 Volts of Heavy Duty shall be permanently provided for charging the battery.

Chequered plate should be provided on the top of the cabin. There should be 18 gauge aluminum sheet with quoting for cabin ceiling instead of upholstery. Single step should be provided inside the cabin for the rear doors fitted with 10 gauge Aluminum, chequered plate for entry into the cabin. Hand railing should be provided in the cabin with leather straps to hold it by the crew. To avert the accidental fall of the crew members in the cabin, the horizontal rod shall be provided throughout the internal width of the cabin. To prevent accidental opening of all four cabin doors, in addition to the normal locking heavy duty tower bolts shall be provided.

4.3.2 In addition to the enclosed accommodation, riding position shall be provided for 2 persons on a platform at the rear of the appliance. Grab rails and non-skid steps shall be provided, wherever required, to assist the crew to mount and dismount.

4.3.3 Sufficient number lockers for the stowage of the equipment, tools, and other items shall be provided. The lockers shall be fitted with waterproof lining.

4.3.4 The cab and the 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.

4.3.4 All lockers shall be provided with internal automatic on-off lighting system with a master switch in the cab. The doors of the lockers shall have efficient means for holding them close by flush-fitting spring-loaded locks. The doors of the side lockers shall not be hinged at the bottom.

4.3.6 Provision for wireless equipment shall be made and the control panel of the wireless equipment shall be located in the driver's cab.

4.3.7 **Public Address System:** Latest type GRAND/AHUJA make light bar with two tone hooter/mike system with amplifiers & microphone shall be provided in front of Officer Seat in driver's cabin in a box. The model will incorporate 4 Nos. of halogen lights and 4 nos. of strobe lights. The model will be VENUSVOICE and will be of a minimum capacity of 75 watts and wire guard also shall be provided to safe the Grand make light bar.

4.3.8 All light fittings at the rear shall b e suitably protected by expanded metal to prevent damage due to movement of the crew

4.3.9 A specially fitted recessed tray for the normal kit of tools carried on the appliance shall be provided.

4.4 Dry Powder Fire Extinguishing Equipment

4.4.1 A quantity of 2000 kg of dry powder of the foam compatible type, conforming to IS : 4308-1982* shall be stored in 2 vessels of capacity 1000 kg each. The vessels shall conform to IS : 7285-1988 reaffirmed 2002 'Specification for seamless manganese steel cylinders for permanent and high pressure liquefiable gases (first revision)'. Each vessel shall be provided with a separate filling aperture with cover, drain plug, safety valve, and pressure gauge, isolation valve, discharge valve, two hose reel etc, at suitable locations. Arrangement shall be provided to expel the powder through the monitor or 2 hose-reels or both at a time. As 2 vessels are used, a common manifold shall preferably be provided for discharge. The 2 vessels shall not

have any interconnection. Each vessel shall be connected to a separate expellant gas supply and fitted with a suitable pressure reduction valve. The vessels shall have treatment for anti-corrosion on internal surface, either of lead-tin alloy (tin not less than 10 percent) having minimum thickness of 0.012 mm, or for epoxy paint.

4.4.2 A long-range monitor shall be mounted on an independent platform just behind the driver's cab. The platform shall be adequately strengthened to avoid any vibration while the monitor is in use. There shall be proper and sufficient moving space around the platform for movement of the operator.

4.4.3 The discharge rate of the powder shall be not less than 2.5 kg per second through each hose-reel and the throw shall be not less than 10 m horizontally and 8 m vertically while working with both the lines. The discharge through the monitor shall be adjustable at 15,25 and 40 kg/s at operating pressure. The throw through the monitor shall be not less than 40 m horizontally in still air.

The total discharge of the powder shall be not less than 90 percent of the total contents. The vessels shall be provided with arrangement for discharging the excess air should not affect the powder charge.

4.4.4 Efficient means shall be provided for flushing the monitor, hose-reels and manifold with the expellant gas after use. The operating lever shall be located at the control panel.

An additional connection shall be provide in the common manifold, with required valve connection, to flush out the powder in the monitor and hose-reels using air from outside source.

4.4.5 The expellant gas system shall preferably have nitrogen gas in cylinders of capacity not less than 50 litres each, having filling pressure of not less than 200 kgf/cm^2. The gas shall be sufficient to discharge 2000 kg of dry powder through the long-range monitor and hose-reels in accordance with the requirements of 4.4.3.

4.4.6 Sufficient amount of the expellant gas shall be available in the cylinders to flush the monitor, hose-reels and manifold when the supply of powder is exhausted. Arrangement shall be made to prevent back-flow of the expellant gas.

4.4.7 The monitor shall be provided in a manner so as to enable the operator to move it easily. The monitor shall rest on a clamp, properly secured, while not in use.

The monitor shall have in-built arrangement to regulate the powder discharge at 15, 25 and 40 kg/s by pushing or turning the operating lever. It shall be capable to work on any angle up to 360^0 horizontally and 100^0 vertically. Suitable controls shall be provided near the grip of the handle to facilitate the operator to control and regulate the discharge of the powder.

4.4.8 Two hose-reels per vessel, one on either side of each vessel of the appliance shall be provided at easily accessible locations so as to facilitate quick withdrawal. Arrangement shall be made to prevent over-running of the reels.

Each reel shall be provided with 30 m long high-pressure rubber hose fitted with trigger type pistol grip nozzle capable of discharging 2.5 kg of powder per second at a pressure 14 kgf/cm^2.

4.4.9 Suitable device shall be provided or arrangement made to restore the fluidity of the powder to ensure its capability to flow through the fittings, valves and pipelines to the outlets.

4.4.10 All valves, discharge nozzles, pipes and fittings, pressure gauges, etc, shall be of approved type and of non-corrosive/non-reactive material compatible with the dry powder.

4.5.1 Adequately illuminated control panel shall be provided at easily accessible position to operate the dry powder system. All controls/items o equipment shall be clearly marked or identified by fixing suitable labels to facilitate easy operation.

4.5.2 The control panel shall include the following:

a) Pressure gauge for expellant gas cylinders;
b) Pressure gauge to indicate operating pressure;
c) Operating levers for:
    1) Expellant gas valve,
    2) Monitor valve,
    3) Valves for hose-reels,
    4) pressure release valve,
    5) Flushing valve for monitor, and
    6) Flushing valves for hose-reels;
d) Switches for lighting arrangement; and
e) Instruction plate for operation, with line diagram.

4.5.3 **Stability :** The stability of the appliance shall be such that when under fully equipped and loaded conditions, excluding the crew, if the surface on which the appliance stands is tilted to either side, the point at which overturning occurs is not passed at an angle of 25^0 from the horizontal.

05. WORKMANSHIP AND FINISH

5.1 All parts of the appliance shall be of good workmanship and shall have streamlined finish.

5.2 All metallic surfaces coming in contact with the dry powder shall be suitably treated against corrosion.

5.3 The appliance shall be painted fire-red to Shade No.536 of IS : 5-1978*. The paint shall conform to IS : 2932-1974$^+$.

06. INSTRUCTION BOOKS(S), ACCESSORIES AND EQUIPMENT

6.1 Instruction Books(s) --- Instruction books(s) for the guidance of the user, including both the operating and normal maintenance procedures, shall be supplied. The books(s) shall include an itemized and illustrated spare parts list gibing reference numbers of all the wearing parts.

6.2 Accessories --- The following accessories shall be fitted/provided in addition to those normally fitted on commercial vehicles:

a) Electrically operated siren--- 1 km working on the batteries of the Appliance, with its switch in the driver's cab. The siren shall be fitted at a position where it is protected from damage due to weather conditions.

b) Fog lamps ---- two.

c) Reversing light with hooter ---- suitably situated to assist reversing.

e) Revolving beacon-light --- of blue colour, capable of throwing beams of blue light Around 360^0 with beams inclined upwards, horizontally and downwards. It shall be mounted on the cab roof and shall be operated from the batteries of the appliance.

f) 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 30m of TRS cable on a reel mounted on the appliance. The capacity of the cable shall be such that the Voltage drop shall be not more than 2 V at the other end.

g) Reversing horn/buzzer to be fitted.

h) Spot light – adjustable, mounted in a convenient position on the rear side of the drivers' cab.

i) Inspection lamp – protected type, on wander lead with plug. A socket shall be provided on the control panel in the driver's cab for plugging in the lamp.

J) Tools – all tools required for routine maintenance of the appliance which are not included in the standard kit of tools for the chassis.

k) Windscreen wipers – two, electrically operated.

l) Fire Bells: 250 mm diameter fire bell as per IS 928 :1962 Re-affirmed in Nov.- 1999 and shall be mounted externally. The be shall be of hand operating type from the driving compartment and shout be mounted above the cabin.

m) One no. SCBA (Self-contained breathing apparatus) with carbon composite (not SS) cylinders (compressed air type) complete with spare cylinder and tool kit fully conforming to EN-137. The BA shall be of MSA/Drager/AUER make. The cylinder shall be of 06 lit water capacity with free air filling capacity of 1800 liters with 300 bar filling pressure. The BA set shall also

contain DSU and electronic signaling and warning unit with digital ambient temperature indicator.

6.3 Equipment – The appliance shall be provided with the equipment detailed in Appendix A.

07. OTHER REQUIREMENTS:

i) The fabricated vehicle should be provided with necessary protective mesh guards for head lights, Revolving beacon-light and wherever required.

ii) The wind shield glassed shall be of flat type. Separate glasses should be provided at the corner for side vision. All the glass shall be tough ended safety glass.

iii) All seats, viz. Driver operator, Officer and crew and back rest should be fitted with good quality foam with strong and durable sponge covered by good quality rexene.

iv) Driver seat should be provided with adjustable system for upward. Downward, forward and backward movement with strong frame.

v) Vertical hand railing to all the four doors of cabin should be provided externally to enable the crew to step into the cabin.

vi) Foot rests are to be provided at the bottom of the front mudguards on either side of the vehicle to enable the Driver and Officer to mount in the vehicle. One more additional foot rest shall be provided on either side of the vehicle by lowering the existing foot rests by about 25 cms. On either side.

vii) Rear foot board and rear bumper should be very strong to take the load of the standing crew and equipment and also with heavy duty towing assembly to enable for towing a large trailer pump.

viii) Removable spark arrester fitted to the exhaust pipe of the Engine : 01

ix) Wireless set Model: Motorola GM 338 or any other equivalent make /model complete with microphone, antenna and other accessories to be fitted in fire tender. Frequency :- 29.7 36 M Hz, 36-42 MHz, 42-50 MHz, 136-174 MHz, 403-470 MHz, 450-527 MHz(1- 25 W) Channels :-128.

x) Glasses: All glasses fixed should be superior quality. All the glass shall be toughened safety glasses with stone guards.

xi) Towing hook should be provided in front side and rear side of the vehicle.

xii) The supplier shall give his acceptance for support services with spares after supply for minimum period of 5years.

xiii) Charging point for GPS system / mobile system shall be provided in the cabin.

08. <u>INSPECTION</u>: Inspection/test of the above DCP Tender shall be carried out at the supplier's site by our inspecting officials.

<u>1ST STAGE:</u> Preliminary inspection covering inspection of Chassis and Construction of under structure, Vessel Thickness Measuring. Hydraulic testing of vessel. All other Welding works should be carried out by qualified welder. All welding joints are to be tested by D.P.Test.

<u>2ND STAGE:</u> Fitment and placement of the HP Tested vessel, Hydraulic Testing of pipeline and Valve, panelling of sheets, fittings Lockers & drawer while checking all relevant parameters.

3RD STAGE: In final stage, performance verification of all other normal items of equipment, fitments, appurtenances, light, fog lamps, search light, revolving blinker, spot light, rear warning lighting as per specified standard system shall be carried out. Following **"Acceptance Test"** on various equipment shall be conducted to meet Parameters.

01. Verification of all relevant Test certificates for vessels as per CCOE.

02. Gradient Test.

03. Stability Test: The stability of the appliance will be such that when under fully equipped & laden condition, if the surface on which the appliance stand it titled to either side, the point at which over turning occurs is not passed at an angle of 27° from horizontal. This Stability Test will be carried out on a Mechanical Tilt Platform & not missionary ramp. For carrying out this test, the bidder should necessarily have Mechanical tilt platform facility at their own manufacturing Unit. All the piping will be subjected to hydraulic test pressure of 1.5 times of operating pressure for a period of minimum 10 minutes.

04. Monitor Throw Test.

09 DOCUMENTATION: -

a) Manufacturer's test certificate
b) Material certificate
c) CCOE Certificate for Vessels and gas cylinders
d) Guarantee cards for bought out equipment's& accessories
e) Warranty certificate for Three years.
f) Manuals.

10. MARKING

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

a) Manufacture's name or trade mark if any;
b) Year of manufacture.
c) The letters "DCP TENDER, CISF FIRE SERVICES- BHEL HYDERABAD-32 along with emblems of CISF & BHEL " shall be painted in English on both side of vehicle in bold yellow letters.. The painting work should be of good workman ship.

BHEL EMBLEM

DCP TENDER
CISF FIRE SERVICE
BHEL®HYDERABAD

CISF EMBLEM

APPENDIX A

(Clauses 4.3.1 and 6.3)

SCHEDULE OF EQUIPMENTS TO BE CARRIED ON

THE APPLIANCE

Item No.	Equipments	Quantity
1.	Fireman's axes (see IS : 926-1970*)	2
2.	Axe large (see IS : 5505-1969+)	1
3.	Axe, hand (see IS : 5505-1969+)	1
4.	Shovel[see IS : 274 (Parts 1 and 2-1981 +)]	1
5.	Spare expellant gas cylinders, each of 50 litres (Nitrogen cylinder)	4