Directorate of Maharashtra Fire Service
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SPECIFICATION FOR DESIGNING CONSTRUCTION, FABRICATION, ERECTION, TESTING AND COMMISSIONING OF QUICK RESPONSE VEHICLE

The Directorate of Maharashtra Fire Service receives specification for various fire tenders and special appliances from different Urban Local Bodies. Mostly, these specs have different compositions such as capacity of Water Tank, Gross Vehicle Weight, Accessories and Various Ancillary Equipment and thus in order to bring theuniformity for all these specifications across Maharashtra, following specification isdesigned and suggested by Directorate of Maharashtra Fire Services. The aforesaid specification is for "Quick Response Vehicle (QRV)" also commonly known as Water Mist Fire Vehicle. Details of specification are as follows.

Note:

1. Wherever makes of any equipment is given it shall always be read in continuation word "or equivalent"
2. Wherever the numerical is used indicating dimensions of any equipment or material, tolerance of +/- 10% shall be accepted.
3. Wherever the items / equipment is mentioned having NFPA or EN requirement, for all those equipment, proper certificate regarding the same shall be supplied by the OEM / Fabricator

1.0 CHASSIS:

1.1 Should be high speed chassis for smooth ride in city as well as off roads, developing minimum power of 110 to 140 HP at 2900 to 4000 rpm, BS VI diesel engine driven, with power steering.

1.2 The chassis shall be Double Cab / Monocoque chassis with single cabin, Right hand drive Power Steering BS VI. It should be designed to be mounted on Isuzu / Tata or Equivalent 4x2 Double Cab / Monocoque chassis with single cabin. It should have minimal requirements of space and weight while optimizing on manpower requirement

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and minimizing the water and other collateral damage to negligible in comparison to conventional water tender. The Unit design is with foam induction system which provides variable foam dosing and suction of water from an external source for direct firefighting or filling of the tank. The Brand new chassis shall be purchased by the successful contractor from the Chassis manufacturer or his authorized dealer in the name of the Urban Local Bodies (ULB's).

1.3 The maximum wheel base of the Vehicle should be less than 3350 mm and maximum Vehicle length should be less than 5650 mm Overall width should be less than 2000mm. Minimum pay load should be 1.5 ton and GVW should be 3.5 Tons.

1.4 The maximum turning radius of the Vehicle should be less than 7 meters for easiest maneuverability in congested area. The Vehicle is to be designed in such a way that it should maintain its centre of gravity while driving it fully loaded at its full Speed. The power to drive Fire pump, various rescue Tools, generator set, dewatering pump etc is to be taken from chassis engine itself through suitable PTO unit only.

1.5 Chassis should have a Suitable cabin and door to accommodate total 4 nos of crew members including driver, a captain/crew.

2.0 HYDROSTATIC DRIVE:

2.1 The power to drive various equipment should be taken through Hydrostatic drive with specially designed drive system by using chassis engine power to run high pressure fire pump, Generator complete with all hydraulic, Oil tank, pumps, motors, manifold, fittings Etc. CAN BUS /Electronic PLC, diagnostic system, control panel with push button PTO actuation. It should have a suitable PTO unit to transmit the chassis engine power to various hydraulically driven equipment.

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Technical specifications of Hydraulic System		
1	Hydraulic Pump	
	-Make	Bosch Rexroth or equivalent European make
	-Type	Variable Displacement
	- Capacity	21 cc or above
	-Pressure	200 bar
	-drive	Direct mount or remote mount
2	Tank Capacity:	50 liter or above
3	Piping	Wire braided flexible pipe
4	Hydraulic Motors	Axial piston or gear motor
	-Make:	Casappa or equivalent European make
	-Capacity:	22 cc @ 200 Bar
5	Direction Control Valve :	Yuken or equivalent European make
6	Filters:	European make
		25 micron
7	Hydraulic Oil grade:	SAE 68
8	PTO	
	- Make	PZB Italy or equivalent
	- Type	Split Shaft
	- Ratio	1:1.15
	- Torque	400 Kgm (main drive) ;25 Kgm(ancillary drive)
	- Actuation	Pneumatically from Cabin

3.0 REAR BODY:

3.1 The rear body shall be original factory built / fabricated by chassis manufacturer / body builder and shall be made from high strength steel fully trimmed, external panels hot dip galvanized. The rear body shall be made in line of driver's cabin and shall be such as to accommodate two firemen. There shall be full partition between driver cabin and rear body with sliding window of suitable size.

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3.2 The approx. dimensions of crew cabin shall be as follows:

Length of cabin	-	1500 mm. approx.
Length of rear body	-	1500 mm. approx.
Width of rear body	-	1975 mm. approx.

The final overall height shall be mentioned by tenderer.

3.3 The complete external paneling of the vehicle including doors shall be made from high strength Aluminium sheet duly painted by cathodic electrodeposition or equivalent process.

3.4 The complete internal paneling of driver-cum-crew cabin shall be of 18 SWG aluminum sheet or molded PVC sheets properly riveted and bided to the body members.

3.5 The flooring of the rear body shall be made from 3 mm aluminum chequered plates rigidly fixed to the flooring. Trap doors for topping up wherever necessary shall be provided.

4.0 DOORS AND WINDOWS:

4.1 The driver cabin shall be equipped with full two doors, for driver and officer in the front and two doors for crew cabin at the back on each side, in case of double cab. Whereas for single monocoque chassis with single cab, even sliding door with window on one side and read door shall be accepted. All the doors shall be fitted on the body shell with hinges and fitted with best quality handles. The grab handles shall be provided from inside the cabin.

4.2 The window on all the doors shall be full lift type with regulating machine. For all the above windows toughened safety glasses shall be provided. The rubber bedding used for fitting glasses and window frames shall be E.P.D.M. rubber.

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5.0 SEATS:

5.1 The driver seat, preferably with inbuilt BA set mounting facility for ease wearing and removing, fully adjustable type both vertical upward and downward, forward and backward be provided. The seat shall be fixed to the flooring by means of nuts and bolts. The seat assembly shall be of original supplied with chassis.

5.2 The officer's seat shall be adjustable or fixed type. The seat shall be fixed to the flooring by means of nuts and bolts. The seat assembly shall be of original supplied with chassis.

6.0 <u>WATER TANK:</u>

6.1 The water tank shall be made of GRP / High-density polyethylene (HDPE) material giving a free corrosion for life and a light weight of the WATER MIST SYSTEM, having useable storage capacity of 400 Liters Water/ foam properly baffled into segment to reduce water surge. The thickness of the water tank should be of 4 mm minimum. A man hole of Ø 330 mm, over flow pipe and an optical level of water should be part of the tank. The tank should resist to the flame and be anti-ignition complying with the International standards.

6.2 The tank shall be mounted in the rear body on heavy duty mountings in such a manner that, the proper load distribution on each axle is achieved.

6.3 Tank shall be integrated as FLAT BED TANK which is used in Forest Fire fighting system to reduce CG height and save space.

6.4 The integrated water tank of required capacity shall be fabricated from GRP / High-density polyethylene (HDPE) and rectangular or 'T' shape duly mounted on a chassis in a manner keeping in view the proper load distribution on the axles.

6.5 The tank design shall be such that it shouldto prevent the surge of water while the vehicle is in motion, accelerating, braking in speed and cornering.

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6.6 Suitable lifting eyes shall be provided on the shell of water tank to enable it to be lifted from the vehicle for repairs / replacement as and then required.

6.7 The tank shall be fitted 50 mm overflow pipe of suitable non-corrosive material and it shall be taken down below the chassis but without reducing the ground clearance.

6.8 The tank shall be fitted with one 63 mm instantaneous hydrant connection with non-return valve and strainers, closed to the pump panel for filling the tank through 50 mm. bore of suitable non-corrosive material. A flexible draw pipe of 1" dia. shall be taken from the tank to the pump suction inlet, incorporating a ball valve of "Audco" or L&T make. The water tank with its piping and fitments shall withstand hydrostatic pressure of 0.3 bar

6.9 A digital water level gauge shall be provided near the control panel calibrated ¼, ½, ¾, and full (preferably calibrated in liter) and shall be interlinked with pump control system (CAN BUS)

6.10 The water tank shall have one treaded manholes of 150 mm. dia. The manhole treaded cap shall be made from suitable material threaded cap with lugs for filling the water in the tank from outside. The tank shall be provided with SS ball valve for draining the water.

6.11 Suitable foam transfer pump shall be provided for transferring the foam liquid from jerry can to foam tank.

Note: The load distribution calculation shall be shown in the detailed drawing.

7.0 WATER MIST FIRE FIGHTING SYSTEM:

7.1 Water Mist system shall be provided for offensively attacking fire. The ultra-high-pressure fire fighting system shall allow the operator to attack fire from a safe position at incipient stage.

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7.2 The flow of the pump shall not be less than 35-38 LPM at 100-150 bars.The pump shall be Hydraulic operated without coupled hydraulic motor to avoid future maintenance and space and weight of water-mist pump with capacity not less than 38lpm@150bar, dimensions L160mmXW 245mm X H165mm, weight not more than10kg. The pump shall be fitted underneath chassis at suitable place no rotory movement of shaft. The pump shall be provided with safety valve and shall be set atappropriate pressure.

7.3 The pump shall be provided with inlet filter of 100 micron.

7.4 The control panel shall be ergonomically designed and operator friendly. The panel shall be labelled and installed to be easily visible from the operator's position. The following instruments and controls shall be installed.

- Power output
- Generator on/off switch
- Water level indicator
- Low water alarm
- Pressure gauges
- High pressure pump on/off switch
- Engine acceleration switch

7.5 The vehicle shall be provided with PLC CAN BUS system duly approved by chassis manufacturer interlinked with engine to:
- vary the engine rpm according to the load on engine so that all hydrostatically driven equipment's can deliver uninterrupted same performance at all times
- fault diagnosis with LED indications.

8.0 HOSE REEL HOSE & HIGH PRESSURE GUN:

8.1 The hose provided in the system shall be high quality and shall be capable of holding the temp. ranges – 20° to + 55° C. The material specification, working pressure, test pressure and cracking pressure should be indicated for each type of hose. The

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minimum length Hose Reel hose should be 60 M of Parker or equivalent make. The seals and O-rings used in the system should be of synthetic material like Nitrile rubber or equivalent.

8.2 The pump shall be provided with high pressure gun having dual mode for straight penetration and fog conversion. The gun shall be provided with a suitable stainless steel filter. The design of gun shall be such that there is no appreciable re coil pressure. The second gun shall have an attachment for discharging foam with suitable aeration facility. The Guns should have a Handle, should be provided with facility to adjust the flow rate.

Flow rate:	25 lits/min (+5%)
Weight of extinguisher gun:	2 kgs Max
Working pressure on the nozzle:	100 bars Max. with nominal reaction
Throw:	Jet – not less than 15 mtrs. (+/- 10%) Spray: 5mtr (+/- 10%)
Hose Reel Hose:	60 mts Auto (Electric) rewind and also gear winding (manually)
Max. set operating pressure:	100 bars

9.0 POWER TAKE OFF:

9.1 The vehicle shall be provided with suitable PTO to drive hydraulic pump for hydrostatic drive.

9.2 The PTO shall have suitable ratio so that it should deliver rated power and torque to drive fire pump at rated output and generator simultaneously which is below:

Make - PZB Italy or equivalent
Type - Split Shaft
Ratio - 1:1.15
Torque - 400 Kgm (main drive) ; 25 Kgm (ancillary drive)
Actuation - Pneumatically from Cabin

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9.3 The PTO shall either be gear mounted supplied along with chassis by chassis manufacturer or split shaft of reputed make.

9.4 The PTO actuation shall be pneumatically from driver's cabin with manual override
Note: The PTO details shall be submitted with offer.

10.0 ELECTRICAL SYSTEM:

10.1 All the important electrical circuits shall have separate fuses suitably indicated and shall be grouped into a common fuse box located at an accessible position. The wiring shall be single pole with negative earth.

10.2 Electrical siren of 1 mile range 12 volts D.C. of reputed make shall be provided and fitted at suitable place with two controlling push buttons on one officer's side and another at Driver side.

10.3 Warning light bar shall be provided over the top of Driver's cabin.

10.4 The other lights, pump cabin light, locker lights shall be approved make.

10.5 All the controlling switches of lights on dashboard shall be approved make.

10.6 Two fog lamps of approved make shall be provided and fitted on front-bumper with controlling switch on dashboard.

10.7. Hooter cum P.A. systems of reputed make shall be provided with a speaker mounted on the top of Driver's cabin with rexin cover. The output shall be 25 watts.

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11.0 SAFETY DEVICES:

11.1 The system shall be provided with pressure safety valve. The system will have proper heat & exhaust outlet for the engine without causing any interference to the operator while operating the unit. Any other safety device should be provided which is felt to be necessary to be a part of the equipment.

12.0 PAINTING AND MARKINGS.

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

- Surface Preparation: Thiswould bepoly- urethane (PU) based paint.
- Vehicle Exterior Paint: The complete vehicle (all exterior surfaces) would be painted with at least 2 coats of zinc phosphate primer each of 50microns DFT & 2 coats of polyurethane finish paint each coat of 50micronsDFT. Further improvement on the paint maybe carried out by the manufacturerbeyond that mentioned above, to give better protection & surface finish. The entire appliance will be painted with Fire Red paint preferably of ASIAN PPG make using double coat spray painting on the outside. The user's (ULB's) name and logo will be written on both-sides with yellow colour (in English & Marathi).

  In case of monocoque chassis, factory painted vehicle is permissible as it gives longer life to vehicle.

- Marking / Name Plates : All the lockers / cabins will be provided with SS Nameplates with letters itched on it boldly indicating the content

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

- Manufacturers Name & Logo
- YearofManufacture
- Capacityof PumpinLPM
- Capacity of Water Tank in Litres

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- Engine & Chassis no.
- Instructionsfor Driver incabin

13.0 DOCUMENTS:

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

General layout of the tender

Equipment layout

Flow diagram Electrical

system Locker drawings

User Manual and Instruction Booklet

14.0 INSPECTION (Final Stage).

14.1 Advance notice of at least 1 week should be given by the fabricator; however, the fabricator must keep the vehicle ready for final stage inspection before giving such notice to Purchaser (Urban Local Body–ULB i.e. Municipal Corporation & Council)

Following shall be inspected at the fabricators place before vehicle is dispatched to ULB's

Final stage Inspection	a. Body Structure Inspection b. Testing of Loose (unmounted) Water Tank c. Inspection of Panel Work. Hydrotesting of Pump d. Installation of Pump, PTO & Piping Pre finishing inspection. e. High Pressure Hose Reel Hose operation test f. Stability (Tilt) test as per IS standard g. Gradient Test for entire vehicle h. Articulation Test for vehicle

	i. Road Test for full laden vehicle for min 30 kms. j. Four Hours Pump Operation Testing, k. Hose Reel performance test. l. Complete functions-operations of all systems installed. m. Checking of all catalogues, Operation manual of appliance n. Any Other : Test as may be required for Final Acceptance

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

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

15.0 APPROVAL AND CERTIFICATION TOWARDS CHASSIS AND BODY BUILD VEHICLE-

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

- GradientTest.
- StabilityTilt Test.
- ArticulationTest
- TurningRadiusTest,
- Road(Braking,Acceleration&Speed).

16.0 TRAINING

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

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

17.0 INSTRUCTION BOOKS:

17.1 Instruction books for the guidance of the user includingbothoperationandnormal maintenance shall be supplied for all the equipment in Englishlanguage. The books shall include an item wise and illustrated spare parts listgiving reference numbers of all the possibly swearing parts. The workshop manual and spare parts catalogue of chassis shall also be supplied with vehicle preferably with soft copy.

18.0 COMPREHENSIVE SERVICE MAINTENANCE CONTRACT (CSMC):

18.1 The Contractor shall offer the vehicle with three years COMPREHENSIVESERVICE MAINTENANCE CONTRACT which includes the cost of repairing ofvehicle at periodic intervals or at the time of break down of vehicle including thesupplyof original spare parts.

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

18.3 The spare parts used at the time of periodical servicing shall be original and brand new. Any breakdown of the vehicle shall be attended within 72 hrs. from the time of intimation of break down (telephonic / written) to the contractor.

18.4 The servicing and repairing of vehicle including chassis shall be carried out through skilled workers as certified by the manufacturer (within the ULB's District Region). All the tools, consumables etc. required for the servicing of the vehicle shall be arranged by the contractor.

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

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

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

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

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

18.10 Any dispute arise out of this contract, Municipal Commissioner / ChiefOfficer will be the final authority and the decision given by him shall be bindingto boththe parties

18.11 The tenderer shall give the details of work to be carried out at periodicintervalof threemonths alongwith theoffer.

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

18.13 During the contract the vehicle shall be checked periodically at the interval ofevery threemonths and all the test and checks shall be carried out as permanufacturersrecommendations.

19.0 ANCILLARYEQUIPMENT:

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

Annexure - A– Mandatory Equipment

Sr. No.	Description about Equipment's	Qty
01	**POWER PACK PUMP & HEAVY DUTY COMBI-TOOLS AND CUTTER & SPREADER:-** The following hydraulic rescue tools shall be utilized in emergency situations. All tools must be EN 13204 and NFPA 1936 compliant. The manufacturer should be ISO 9001 registered. All hydraulic rescue tools shall carry a 12 months warranty on materials and workmanship. All hydraulic rescue tools shall incorporate an Automatic Safety Relief Device to prevent over pressurization. Quick-connect couplers without pigtail hoses shall be provided to facilitate the quick and easy connect and disconnect of the tool. All quick-couplers shall be equipped with dust covers to protect couplers from contamination. All the hydraulic rescue tool controls shall be deadmans type (no twist or thumb control) for easy operation in any position.	
	A. HYDRAULIC CUTTER (Lukas / Holmatro / Weber make): Max. working pressure – not less than 630 bar, Min. cutting force - 65 ton, Min. round bar cutting cap. 38 mm dia, Min. blade opening : 160 mm Weight not more than 19 kgs. Dead mans type Rotary control/Push Button for cutter operation with spring return to neutral position, Built in double check valves with full protection against over load with carrying handle. The design of the tool shall be based on EN 13204 with type test certificate. Operation and maintenance manual to be provided. Tool kit with spare set of cutting blades to be supplied with the tool Class EN: 1K 2F 3G 4J 5G Class NFPA: A8, B6, B8, B9, C6, C7, C8, D7, D9, E9	01 No. Each

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	B. Hydraulic Spreader (WEBER/Lukas / Holmatro make) complete with pulling head set and chain set; Max. working pressure – not less than 630 bar, Min. spreading force on the open arm – not less than 50 tons Minimum spreading distance – 720 mm Minimum spreading force at closed arm – 5 ton (measured at 25 mm from the tips) Minimum squeezing force – 120 kn, Minimum pulling length – 600 mm, Minimum pulling force – 60kn, Weight not more than 20 kgs. It should have well serrated tips for perfect grip for spreading & squeezing with slim arms & yoke design for easy penetration in confined spaces. Dead mans type Rotary Control/Push Button for spreader operation with spring return to neutral position. Built in double check valves, full protection against overload with carrying handle. Accessories: Pulling chains and chain adapters . The design of the tool shall be based on EN 13204 with type test certificate. Operation and maintenance manual to be provided. Class EN: AS / BS Class NFPA **ACCESSORIES** 1. Set of pulling attachments 2. Set pulling chains (1.5 mtrs and 3 mtrs)	
	C.HYDRAULIC COMBI TOOL WITH PULLING ADAPTER & PULLING CHAIN Max. spreading force on the open arm - Not less than 200 Kn. Minimum spreading distance – Not Less than 250 mm Minimum Spreading force on the closed arm measured - Not less than 30 Kn Minimum pulling force - Not less than 30 Kn Minimum cutting force – Not less than 300 Kn Round Bar Cutting capacity - Not less than 25 mm dia.	**01 set**

	Weight not more than 15 kgs. It should have well serrated tips for perfect grip during spreading & squeezing, sharp cutting blades with optimal angle. Rotary Control for operation with spring return to neutral position, Built in double check valves with full protection against overload with carrying handle. Accessories - Pulling chains, chain adaptors. the design of the tool shall be based on EN 13204 with Type Test Certificate The tools shall be of reputed make such as LUKAS, HOLMATRO, WEBER OR EQUIVALENT . Operation and maintenance manual Class NFPA: A6, A7, B7, B8, C6, C7, C8, D7, D8, E7, E8 Class EN: 1H, 4H, 2G, 3G, 5G, 1J, 2J, 3K, 4K, 5K	
	D. Hydraulic Telescopic Ram (Lukas / Holmatro make): Max. working pressure – not less than 630 bar, Minimum spreading force of first plunger – 23 ton Minimum spreading force of 2nd plunger 11 ton Minimum retracted length not more than 650 mm, Maximum extended length including cross head – not less than 1500 mm, Min. stroke of 1stplunger – 450 mm, Min. stroke of 2nd plunger – 425 mm, Weight not more than 21 kgs, Dead mans type Rotary control / Push Button for operation with spring return to neutral position Built in double check valves with full protection against over load The design of the tool shall be based on EN 13204 or NFPA with type test certificate Operation and maintenance manual to be provided	**01 No.**

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	E. HYDRAULIC HOSES: 01 SET High quality 'Thermo Plastic' hose of 10 mtrs. in length for pressure and return line with quick connect couplings suitable to connect power pack and tools shall be supplied with the pump. Total 2 nos of hoses of 10 mtrs each shall be supplied with the pump. The weight of each hose shall not be more than 5 kgs The two hoses shall be in two different colors to identify easily. Non-interchangeable hydraulic coupling designed for quick connection / disconnecting shall be provided with dust caps, complete with automatic self-locking system. The hoses shall have the working pressure suitable for tools and the busting pressure of the hoses shall be 4 times the working pressure.	
02	**POWER PACK** Operating pressure - 720 bar Possible connections - 2 Tools Width - 315 mm Depth - 455 mm Height - 460 mm Oil flow pressure - 2900 cc / min @ 150bar 1300 cc / min @ 280bar 550 cc / min @ 720 bar Power unit - 4 stroke petrol engine Power - 3 HP Fuel tank (usable amount) - 1.5 lit Max run time - not less than 90 min Weight - 22.7 kg	

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03	**PNEUMATIC LIFTING AIR BAGS** (flat type) AND ACCESSORIES: Lukas /Holmatro make High pressure pneumatic lifting bags having working pressure not less than 12 bar, made of Kevlar reinforced nitrile rubber with 3 layers aramide reinforcement, nonslip design, capable of being interlocked when 2 bags are placed on top of each other, quick connection with automatic double locking system, insertion thickness not more than 27 mm including profile, resistant to ozone and range of chemicals, reflective markings on the corners of the bags, centering mark, etc of the following capacities shall be supplied :-	**01 No.**

Lifting capacity	Min. Inflation height (mm)	Weight (not more than) kgs.	Quantity
31 tons	320	8.6	2 nos
53 tons	410	15.0	2 nos.

The Airbags and all its accessories shall comply the operating requirement and safety standard stipulated under EN 13731

The airbags are to be supplied with the following accessories

Pressure reducer 300 bar to 8 bar	2 nos
Control box for operating 2 airbags with pressure gauges ad carrying strap	2 nos
Air Hose 5 mtrs	2 nos
Air hose 10 mtrs	2 nos
Shut off hose with safety valve	4 nos
Connection piece to connect two air cylinders	2 nos

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04	**<u>Ventilating Fan</u> :** It should be tough, durable and versatile as per below specifications. Motor : 12 VDC Blower Diameter : 200 mtr min Dimensions: not less than 36 X 31 X 33 cms. Noise : 74 dba Weight : 6 to 8 Kgs Capacity : 850 CFM min	**01 No.**
05	**<u>Telescopic Light Mast</u>**:- A compact, low profile, roof mounted lighting system fitted with 2 x 150 watts or equivalent High Power LED lamp with more than 50000 hours working life, vertically elevated and pneumatically extended up to 1800-2000 mm from the roof of the vehicle, lighting is provided by a 12 v or 24 v DC with pistol grip remote control positioner. The total output shall be more than 28000 Lumens. The generator power is used for lighting the light mast hence it can be operated for longer time without any interruption. It shall have directional lighting system with 360 degrees rotation and 180 degrees tilt lamps to provide total coverage. The remote control unit allows a person to operate all the functions of the light mast and accurately aim for complete directional positioning. The complete unit shall be imported and it shall comprise of pistol grip handheld remote control with cable, RCP rotation and tilt positioner, mounting frame with built in tilt system etc. The total weight of the roof mounted light mast shall be less than 55 Kgs. It shall be manufactured in light weightaluminium and stainless steel materials. The necessary electrical wiring and connections from generator and vehicle electrical shall be provided to the mast.	01 No.

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06	**Alternator Unit / D.G. Set 3.5 KVA :** It shall have : . The generator shall be hydraulically driven an in-built alternator shall be provided and fitted in the rear body at suitable location. The location of the generator shall be shown in the drawing. . The generator shall consist of alternator and hydraulic motor. . The generator shall be single phase 230 volt, +/- 6%, 3.5 KVA,50 Hz. The generator shall have automatic frequency control mechanism. . The generator shall have IP 54 ingress protection. . Dimensions & weight : 445x220x240 weight not more than 26kg. . The generator shall be provided with automatic circuit breaker unit for protection from overloading. . The generator shall have automatic voltage regulator to maintain constant voltage at variable electric load. . The voltage shall be kept constant through the whole load range with accuracy of +/- 6%. The generator shall be of Dynaset make or equivalent	01 No.
07	**Winch Set-** 1. A pulling winch of 2 ton pulling capacity shall be provided and fitted on the front bumper. 2. The winch shall operate hydraulically/electrically. 3. Tow eye should be in the front of the vehicle and it shall be operated from the drivers cabin. 4. Wire cable or special rope of minimum 15 m length shall be provided on rope drum with replaceable self locking clevis hook. 5. The winch shall be mounted on heavy duty foundation to bear the pulling load of 2 ton.The winch shall be of reputed make such as Mile Marker or Warn or equivalent.	1 nos :

Annexure – B – Optional Equipment

Depending on the budget availability of the ULB's, Annexure – B should be looked as anoptionandmay procure the items as given in Annexure– Basfollows.

<table>
<tr><th>Sr. No.</th><th>Description about Equipment</th><th>Qty</th></tr>
<tr><td>01.</td><td><u>Complete set of Battery operated combi-tool for cutting and spreading & RAM</u>
<u>BATTERY OPERATED COMBI-TOOL:</u>
The combi tool shall be capable of cutting of various sections such as solid round bar, hollow round bar, flat section, square tube, rectangular tube etc. It would also cut the door pillars of new generation cars and also be able to perform the spreading and pulling function.

The blades shall be of shock resistant non corroding alloy steel, hardened and ground and shall be exchangeable and regrindable.

The tool carrying handle shall have integrated LED lights powered from the main battery. The LED lights can be turned on or off by means of a switch.

The combi tool shall have following specifications:

<table>
<tr><td>Spreading Distance</td><td>Not less than 350 -380 mm</td></tr>
<tr><td>Spreading force measured at 25 mm from the tips as per EN 13204</td><td>Not less than 3 T</td></tr>
<tr><td>Max. Spreading force</td><td>Not less than 100 T</td></tr>
<tr><td>Cutting force</td><td>Not less than 65 T</td></tr>
<tr><td>Squeezing force</td><td>Not less than 4 T</td></tr>
<tr><td>Pulling distance</td><td>Not less than 250 mm</td></tr>
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</td><td>01 No. Each</td></tr>
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Pulling force	Not less than 5 ton
Weight including battery	Not more than 21 kgs
Capable of cutting round steel bar	Not less than 32 mm
The material of the steel profiles shall conform to -	EN 10025-1-2000 table 5, type S 235
Mandatory Compliance category of cutting performance as per NFPA 1936 -	A7,B8,C8,D8,E8
Mandatory Compliance category of cutting performance as per EN 13204 -	1J,2J,3K,4K,5K

Accessories

Pulling Chains Set 10 mm – 1.5m + 3.0m	1 set
Pulling Attachment Set	1 set
Mains Power connector to connect the tool to any 220 V source	1 no
Battery charger – 300 watts – with indication for the state of health of battery	1 no
On Tool Charging Cord	1 no
Tool diagnostic cord having Cable not less than 3.5 mtrs to connect the tool to a PC or laptop for battery and tool diagnostics through diagnostics software	1 no
Spare Battery	1 No

BATTERY OPERATED TELESCOPIC RESCUE RAM

The ram cylinder shall be double acting hydraulically operated device of light weight construction suitable for manual application with ease. A laser pointer shall be fitted inside the cross head for facilitating right and

precise placement of the ram and it must be possible to install an extension pipe without having to remove a ram head. 2 nos Carrying / holding handles shall be fitted on the tool. The tool carrying handle shall have integrated LED lights powered from the main battery. The LED lights can be turned on or off by means of a switch.

The telescopic ram shall have following specifications

Max. Spreading force 1st plug.	Not less than 13 T
Max. Spreading force 2nd plug.	Not less than 6.5 T
Length retracted	Not more than 580 mm
Stroke 1st plug	Not less than 400 mm
Stroke 2nd plug.	Not less than 375 mm
Total stroke	Not less than 775 mm
Max. Length including extension piece	Not less than 1800 mm
Weight	Not more than 20 kgs

Accessories

Mains Power connector to connect the tool to any 220 V source	1 no
Battery charger – 300 watts – with indication for the state of health of battery	1 no
Spare Battery	1 No
On Tool Charging Cord	1 no
Tool diagnostic cord having Cable not less than 3.5 mtrs to connect the tool to a PC or laptop for battery and tool diagnostics through diagnostics software	1 no
Extension pipe min. 425 mm in length with automatic locking	1 no

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02	**FLOOD LIGHT :** A 12 Volts DC flood light that can be plugged directly onto the rescue system portable power pack or to extension or jumper cables for hanging or reaching into tight spots.	**01 Set**
03	**Reciprocating Saw:** 8 volts Cordless reciprocating saw with Power Adapter, 5 "Torch" Metal Cutting Blades, 1 " Ax" Wood Cutting Blade.	**01 No.**
04	**Rotating Saw:** 18 volts Cordless rotating saw with Power Adapter, 5 "Torch" Metal Cutting Blades, 1 " Ax" Wood Cutting Blade.	**01 No.**
05	**Auto Jack:-** Shall be of imported make auto Jack as per below specifications. **1.** It shall be a piston actuated, spring loaded, automatically rise to engage a vehicle body or object to be lifted. **2.** It shall lock automatically during operation. **3.** It shall be capable of reaching height of 13 inches. **4.** It shall weigh less than 7 kgs **5.** It should lift minimum 900 kg load. It shall be very compact in size and stowed at convenient place in vehicle.	**01 No.**
06	**First Aid Medical Outfit for 15 persons:** It should be of a best quality, approved by BIS and Medical Board.1 Set 1. The kit shall be provided in Thermoplastic unbreakable box. 2. The approx. dimensions shall be 24" X 12" X 18" 3. It Locking Mechanism shall have a Press Lock and Quick Release Clamps. 4. It shall have Centrally Located Handle with Side Holds at both sides to lift the box. 5. It shall have Sliding Compartments inside the Box with At Least	**01 set.**

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	2 Trays One 4" From Top and Second 5" From First. 6. It shall include a Medical First Aid kit for 20 Persons. 7. It shall include CPR Masks – 3 Nos. 8. It shall include adjustable Collars – 5 Nos. 9. It shall have Ambu Bags for Child 1No. and Adult 1No. 10. It shall have color coded Airway Oral Sets of different sizes – 60mm , 70mm, 80mm, 90mm, 100mm.- 2 Nos. 11. It shall have Emergency adjustable Flexible Splints of Large,Medium and Small Size (Set of Three) – 1 NO. 12. It shall have Pneumatic Splints Set – 1 NO. - Material Radio Lucent, Light Quality Plastic. - With Inflation Valve and Closing Clamp, Fixing By Radio Lucent Zipper. - Set Of Six Sizes Hand And Wrist Half Arms, Full Arms, Foot And Ankle, Half Leg And Full Leg. 13. It shall have 5 Nos. of Glasses for Eye Protection which shall be - - Scratch resistant and unbreakable polycarbonate material. - It shall have maximum UV Protection. - Frosted Brow Guard To Block Overhead Glare. - Side Shields which Are Adjustable. - Adjustable Temple Length in Four Positions. - Overall Shape Should Be So As To Prevent Any Splash Of Body fluid entering in the Eye.	
07	**<u>Axes and Hand Tools</u> :** Multipurpose seven in one Hand Tools Kit as per below specifications: **1.** Made out of high grade tempered steel, **2.** 34 inches composite polyglass handle, **3.** 3.5 pound Hudson bay style axe head, **4.** Leather axe sheath, **5.** weighs 12.5 pounds, **6.** Compact storage in a low profile cordura carrying case.	**01 set**

	Tool Kit comprises of following tools : **1.** Axe with sheath **2.** Shovel **3.** Mclead Reversible Roke / Hoe **4.** Safety Locking pins **5.** Broad Pick **6.** Pick axe **7.** Mattock	
08	**Breathing Apparatus** B.A.Setshavingworkingdurationof45minscapacitywithone sparecylinder eachasper IS10245Part2 with engulfing test done.	**04 Nos.**
09	**Life jacket:** The jacket of universal size should be so designed to help save human life in water. Should be made of highly visible international "Orange" colour, rot proof nylon, stuffed with polyurethane foam with nylon webbing and retro-reflective tapes which should be highly buoyant even when punctured or torn, waterproof and non-inflammable and should conform to SOLAS 1983 (IM) Resolution A 689 (17) and should be MMD approved.	**04 no**
	HAND HELD FORCIBLE ENTRY TOOL KIT- The complete unit will comprise of the following:- 1. Ram bar – 1 no. 2. Tool bits – 5 nos. 3. Carrying pouch – 1 no. **RAM BAR** The hand held forcible entry tool of PARATECH make Model PRT kit shall include one compact Ram bar which will be made of hard coated aluminium alloy tube body. The tube body and handle shall be machined grooved for non slip grip. The Ram bar shall have hard coated aluminium alloy Tool bit retainer	**01 Set**

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and a locking ring. The ram bar shall have a locking device which can lock the ram bar at any length for added leverage and safety and also for storage.

The Ram bar should be able to connect the interchangeable bits for added versatility. The Ram bar design shall have an easy sliding action which can direct all its force directly at the point of impact for maximum effect.

INTERCHANGEABLE TOOL BITS

The hand held forcible entry tool shall include 5 nos interchangeable tools bit. These tool bits shall be made of forged, heat treated steel alloy. The following tool bits shall be provided:-

1	Bull point tool bit shall be designed for breaking concrete and masonry walls – length 450 to 500 mm	1 no
2	Chisel of 25 mm width shall be designed for breaking concrete, prying and breaking bolts, breaking bricks and blocks walls – length 450 to 500 mm	1 no
3	Chisel of 75 mm width shall be designed for breaking concrete, prying and breaking bolts, breaking bricks and blocks walls – length 450 to 500 mm	1 no
4	Metal Cutting Claw shall be designed for punching and cutting sheet metal and shall work like a manual can opener.- length 300 to 350 mm	1 no
5	Lock Breaker Claw shall be designed for prying or forcing open doors, windows, twisting hasps and breaking locks - length 300 to 350 mm	1 no

CARRYING POUCH

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	The hand held forcible entry tool shall be supplied with a ballistic nylon transport case which can store the tool and the tool bits properly. **WEIGHT** The total weight of the kit including the ram bar, 5 chisels & carrying case should not exceed 13.5 kgs **WARRANTY** The Hand held forcible entry tool shall have a lifetime warranty against all defects in material and workmanship. **MANUAL** A fully illustrated step by step guide on use, care and maintenance of the hand held forcible entry tool shall be provided.	
10	**DEWATERING PUMP** –Imported suitable for use in water and rainy season, for general purposes - pumps clear and muddy water, with motor – Min.2.5"Female discharge mouth, water Flow max 1600 L/min – water height 40 mt - solid handling capacity 2cm, pump body in aluminum. One no rubber lined delivery hose of 63mm X 15 mtr length fitted with male & female coupling shall be supplied with pump. One no short branch shall be provided with pump.	**01 No.**

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