

PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)

TECHNICAL SPECIFICATION FOR FIRE TENDERS, FIRE JEEP AND SAFETY EQUIPMENT VOLUME – II B

SPECIFICATION NO.: PE- TS- 434- 550- A001, Rev 00



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



INDEX

**3 X 800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENTS**

SPECIFICATION NO. PE-TS-434-555-A001

REV 00

SHEET 1 OF 1

SECTIONS	TITLE	PAGE NO.
SECTION-I	SPECIFIC TECHNICAL REQUIREMENT	
IA	INTENT OF SPECIFICATION	3-6
IB	PROJECT INFORMATION	7-9
IC	CUSTOMER SPECIFICATION	10-47
ID	TECHNICAL REQUIREMENT	48
	D1 SCOPE OF SUPPLY FOR FIRE WATER TENDER	49-63
	APPENDIX-1 SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH FIRE WATER TENDER	64-66
	D2 SCOPE OF SUPPLY FOR DCP TENDER	67-74
	APPENDIX-2 SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH DCP TENDER	75
	D3 SCOPE OF SUPPLY FOR FOAM TENDER	76-77
	APPENDIX-3 SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH FOAM TENDER	78
	D4 SCOPE OF SUPPLY FOR FIRE JEEP WITH TRAILER PUMP	79-87
	APPENDIX-4 SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH FIRE JEEP WITH TRAILER PUMP	88
	D5 SCOPE OF SUPPLY FOR FIRE SAFETY EQUIPMENT	89-91
	APPENDIX-5 LIST OF MAINTENANCE TOOLS & TACKLES	92-93
	APPENDIX-6 REFERENCE QUALITY PLANS	94-110
SECTION-II		
	ANNEXURE-1 MASTER DRAWING LIST WITH SCHEDULE OF SUBMISSION	111-112
	ANNEXURE-2 FORMAT FOR OPERATION AND MAINTENANCE MANUAL	113-116
SECTION-III	DOCUMENTS TO BE SUBMITTED BY THE BIDDER	117
SECTION - IIIA	LIST OF DOCUMENTS TO BE SUBMITTED WITH BID	118-119
SECTION - IIIB	COMPLIANCE CUM CONFIRMATION CERTIFICATE	120-122
SECTION - IIIC	PRE BID CLARIFICATION SCHEDULE	123-124
SECTION - IIID	SCHEDULE OF TECHNICAL DEVIATION	125-126



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: IA

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : IA

INTENT OF SPECIFICATION



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SECTION: I

SUB-SECTION: IA

REV. NO.-0

1.0 INTENT OF SPECIFICATION

- 1.1 This specification covers the design (i.e. preparation and submission of drawing /documents including "As Built" drawings and O&M manuals), engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, maintenance tools & tackles, fill of lubricants & consumables along with spares for start-up and commissioning as required, forwarding, proper packing of accessories, shipment and delivery at site and carrying out Performance guarantee / Functional / Demonstration tests at site, training of customer/client O&M staff, permanent registration and one year insurance of the vehicles in the name of end customer and handover in flawless condition of the package to the end customer complete with all accessories for the total scope defined as per tender technical specification, amendment & agreements till placement of order.

The bidder's scope shall also include any other services, etc. if called for in the succeeding sections of the specification.

- 1.2 It is not the intent to specify completely all details and construction of the equipment. However, all the equipment shall conform, in all respect, to high standard of engineering, design and workmanship and be capable of performing in continuous commercial operation up to desired period.
- 1.3 BIDDER's guarantee in a manner acceptable to the PURCHASER who will interpret the meaning of drawing and specification and shall have power to reject any work or material which, in his judgement, are not in full accordance with specified specification and technical parameter.
- 1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.
- 1.5 Items though not specifically mentioned but needed to make the system complete as stipulated under these specifications are also to be furnished unless otherwise specifically excluded.
- 1.6 The general terms and conditions, instructions to tenderer and other attachment referred to elsewhere are hereby made part of the tender specifications. The equipment / material and works covered by this specification is subject to compliance to all the attachments referred in the specification. The tenderer shall be responsible for adherence to all requirements stipulated herein.
- 1.7 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol.-III of the specification within 10 days of receipt of tender documents. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as



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SPEC NO. PE-TS-434-550-A001

SECTION: I

SUB-SECTION: IA

REV. NO.-0

per interpretation of Purchaser/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by Purchaser/ Customer as and when brought to their notice either by the bidder or by purchaser/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

- 1.8 No deviation is permitted in normal case. Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.
- 1.9 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.
- 1.10 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer as interpreted by BHEL in the relevant context. Please refer GCC/SCC for better clarity.
- 1.11 In the event of conflict between requirements of two clauses of this specification/ documents or requirements of different codes/standard specified, the more stringent requirement as per interpretation of owner shall apply.
- 1.12 The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer.
- 1.13 BHEL's Customer's representative shall be given full access to the shop in which the equipment's are being manufactured or tested and all test records shall be made available to him.
- 1.14 Various codes and standards to be used shall be as indicated in various parts of the specification. In case bidder uses any standard other than those indicated in the specification, the onus of establishing equivalence of the same with the specified standards will rest with the bidder and acceptance of the same shall be sole prerogative of customer. The bidder will also arrange for BHEL a copy of the standards in ENGLISH language. The cost of such service will be deemed to have been included by the bidder in the total cost of the package. BHEL will not entertain any additional cost on account of the same.
- 1.15 All text/ numeric in the document / drawings to be generated by the successful bidder will be in English language only.
- 1.16 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.
- 1.17 The inspection and testing of all the equipment shall be as per approved quality Plan/Inspection checklist.



**3X800 MW PATRATU STPP
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SPEC NO. PE-TS-434-550-A001

SECTION: I

SUB-SECTION: IA

REV. NO.-0

Note:

Bidder to note that BHEL reserves the right for drawing/document submission through web based Document Management System. Bidder would be provided access to the DMS for drawing/document approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7.
- Internet speed – 2 mbps (Minimum preferred).
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked.
- Vendor's internal proxy setting should not block DMS application's link (<http://dmsserver.bhelpem.com/Wrench%20Web%20Access/Login.aspx>).



**3X800 MW PATRATU STPP
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SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: IB

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : IB

PROJECT INFORMATION



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

CLAUSE NO.	PROJECT INFORMATION			एन टी पी सी NTPC															
	PATRATU STPS EXPANSION PHASE-I (3X800 MW)																		
1.00.00	BACKGROUND A Memorandum of Agreement (MOA) has been entered on 29.07.2015 amongst Govt. of Jharkhand (GoJ), Jharkhand Urja Vikash Nigam Limited (JUVNL), Jharkhand UrjaUtpadan Nigam Limited (JUUNL), Jharkhand BijliVitaran Nigam Limited (JBVNL) and NTPC Limited to form a Joint Venture Company of NTPC Limited& JBVNL for transfer of Patratu Thermal Power Station (PTPS) located in Ramgarh District of Jharkhand State to the proposed JV Company for Performance Improvement of existing capacity & 4000 MW Capacity expansion of PTPS. Further to signing of JV agreement on 29.07.2015, a Joint Venture Company namely Patratu Vidyut Utpadan Nigam Limited (PVUNL) has been incorporated amongst GoJ, JUVNL, JBVNL and NTPC Ltd. on 15.10.2015. The Performance Improvement of existing capacity and 4000 MW Capacity expansion of Patratu STPS will be implemented by the JV Company (JVC). The configuration of expansion of 4000 MW shall consist of 5 units of 800 MW to be implemented in two phases; Phase-I: 3x800 MW and Phase-II: 2x800 MW. The present proposal is for Patratu STPS Phase-I (3x800 MW). The project is envisaged to be commissioned during XIII Plan period.																		
2.00.00	CAPACITY Patratu STPS Phase-I: 3x800 MW - Present proposal																		
3.00.00	MODE OF OPERATION Base Load																		
4.00.00	LOCATION AND APPROACH																		
4.01.00	Patratu Thermal Power station (PTPS) is located just outside the coal belt of South Karanpura in Ramgarh District of Jharkhand State. The nearest Railway Station is Patratu which is at a distance of about 4 km on Barkakhana-Barwadih Railway line.																		
4.02.00	The latitudes and longitudes of the site are as follows: <table><tr><th>Corner name</th><th>Latitude</th><th>Longitude</th></tr><tr><td>Top Corner</td><td>23° 38 ' 60 '' N</td><td>85° 17' 51.5" E</td></tr><tr><td>Bottom Corner</td><td>23° 38 ' 12.5 '' N</td><td>85° 17' 27" E</td></tr><tr><td>Left Corner</td><td>23° 38 ' 22.5 '' N</td><td>85° 17' 10.6 '' E</td></tr><tr><td>Right Corner</td><td>23° 38 ' 40 '' N</td><td>85° 17' 57 '' E</td></tr></table>				Corner name	Latitude	Longitude	Top Corner	23° 38 ' 60 '' N	85° 17' 51.5" E	Bottom Corner	23° 38 ' 12.5 '' N	85° 17' 27" E	Left Corner	23° 38 ' 22.5 '' N	85° 17' 10.6 '' E	Right Corner	23° 38 ' 40 '' N	85° 17' 57 '' E
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Left Corner	23° 38 ' 22.5 '' N	85° 17' 10.6 '' E																	
Right Corner	23° 38 ' 40 '' N	85° 17' 57 '' E																	
4.03.00	Airport The nearest commercial airport is Ranchi at about 45 km by road.																		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION	PAGE 1 OF 15															

CLAUSE NO.	PROJECT INFORMATION		
5.00.00 6.00.00	A copy of Vicinity plan of the project site is placed at Annexure - I. LAND The total land to be transferred to JV Company is 1859 acres. Out of 1859 acre, about 1234 acres of land has been envisaged for Plant, Ash pond and Land on railway track of the for Phase-I (3x800 MW). The balance 625 acre of land shall be transferred during commencement of Phase-II (2x800 MW). WATER The make-up water for PSTPS is to be met from Patrattu Dam on Nalkari River (capacity 99 MCM i.e. 110 Cusecs). About 52.34 Cusecs of water will be available at 90% dependable monsoon flow after considering evaporation loss. GoJ/JUVNL owns and controls water of Patrattu Dam. GoJ/JUUNL supplies water to PTPS and to the other entities in the vicinity from this water reservoir. JUVNL had entered into agreements with these other entities for supply of water from water reservoir. JUVNL shall revisit these agreements to meet the requirement of water for expansion projects, if required. Make up water requirement of PSTPS, Phase-I (3x800 MW) would be about 27 Cusecs with "Air Cooled Condenser" based power plant. GoJ shall provide the required water from the existing reservoir to the JV Company. The JVC shall be responsible for the water supply arrangement starting at the downstream of intake chamber from where water supply commences for the Station. Ownership of the entire water supply system and related plant and equipment, including the water treatment plant, shall be that of the JVC and after the asset transfer, the JVC shall maintain, take care and use the same. The additional facility including addition of plant, equipment etc. for enhanced requirement (if any) and drawl of water shall be the responsibility of JVC and to be arranged by the JVC at their own cost.		
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-I (3X800 MW)	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO CS-9585-001-02	SUB-SECTION-IB PROJECT INFORMATION	PAGE 2 OF 15



3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: IC

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION: IC

SPECIFIC TECHNICAL REQUIREMENT
OF CUSTOMER



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

FIRE TENDER AND FIRE STATION EQUIPMENTS:

The scope of equipment to be provided under this specification shall cover all the system and major equipments detailed hereunder. However, for all those items for which details are not covered below relevant IS standard (latest revision) may be referred to.

1.0 FIRE WATER TENDER (TYPE-B) FOR FIRE BRIGATE WITH ALL ACCESSORIES

- 1.1 Fire water tender, Type-B for fire brigade use shall be provided as per IS 950. All accessories listed in IS: 950 shall also be provided with above fire water tender.
- 1.2 The design and construction of water tender shall be in accordance with IS: 950.
- 1.3 The appliance shall incorporate a high and low pressure fire pump of minimum capacity 3000 LPM at 07 MPa and 300 LPM at 3.5 MPa capacity in line with IS:950.
- 1.4 The appliance shall carry a water tank of 5000 litres capacity depending upon the type of chassis used. It shall carry an extension ladder and shall be capable of towing trailer pumps.
- 1.5 Gross vehicle weight shall not be less than 25000kg. Maximum speed on level road fully laden, acceleration from standing start through the gear (fully laden) and overall dimension shall be as per IS: 950. The appliance shall be capable of being started from rest on a gradient of 1 to 4.
- 1.6 The choice of material to be used in the construction of the appliance shall be made with a view to combining lightness with strength and durability.
 - (i) Pump casing & low pressure impeller Lead Tin bronze (grade LTB2 of IS:318)
 - (ii) High pressure impeller Phosphor-bronze or stainless steel or aluminum-bronze (IS: 617)
 - (iii) Impeller ring & impeller neck ring Lead tin bronze (grade LTB2 of IS:318)
 - (iv) Pump shaft Stainless steel (Grade 04Cr18Ni10 of IS:6603)
 - (v) Pump Panel Aluminum sheet/ chequered plates (IS: 737) or Mild steel sheet (IS: 513)
- 1.6.1 All parts which form water ways or come into contact with water shall be of stainless steel.
- 1.7 Design and construction of water tender shall be as per IS: 950.
- 1.8 The tank body and baffles shall be of minimum 5mm thick mild steel plates.
- 1.9 The tank shall have a bolted manhole of 450mm diameter (min.) and shall have a gun metal threaded ring and cap. of 300mm dia. Of filling the water tank from the top. The manhole cover shall be made from 5mm thick mild steel

- plates and epoxy coated from inside and outside. A cleaning hole of at least 250mm dia. shall be provided at the bottom.
- 1.10 The design and selection of pump, pump, suction & delivery valves, primer and pipeline & valves etc. shall be in compliance with IS: 950. The pump performance data shall be as per IS: 950.
- 1.11 Hose reels and water/Foam Monitor required shall be as per IS 950.
- 1.12 An electrically operated cable winch of 6 t capacity shall be provided. The winch unit shall be complete with minimum 5.5 HP 12 V dc series wound electric reversible motor for increased pulling power, rope drum, and 27 m heavy duty galvanized EIPS wire rope with replaceable self-locking clevis hook and shall be mounted on the front bumper of the vehicle with suitable strong supports.
- 1.13 Telescopic Light Mast or Inflatable Emergency Lighting System shall also be provided as per IS Code.
- 1.14 Tool-Kit Container:-A specially fitted recessed tray for the normal kit of tools, carried on the appliance, shall be provided.
- 1.15 The stability of the appliance shall be such that when under fully equipped and loaded conditions (but excluding 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 30° from the horizontal.
- 1.16 All parts of the appliance shall be of good workmanship and shall have streamlined finish.
- 1.17 The appliance shall be painted fire red colour conforming to Shade No. 536 of IS 5. The paint shall conform to IS 2932.
- 1.18 Instruction Book, accessories and equipment shall also be provided.

2.0 DRY CHEMICAL POWDER (ABC TYPE) FOR FIRE FIGHTING PURPOSE WITH ALL ACCESSORIES

2.1 Dry Chemical Powder Mono Ammonium Phosphate based shall be, as per IS-14609-1999 (Reaffirmed-2010), IS1 Marked and compatible with all types of foams.

- a) The Dry Chemical Powder shall be Dry Mono Ammonium Phosphate Base Powder with MAP80 and compatible with all types of foam compound including AFFF.
- b) It must be safe for use on live electrical equipment and must not contain any electrically conductive material. The various materials and additives used to produce the extinguishing powder should be non-toxic.
- c) "Apparent Density" should be 0.75 to 1.10 g/ml.
- d) "Moisture content" shall not exceed 0.25%.
- e) "Hygroscopicity" (Percentage gain in Mass due to moisture absorption) shall not exceed 1.5%.
- f) "Water Repellency" shall not exceed 0.75% gram that is 1.5 percent.
- g) "Foam Compatibility" should be all types of foam compound including AFFF cover under IS: 4989 (Part 1, 2, 3)
- h) "Fire Knock Down" test should pass as specified in IS-14609.
- i) "Free Flowing" test should meet the requirement of IS-14609.
- j) "Heat Resistance" test should meet the requirement of IS-14609.

2.2 PACKING:

The powder shall be packed in hermetically sealed moisture proof plastic bags of 10 Kg / 05 Kg to ensure the high performance quality throughout the shelf life of powder.

2.3 ATP CRITERIA

2.3.1 Manufacturer/Suppliers should have the In-House testing facilities of chemical and physical property as per IS: 14609 (Reaffirmed 2010) i.e.

- i) Apparent Density & Caking test
- ii) Hydroscopicity & caking test
- iii) Water Repellency Test

2.3.2 The following performance test will be carried out at the time of inspection, in presence of inspection team.

- i) Fire Resistance Test
- ii) Foam compatibility
- iii) Fire knocking down properties.

2.3.3 All accessories and its appendices shall be as per IS: 10993.

3.0 FOAM FIRE TENDER WITH ALL ACCESSORIES

GENERAL: The foam fire tender including all accessories shall be designed & manufactured as per the following specifications and sound engineering practice.

All the equipments & accessories shall be fixed on the appliance in a compact & neat manner & so placed that each part is easily & readily accessible for use and maintenance. Foam fire tender with aerodynamic design generally confirming to IS 10460.

3.1 CHASSIS

The chassis shall be suitable with minimum 16 Tons Gross vehicle weight (GVW). The engine fitted on the chassis shall comply with the respective emission norms in force at the time of delivery of chassis. The chassis shall be with the following specifications.

1.1	Engine	Diesel engine developing not less than 150 bhp and conforming to prevalent emission norms.
1.2	Clutch	Single plate dry friction type hydraulically actuated.
1.3	Gear	Synchromesh gear box with 6 forward and 1 reverse gear.
1.4	Front Axle	Heavy duty, forged, 'I' beam.
1.5	Rear Axle	Single reduction, hypoid gears, fully floating axle shaft.
1.6	Steering	Integral hydraulic power assisted steering.
1.7	Brakes	Dual circuit fully air braking system with pneumatically operated brakes on rear wheel.
1.8	Suspension	semi- elliptical leaf spring at front and rear with hydraulic double acting shock absorber on front.
1.9	Frame	Ladder type heavy duty frame with riveted 1 bolted cross members.
1.10	Wheels and Tyres	Suitable size available in local market with minimum 16 PR – 7 Nos. (Including spare wheel)
1.11	Fuel Tank	Minimum 160 litres capacity.
1.12	Electrical System	12/24 volts. 120 Ah capacity battery with Alternator.

- 1.13 Cowl Standard cowl duly painted in RED colour with instrument cluster, rear view mirrors, Wiper system, original driver seat, safety belts.
- 1.14 GWW Not less than 16000 Kgs.
- 1.15 safety features Anti-Lock Breaking System (ABS)

3.2 PUMP:

- 3.2.1 The pump shall be centrifugal type, multi pressure, having output capacity of 3000LPM at 8 kg/cm² and 300 LPM at 35 kg/cm² at 3 mtrs suction lift at NTP condition. The low-pressure side will be of single stage and the high-pressure side also with single stage having regenerative type impeller.
- 3.2.2 The pump shall comply to the following performance parameters.
- a) Normal Pressure output : 3000 LPM at 8 kg/cm²
 - b) High pressure output : 300 LPM at 35 kg/cm²
 - c) Maximum pressure in : 14 kg/cm² (shut off pressure)
Normal pressure mode.
 - d) Maximum pressure in : 35 kg/cm²
High pressure mode
 - e) Deep lifting capacity of : 30 cm/sec. max. upto 7 Mtrs in
Pump. 30 sec. at NTP condition.
- 3.2.3 The overall pump shall be constructed from gunmetal. The normal (low) pressure impeller, volute, and impeller wearing shall be made from gunmetal confirming to Gr I of IS: 318 and the regenerative type high pressure impeller shall be of Aluminum, Bronze (AB-2). The pump shaft shall be made from stainless steel confirming to IS: 6603. The bearing housing will be made of C.I. and all the studs and bolts coming in contact with water shall be of stainless steel. The bearings used in the pump shall be of reputed make.
- 3.2.4 The normal and high-pressure impeller shall be mounted on a single shaft and normal, (low) pressure impeller shall be dynamically balanced.
- 3.2.5 The pump shall be provided with self-adjusting mechanical carbon seal with interface plate. The mechanical seal assembly shall with stand dry running of pump upto 2 minutes without any damages.
- 3.2.6 The pump shall be provided with an inbuilt filter of easily removable type, which shall filter the water before entering into the high-pressure stage impeller.
- 3.2.7 Operation of low pressure to high pressure or vice-a-versa shall be possible by actuation of single lever.
- 3.2.8 The pump shall have facility to operate low pressure and high-pressure mode simultaneously or individually. While high pressure mode is in operation and

delivering 300 LPM at 35 kg/cm², the pressure in low pressure side shall not exceed 8.5 kg/cm².

- 3.2.9 The pump shall be provided in built (integrated in the pump outlet manifold) Pressure Relief Valve (PRV) which shall operate automatically and shall not allow the high-pressure to increase beyond 40 kgs/cm².
- 3.2.10 The size of high-pressure outlet shall be of 25 mm connected to high-pressure hose reel.
- 3.2.11 The pump shall be provided with one suction inlet of 125 mm dia. having round threads confirming to IS:902 and three numbers of 63 mm delivery outlets having screw down type valves fitted with instantaneous couplings as per IS: 903. The delivery valve spindle sealing shall not be of gland type. The high-pressure outlet shall not be less than 25 mm and shall either be flange on screw type.
- 3.2.12 The efficiency of the pump shall be such that the power and RPM required shall not be more than available with the engine.
- 3.2.13 The pump housing shall have provision to connect to internal cooling system.
- 3.2.14 The pump shall be mounted at the rear of the vehicle connected to P.T.O. by propeller shafts and universal and slip joints with sufficient number of bearing supports. All the propeller shafts shall be dynamically balanced and shall be procured from the OEM (the chassis manufacturer).
- 3.2.15 Pump Primer:-The priming system shall be horizontal Reciprocating type or water ring type. The priming shall be fully automatic in operation and shall not require any operation whatever from the pump operator other than throttling the engine to the required RPM. The primer shall get automatically disengaged once the pressure is registered at the pump. The primer shall be capable of lifting the water in 30 seconds from the depth of 7 mtrs. (up to pump inlet) at NTP condition. The pump shall attain a dry vacuum of 620 mm of Hg. The primer shall disengage automatically at a pump pressure of 1.5 to 2.0 kg/cm².
- 3.2.16 In addition Exhaust ejector type primer capable of lifting water from 7 mtrs within 30seconds shall also be provided.

3.3 PUMPTEST:

The pump fitted on the vehicle shall be subjected to various tests as detailed below:

- 3.3.1 The pump with its all fitments will be subjected to Hydrostatic testing on a pressure of 21 kgs./cm².

- 3.3.2 The pump shall be run dry for a period of minimum two minutes at 2000 RPM to check the integrity of mechanical carbon seal. After this test there shall not be any leakage of water through carbon seal.
- 3.3.3 The pump performance test will be carried out by running the pump at constant RPM at 2600 and measuring the discharge at various pressure.
- 3.3.4 The pump will be subjected to Endurance test for a period of four hours continuous running. The first Three hours the pump shall deliver rated output of 3000 LPM at 8 kg/cm² and next one hour will be 300 LPM at 35 kg/cm².
- 3.3.5 During the endurance test the water shall not be replenished in the cooling system and the temperature of the cooling water and engine oil should not exceed the manufacturer's standard recommendations for the continuous operation and engine should not show any sign of stresses.
- 3.3.6 Foam induction test to check the calibration of metering valve.
- 3.3.7 Foam production test with monitor and side lines for foam quality.

3.4 POWER TAKE OFF:

The P.T.O shall be Heavy duty type with suitable ratio capable of transmitting the full torque of the engine in first gear. The lever for engaging the P.T.O. shall be provided in the Driver's cabin with proper locking arrangement. The PTO shall be mounted on heavy duty cross members and support brackets between the longitudinal members of the chassis frame. Means shall be provided to check the oil level in the PTO and suitable drain plug shall be provided at the bottom. A cooling coil made of copper tubes shall be provided inside the PTO at the bottom to prevent the oil of the PTO from heating.

3.5 WATER TANK -

The capacity shall not be less than 5000 liters. The tank body and baffles shall be of minimum 5 mm thick MS plates confirming to IS: 2062. The sides of the tank shall have Die Pressed reinforced webs for better strength and rigidity. The design of the tank should be such that the complete width of the vehicle is utilized and the height of the tank is to be kept as low as possible for better stability.

- 3.5.1 A tank of required capacity constructed out of mild steel treated for anticorrosion shall be suitably mounted on the chassis in a manner keeping in view the proper load distribution on the axles.
- 3.5.2 A full length runner from behind the driver cabin till end of chassis frame shall be provided and made out of M.S. Channel of 100 x 50 x 5 mm suitably fixed to the chassis, frame with 6mm thick M.S. plate and bolted to chassis frame

- wherever holes are available in the chassis frame and also with 518" 'U' bolts and nuts shall be nylock nuts only.
- 3.5.3 The tank shall be suitably baffled with minimum 2 nos. of baffles fitted longitudinally and 21 nos. baffles fitted transversely to prevent surge when the vehicle is braking, cornering or accelerating.
 - 3.5.4 The baffles shall be arranged in a manner to facilitate the passage of a man throughout the tank for cleaning purpose.
 - 3.5.5 The tank shall be mounted on minimum three cross members to counter act the stresses caused by chassis flexion and shall be so secured that it can be easily removed. The water tank shall be provided with six chairs, three on either side for mounting the tank on the runner and chassis frame.
 - 3.5.6 The water tank shall be fixed to the chassis frame and runner with 'U' clamps and aluminum packing block and self-locking nuts.
 - 3.5.7 Suitable eyes shall be provided on the shell of the tank to enable it to be lifted from the vehicle for repairs / replacement as and when required
 - 3.5.8 The tank shall be fitted with a 50 mm bore overflow pipe. Two 63 mm instantaneous hydrant connection, incorporating a strainer with NRV, shall be provided close to the pump control panel for filling the tank through 75 mm bore pipe. Minimum 125 mm bore pipe line shall be taken from the tank to the suction inlet of the pump incorporating minimum 125 mm internal dia. butterfly type valve. Drain valve shall be provided at the bottom of the tank.
 - 3.5.9 The MS plates used for the tank shall be Zinc Plated or galvanized and shall be given adequate anti-corrosive treatment of epoxy treatment consisting of one coat of primer with two coats of finish after preparing the surface by sand or shot blasting from inside and outside after fabrication if it is not galvanized. The open end of the overflow pipe should be taken down to a point well below the chassis without affecting the effective ground clearance when fully loaded and shall discharge away from the wheels.
 - 3.5.10 Visual -level gauge of the glass / acrylic tube shall be provided at the control panel calibrated 1/4, 1/2, 3/4 and full (preferably calibrated in litres).
 - 3.5.11 The tank shall have a bolted manhole of 60 cm dia minimum and should have a gunmetal threaded ring and gun metal cap of 30 cm dia for filling the water tank from the top. The manhole cover shall be made from 5 mm thick M.S. plate and epoxy coated from inside and outside. A cleaning hole of at least 25 cm dia shall also be provided at the bottom.
 - 3.5.12 The tank shall be connected with the pump and hose reel and valve(s) shall be provided in such a way that any of the following operations are possible:
 - a) Hydrant -tank,

- b) Hydrant - reel,
- c) Tank - pump - high and low pressure hose reels,
- d) Hydrant - pump - low pressure hose reel, and
- e) Tank - Pump - Monitor (Foam water)

3.6 FOAM TANK:

The foam tank of 500 Ltrs. capacity shall be fabricated out of min. 4mm thick SS plates (304) for bottom & 3mm plates for the sides & baffles. The tank shall be suitably baffled. In addition a 2% of expansion space be made in the tank, over and above foam compound capacity.

- 3.6.1 The cleaning hole of 250mm & drain pipe with a ball valve & plug incorporated in it to be provided. The filler orifice of 150mm dia. with a removable strainer (Material-Resistant to the attack of foam compound) will be provided. The filler cap shall be clearly marked "FOAM".
- 3.6.2 The design of the tank shall incorporate a removable sump fitted with a drain valve. The foam compound draw off tube shall be positioned in the centre of the sump in such a manner that foreign matter or sludge will not pass into the compound line. The draw off tube shall be fitted with a gauge strainer of suitable material, mesh, size & adequate straining area.
- 3.6.3 Means shall be provided for automatic venting of the foam tank when the foam is being produced or the tank is being filled. The device employed shall be as simple as possible & shall not get clogged easily during normal use of the Appliance.
- 3.6.4 Inspection hole of 450 mm with cover will be provided. Means shall be provided for automatic venting of the foam compound tank when the foam compound is drawn from it or when the tank is being filled.
- 3.6.5 A foam solution transfer pump Rotary type with necessary piping will be provided. Provision will be made for drawing foam compound direct from an external source through a pick up tube while producing foam.
- 3.6.6 The draw off tube will be connected to the foam proportioner with NRV in addition to the main control valve. The draw off pipe will be fitted with removable strainer.
- 3.6.7 Visual level gauge of the glass/acrylic tube shall be provided at the control panel calibrated 114, 112, 314 and full (preferably calibrated in litres).

3.7 FOAM PROPORTIONER:

Manually operated selector type around the pump foam proportioning system shall be provided at the rear of the pump. The Pump proportioner shall induct foam & water proportionately to feed the foam monitor and hand lines at rate

of 6 % plus/minus 0.5% foam. The proportioner shall be calibrated to ensure the correct intake of air foam liquid to foam equipment. This shall have five different position of selector valve i.e.0, 1, 2, 3 & 4.

3.8 DELIVERY OUTLETS:

There shall be 2 Nos. delivery outlets having standard GM inst. female coupling with screw down type delivery valves with blank caps. It should have twist type lugs made of gun metal.

3.9 HIGH PRESSURE HOSE REEL:

Two high pressure hose reel to facilitate operation of the high pressure section of the Fire Pump shall be provided and mounted so as to be accessible for use from either side of the appliance. The hose should be prevented from kinking. The hose shall be light weight PVC nylon braided hose or equivalent and the working pressure of hose will not be less than 40 Kglcm².

The high pressure Hose reels will hold not less than 30 M of hose in one length, terminating in High pressure fog/jet trigger type gun connected by quick connect couplings. The fog gun shall be made of Aluminium alloy or stainless steel (SS 304).

The inlet connection shall have a leak proof rotating type hose connector. The gun shall be of constant flow type with a discharge capacity of 150 LPM approximately. Provision shall be made in the gun controls to achieve combat mode (straight jet) or a fo9 shield in split second. The gun shall have the ability to work on pressure from 20kg/cm to 40kg/cm² without affecting discharge pattern. The weight of the gun assembly shall not be more than 3 kg.

3.10 WATER/ FOAM MONITOR:

One water cum foam monitor will be provided on the top at suitable location, with cap. of 3000 LPM of water @8.5 Kg/cm². The monitor will be capable of traversing through 360° in horizontal plane, +75deg & -15deg in vertical plane with discharge range of 70 M (water). The detailed specification of the Monitor is as under:

- Size 100 mm
- Body Barrel of SS, GM swivel joint for horizontal & Vertical motion manual operation
- Rotation 360'
- Elevation 90' (+75' -15')

3.10.1 CONSTRUCTION DETAILS

- Working pressure :-7 to 10 kg/cm'.
- Painting :- As per IS:5 (2 coats of red enamel paint)

3.10.2 SELF INDUCTION NOZZLE

- Material of construction Aluminium alloy to IS:617 or
GM LTB Gr.2 of IS: 318.
- Type of Foam used AFF Foam
- Discharge capacity 3000 LPM
- Throw horizontal Water: min. 70 mtrs. , Foam: min. 65 mtrs.
- Foam Expansion Min. 1:6
- Fog (curtain) 160°
- K Factor 100.

Semi fog for tank cooling, dissipation of vapour & gases at a distance of 10m & above.

3.11 PIPELINES AND VALVES

- 3.11.1 All pipelines and pipe fittings shall be of Stainless steel (SS 304) and all valves upto 50mm size shall be 3 piece design SS 304 ball valves. All valves above 50mm size shall be standard butterfly valves.
- 3.11.2 All piping shall be sized so as to have minimum pressure drop and achieve the required pressure and flow at various locations.
- 3.11.3 All piping shall be designed for 10% over the maximum pressures encountered in the pipe.
- 3.11.4 The piping shall be flanged for ease of maintenance. However, flange joints shall be kept to minimum.
- 3.11.5 All lines shall be hydraulically tested at 1.5 times of the design pressure and pressure shall be held for two hours. In no case the lines shall be tested below 25 kg/sq. cm. (g).
- 3.11.6 All lines shall be suitably supported so as to provide rigidity and avoid vibrations.
- 3.11.7 All lines less than 50 mm NB size can be socket welded to matching rating fittings.
- 3.11.8 All lines above 50mm NB size shall be butts welded with full penetration welds.
- 3.11.9 All bolts, nuts and washers used shall be of SS-304.
- 3.11.10 **COOLING SYSTEM:**

An indirect cooling system of open circuit type heat exchanger shall be provided for cooling the radiator water & Engine. The heat exchanger tank shall be made from minimum 1.22 mm thick brass sheets and the coil in the coolant tank shall be of copper for effective cooling. The design of the heat exchanger shall be such that the temperature of the engine shall not exceed the operating temperature specified by the chassis manufacturer when the vehicle is being used in stationary conditions

3.12 CONTROL PANEL

3.12.1 Adequately illuminated control panel shall be provided near the pump.

3.12.2 The control panel(s) shall include the following:

- a) Throttle control for engine;
- b) Pressure gauge - 0 to 17.5 kgf/cm²; for low pressure (glycerin filled)
Pressure gauge - 0 to 50 kgf/cm²; for high pressure (glycerin filled)
- c) Compound gauge (glycerin filled) calibrated as under:
Vacuum - 0 to 75 cm Hg, preferably in black;
Pressure - 0 to 15 kgf/cm², preferably in black;
- d) Primer control for exhaust primer
- e) Temperature gauge and glow lamp for lubricating system
- f) Cooling water circuit control.
- g) Water tank valve
- h) Foam tank valve
- i) Foam proportioning valve.
- j) Auxiliary foam connection with valve.
- k) Monitor valve
- l) Delivery valves.
- m) Suction inlet.
- n) Hose reel valves.
- o) Water level indicator
- p) Foam level indicator

3.13 BODY WORK AND STOWAGE

3.13.1 Enclosed accommodation for six persons shall be provided in the driver cab-cum-crew compartment including the driver and in-charge of the crew. Both the seats should be independent. The driver's seat should be adjustable and comfortable. The rear compartment of driver's cabin should have one removable seat for full width of cab for 5 (five) crewmembers. The cab floor should be covered with 3 mm thick Aluminium chequered plate rigidly fixed to the under frame cross members by means of nuts and bolts or riveting except the mudguard arches which shall be covered with 1.60 mm Aluminium chequered plates. Trap doors for topping up oil etc wherever necessary shall be provided.

3.13.2 Grand type light should be provided in the driver's cabin dwell vision and external rear view mirrors should be fitted to the cab.

- 3.13.3 The driver cum crew cabin shall be provided with full four doors, one for driver, one for officer and two at the crew compartment. The doors shall be generously sized for easy embarking/disembarking of crew members. All the doors shall be fitted on the super structural members, each hung upon three invisible coach type M.S. stout hinges and fitted with best. Quality handles.
- 3.13.4 The door handle on outside of driver seat shall have a locking arrangement. Other doors shall be lockable from inside. In addition to the doors locks, aluminum tower bolt shall be provided for all the doors from inside Adequate grab rails shall be provided for easily boarding and alighting from the appliance.
- 3.13.5 The windscreen glass shall be provided in the two halves and shall be semi curved type. Each glass shall be fitted in E.P.D.M. rubber beading. The glasses shall be 5 mm thick toughened safety glass.
- 3.13.6 The rubber beading used for fitting glasses and window frame shall be E.P.D.M. rubber.
- 3.13.7 The driver seat shall be adjustable type vertically, forward and backward. The officer seat shall be fixed type. Both the seats shall be rigidly fixed to the flooring by means of nuts and bolts.
- 3.13.8 The seat cushion shall be of latex foam rubber 75 mm thick upholstered in good quality foam leather cloth. The back seat shall be of latex foam rubber 50 mm thick upholstered in good quality foam leather cloth.
- 3.13.9 Below the crew seat, two lockers shall be provided One for battery box and another for keeping accessories. The extra length of battery cable if required shall be provided
- 3.13.10 The crew seat shall be rigidly fixed to floor by means of nuts and bolts, running full width of the vehicle suitable for sitting five fireman, covered with 75 mm x 50 mm cushion latex foam rubber upholstered in good quality foam leather of approved shade.
- 3.13.11 The rear body shall be fabricated in continuation and in line. The under frame cross members shall be fabricated from the rolled M.S. channel of 100 x 50 x 5 mm size.
- 3.13.12 The M.S. runner of 100 x 50 x 5 mm size shall be provided over the full length of the chassis member for the uniform distribution of load over the chassis.
- 3.13.13 Each cross members shall be secured to the chassis frame by 16 mm dia 'U' Bolts with aluminum packing block and self-locking unit.

- 3.13.14 Balata packing of thickness 6 mm shall be provided in between the chassis frame and across members.
- 3.13.15 The structure frame work shall be of welded constructions and made from 2mm thick MS pressed sections and square tubes. The Angles and channels used shall be of min. 3mm thickness. The complete structure material shall be treated for anti-corrosion by Zinc Plating. The plating thickness shall not be less than 20 microns. Two coats of Epoxy paint shall be applied to the completely welded structure. The structure shall be so designed so as to avoid any vibration I rattling I deformation in the intended usage of the vehicle.
- 3.13.16 The details of super structure are as follows:
- a. Under frame cross members :100 x 50 x 5 mm (Min.)
 - b. Floor longitudinal members :50 x 50x 6 mm (Min.)
- The cab and lockers should be of composite construction with sufficient rigidity and reinforcement and shall be kept as light as possible.
 - The interior paneling shall be done from 1.22mm thick aluminium sheets & the exterior paneling shall be done from 1.60mm thick aluminium sheets.
 - The roof on the cabin of the vehicle shall be covered with min. 1.60mm thick aluminium chequered plates. All the lockers sides & complete rear of the vehicle shall be covered with min. 1.22mm thick aluminium chequered plates. The complete rear deck and all lockers floors and the rear foot boards shall be covered with minimum 3mm thick aluminium chequered plate.
 - Sufficient number of Lockers with suitable shelves, partitions and roll in roll out type drawers It rays shall be provided on both sides of the vehicle for secure stowage of all equipment given in annexure. One through and through locker shall be provided immediately behind the drivers cab. All space available below the chassis frame level shall be utilized by providing lockers with proper doors. These doors shall be fitted with suitable chains and hooks on both sides so that the same can be used as foot board.
 - All lockers shall be provided with internal automatic lighting arrangement with the master switch in the cab.
 - All lockers above chassis floor shall be covered with Aluminium roller shutters. The roller shutters shall be made from extruded aluminium sections with suitable roller, spring, guide channels etc. All aluminium sections used shall be properly anodized.
 - The Roller shutters shall be rolled inwards underneath the roof giving unobstructed access to the equipment lockers and the firefighting material.
 - These roller shutters should open in every position of the vehicle even in rough terrain. Guide rails shall support the shutters over

entire length on both sides to make them absolutely torsion free. The roller shutters should have a sturdy lock, preventing accidental opening during movement of vehicle.

- Roller shutters shall be made of hollow rectangular shaped aluminium links which shall be inter connected with rubber /plastic1 PVC profiles sealing the roller shutter watertight when closed. These roller shutters should be durable, maintenance free, weather and corrosion resistant.
- Suitable storage space shall be provided to store four 2.5-m lengths of suction hoses with couplings at convenient location
- SPECIAL PROVISION FOR STOWAGE OF EQUIPMENTS: For all hose fittings like branch pipes etc. quick release type couplings are provided which enables the operator to locate the desired equipment instantly and thereby save valuable time at the time of fire. These couplings also ensure that none of the items damage the internal paneling & thereby increase the life of the vehicle. Suitable clamps, brackets, holders etc. are provided for all other items`

3.14. MISCELLANEOUS

- a. A suitable bumper shall be provided at the rear rigidly fixed to the super structural members by means of nuts and bolts which is supplied along with the chassis.
- b. Two cat ladders made out of S.S. round or square pipe of 25mm dia shall be provided.
- c. 2 nos of 25mm dia aluminum pipe railing with sufficient number of aluminum double socket brackets shall be provided to the rear body over the deck.
- d. A heavy duty Towing hook shall be provided and fitted the rear bumper by means of nuts and bolts.
- e. Quick removable type wire mesh guard made from 25x25mm size MS wire mesh of 1.60 mm covered in MS angle frame shall be provided to all the glasses of driver-cum crew cabin.
- f. CABLE WINCH. An electrically operated cable winch of having capacity of not less than 6.5 tons pulling capacity (single layer) should be provided and mounted in the front of the vehicle. The winch unit should be complete with minimum 5.5 hp, 12v DC series wound electric reversible motor for increased pulling power. The motor and solenoids shall be grounded to the battery. It shall have an automatic load holding brake system for more strength. For free spooling the clutch design shall be easy to use type with spring loaded pull and rotate system. The gear system should be 3 stage planetary type for faster line speed and the gear reduction ratio shall

not be more than 300:1, the rope drum shall not be of more than 8 inches long having 3.5 inches dia and shall be supplied with minimum, 90 ft heavy duty galvanized EIPS wire rope with replaceable self-locking clevis hook and would be mounted on the front bumper of the vehicle with suitable strong supports and a 4 way roller fairlead. The Weight of the winch shall not be more than 55 kgs. Wireless remote for 12 V system or wired remote for 24 v system shall also be supplied with the unit.

g. **TELESCOPIC LIGHT MAST**

A Pneumatic telescopic should be mounted on the vehicle. It should be manufactured from Anodized aluminium 6063 T6 alloy tubes and have a max diameter of 115 mm diameter on its base and complete with a foot plate dia. 150 with up to six fixing holes for bolts. The temperature range shall be from -40°C up to 60°C, with anti-twist lock, with safety valve and drainage outlet valve.

The telescopic mast should be extremely strong and designed with a minimum of 6 sections and equipped with a special plastic locking system placed on the ring between the first and the second section meant to eliminate any backlash between all the sections, once the mast is retracted. The mast should be equipped with an internal spiraled electrical cable with 9 wires with a section each of 1.5 mm² and 13 wires with a section each of 0.22 mm², the group of 13 wires should be screened. Each section of the mast should have a thickness of not less than 3.5 mm². For a better movement of the internal cable, the last three internal pistons should be threaded to the corresponding sections. The maximum height of the mast when deployed should be minimum 6000 mm (from the ground), the retracted height should be of maximum 1.900 mm: both heights are meant with the integrated tilt & turn unit. The working pressure should not be less than 2.5 bar and more than 3.5 bar. An electro-pneumatic group of valves must be supplied and mounted at the bottom of the mast with the possibility to regulate the extension speed and the retraction speed separately.

The light mast should have 4 x 1000 Watt Halogen flood light projectors in weatherproof casing. The floodlights on the top should have a minimum electrical rotation of 360° and a tilt of 310°, by means of a tilt and turn unit with an ABS cover for inspection.

A 5 KVA portable Petrol engine operated Gen Set shall be installed at a suitable location in the rear locker and necessary wiring /connections shall be given to the light mast.

3.15 ELECTRICAL SYSTEM:

- 3.15.1 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.
- 3.15.2 The suitable size wire shall be selected for different circuits considering the current consumption for that circuit.
- 3.15.3 Electrical siren of 1.6 Kms range 12/24 volts D.C. shall be provided and fitted at suitable place with two controlling push buttons on one officer side and another at Driver side.
- 3.15.4 Two rotating beacon lights with Amber lens shall be provided over the top of driver's cabin.
- 3.15.5 The other lights, pump cabin light, locker lights shall be of approved make.
- 3.15.6 All the controlling switches of lights on dashboard shall be approved make.
- 3.15.7 Two fog lamps of approved make shall be provided and fitted on front-bumper with controlling switch on dashboard.
- 3.15.8 New wiper motor assembly of 17 watts with new blades and arms shall be provided if not provided with the chassis. The location of wiper motor shall be such that it shall be easily accessible for repairs.
- 3.15.9 Adjustable search light assembly shall be provided at a convenient position on the top of rear body deck with 30 mtrs. Cable drum with Rexene cover.
- 3.15.10 Hooter cum P.A. system shall be provided with a speaker mounted on the top of Driver's cabin with Rexene cover. The output shall be 25 watts.
- 3.15.11 Adjustable spot light, mounted in a convenient position to give flood or beam 04light at the rear of driver cabin shall be provided.

3.16 PAINTING:

- 3.16.1 The complete structure material shall be treated for anti-corrosion by Zinc Plating. The plating thickness shall not be less than 20 microns. Two coats of Epoxy paint shall be applied to the completely welded structure.
- 3.16.2 The complete external and internal aluminum paneling of driver cum crew cabin and rear body shall be painted with two coats of Zinc Chromate paint.
- 3.16.3 The complete exterior of the vehicle shall be painted with two finish coats of "POST OFFICE RED" polyurethane paint of reputed make.
- 3.16.4 The internal painting of cabin lockers etc. shall be done with two coats of Grey Synthetic enamel paint of reputed make.

3.16.5 The name of the fire service/organization shall be painted on both sides of vehicle in letter of suitable size in golden yellow paint with black colour shading.

3.16.6 The "EMBLEM" of the department shall be painted on both sides of vehicle in natural colours at suitable place.

3.17 LADDER WITH GALLOWS:

An Aluminium extension ladder of trussed type 10.5 mtrs height shall be provided with the vehicle and mounted on suitable ladder gallows. The design of the gallows shall be such that the ladder can be released without difficulty from a reasonably accessible position. Means shall be provided for locking the ladder when stowed

3.18 B.A. SET BRACKETS:

B.A. set brackets for fixing with its fitments shall be provided just behind the crew seat. The mounting of B.A. set bracket shall be such that, it can allow fireman to wear B.A. set while vehicle is approaching to fire call. Proper padding and harnessing arrangement shall be made in the bracket to avoid damages to the critical parts of the BA set.

3.19 ACCESSORIES:

The following accessories shall be provided.

3.19.1 Fire Bell: (Bell Carillon): One Gun metal fire bell of 250 mm size confirming to IS: 1928 shall be mounted externally on the top of crew compartment and shall be operated within the crew compartment by firemen in seating position.

3.19.2 Six aluminum hooks for keeping the uniform clothing shall be provided in crew compartment.

3.20 WIRELESS SET BOX:

Box made from 2 mm gauge aluminum sheet with lid shall be provided just behind the officer seat with 13mm wooden plank for fitting the wireless set bracket. The design and mounting will be shown at the time of fabrication work.

3.21 WORKMANSHIP & FINISH: The GVW of appliance shall not cross the chassis mfgs. Specification with all equipment & Crew. The weight distribution diagram should be submitted for approval. The entire appliance will be painted fire red on the outside. The user name will be written on both-side with yellow colour. Before final painting of Fire Tender two coats of anti corrosion and primer coat will be applied.

The appliance will clearly have the following markings at suitable locations.

- Manufacturers name and Trade mark.
- Engine and Chassis No.
- Pump No. and capacity of the pump.
- Capacity of Water tank, Foam tank
- All instruments control will be identified with nameplates

3.22 ACCEPTANCE TESTS:

The following acceptance tests shall be carried out to the complete satisfaction of the user. The design of vehicle to be such that it shall not affect the Chassis Characteristic as specified by the chassis manufacturer such as speed, turning circle, acceleration, braking distance etc.

The stability of the appliance shall be such that when under fully equipped & laden condition, if the surface on which the appliance stands is tilted to either side, the point at which over turning occurs is not passed at an angle of 270 from horizontal. This test should be carried out at the vendor factory in front of all the inspecting officers.

- i) The pump with its all fitments will be subjected to Hydrostatic testing on a pressure of 21 kgs./cm²
- ii) The pump shall be run dry for a period of minimum two minutes at 2000 RPM to check the integrity of mechanical carbon seal. After this test there shall not be any leakage of water through carbon seal.
- iii) The pump will be subjected to Endurance test for a period of Four hours continuous running. The first Three hours the pump shall deliver rated output of 3000 LPM at 8 kg/cm² and next one hour will be 300 LPM at 35 kg/cm².
- iv) During the endurance test the water shall not be replenished in the cooling system and the temperature of the cooling water and engine oil should not exceed the manufacturer's standard recommendations for the continuous operation and engine should not show any sign of stresses.
- v) The other tests shall be as per detailed performance parameters given for chassis, superstructure, firefighting system which include monitor output & throw, foam induction & expansion, load etc.
- vi) Accessories shall also be subjected to relevant tests as per the specification indicated above.
- vii) All accessories and its appendices shall be as per IS: 10460. Minimum requirements of items & their quantities of accessories are specified in annexure-A.

ANNEXURE “A”**LIST OF ACCESSORIES**

S. No.	ITEM	QUANTITY
1.	125 mm rubber suction hose in 2.5 mtrs length with 125 mm suction hose GM couplings as per IS : 3549	4 Nos.
2.	Suction collecting head – 125mm suction inlet, GM two way as per IS : 904	1 No.
3.	Suction strainer for 125 mm suction hose-brass as per IS : 907	1 No.
4.	Dividing breeching with control 63mm instantaneous pattern- GM as per IS : 5131	1 No.
5.	Collecting breeching 63mm instantaneous pattern-GM as per IS : 905	1 No.
6.	Suction wrenches for 125mm suction hose couplings as per IS : 4643	2 Nos.
7.	Combined key for hydrant cover and lower valve as per IS : 910	2 Nos.
8.	Hose straps as per IS : 5612 : Part I	6 Nos.
9.	Branch with revolving head, GM, 63mm size as per IS : 906	1 No.
10.	Torch electric with 4 cell water proof	2 Nos.
11.	Flame proof torch as per approved specs.	2 Nos.
12.	Foam branch-FB5X type with pick up tube, GM as per IS : 2097	2 Nos.
13.	Rope polyamide 32mm dia for lowering line of 30 mtr long with sealed ends	1 No.
14.	Rope polyamide 12 mm dia for guy line of 30 mtr long with sealed ends	1 No.
15.	Rope polyamide 24mm dia for long line of 30 mtr long with sealed ends	1 No.
16.	Rope polyamide 22mm dia for short line of 20 mtr long with sealed ends	1 No.
17.	Hose bandages as per IS : 5612 Part 2	4 Nos.
18.	Hose slings as per existing Indian Standards	2 Nos.

19.	Rubber gloves as per IS : 4770 for 5000 Volts	4 Pairs
20.	Leather gloves IS : 6994 Part 1	2 Pairs
21.	Canvas gloves with anti skid palm	2 Pairs
22.	Axe large as per IS : 963	2 Nos.
23.	Pick axe as per IS : 703	1 No.
24.	Fireman Axe as per IS: 926	1 No.
25.	Spade with wooden handle	1 No.
26.	Crow bar of 6ft long 25mm dia as per IS : 704	2 Nos.
27.	Spanner adjustable, 30cm long	1 No.
28.	Jack Hydraulic for 20 ton capacity with handle	1 No.
29.	Oil feeder standard capacity	1 No.
30.	Funnel 300mm dia made from GI 18SWG sheet	1 No.
31.	Hammer sledge with wooden handle – 10 kg	1 No.
32.	Hammer sledge with wooden handle – 5 kg	1 No.
33.	Suction adaptor GM 125mm female x 63mm male with lugs	1 No.
34.	Adaptor 63mm male to 38mm female GM	2 Nos.
35.	Adaptor 63mm female to 63 mm female GM	1 No.
36.	Tool kit (fixed spanners, ring spanners, screw drivers & Plier insulated)	1 No.
37.	Belt hook	1 No.
38.	Selectable flow nozzle, made of aluminium alloy (hard anodized), light weight and easy handling having 63 mm size male instantaneous inlet. Nozzle shall have rubber moulded bumper and pistol grip handle, ball valve with shut off handle. Selectable flow capacity nozzle flow rate settings of approx. 200-250-350-475-600 lpm at 7 kg/cm ² , with good range hollow jet and dense fog in spray position and having an arrangement of low and medium expansion foam attachment.	3 Nos.
39.	Branch pipe with 19 mm nozzle GM 63mm male inlet as per IS : 903	1 No.
40.	Sand bag canvas, round shape, 300mm dia, 450mm length with cotton rope for closing mouth	2 Nos.
41.	Cap hydrant spindle	1 No.
42.	Cap hydrant spindle new pattern	1 No.
43.	Chisel cold	2 Nos.
44.	Tyre Lever	1 No.
45.	Bolt cutter-600mm long	1 No.

46.	Hammer ball type-500 gms	1 No.
47.	Hook ceiling (preventer) with 3mtr. Long wooden handle	1 No.
48.	Hook anchor	1 No.
49.	Knife salvage	1 No.
50.	Plier cutting	1 No.
51.	Plier insulated	1 No.
52.	Petrol Chain saw machine, 600 mm guide bar length, with spare chain	1 No.
53.	Rake three prong	1 No.
54.	Hose ramp (rubber) as per IS 30 ton capacity suitable for 2 lines	4 Nos.
55.	Saw carpenter-300 mm	1 No.
56.	Door breaker manual	1 No.
57.	Shovel with handle	1 No.
58.	Nozzle spanner as per IS specification	1 No.
59.	Strainer wicker with canvas hood	1 No.
60.	BA Set as per BIS/EN specification	2 Nos.
61.	Hand held forcible entry tool	1 No.
62.	Delivery hose 63 mm dia confirming to IS: 636Type A in 30 mtrs length with Gun Metal male and female couplings. The hose and the couplings should be ISI marked	10 Nos.
63.	Fire proximity Suits	2 Nos.
64.	First Aid Box for 10 person	1 No.
65.	Fog nozzle as per IS 952 with extension applicator and fog head	1 No.

4.0 FIRE JEEP WITH TRAILER PUMPS AND WITH ALL ACCESSORIES

Fire Jeep with Trailer pumps and with all accessories shall be provided as per IS: 944. The appendices indicated in the IS code shall also be provided.

4.1 Scope

This standard lays down the requirements regarding material, design and construction, workmanship and finish, and performance tests of 1800-1/min trailer pump for fire brigade use.

4.2 The trailer pump shall consist of a pump of capacity of not less than 1800-1/min at 0.7 MN/m² (7.0 kgf/cm²) pressure, driven by an internal combustion engine. The combined unit being permanently mounted on a trailer with the pump at the rear, and shall be capable of being towed to safety by a standard vehicle.

4.3 Overall Dimension: The overall length of the whole unit shall not exceed 3-3m, the height shall not exceed 1.6 m (with spot light) and the wheel track shall not exceed 1-4 m.

4.4 The design & construction and all material used for the trailer pumps shall fulfil the requirements of IS: 944. Also the accessories mentioned in IS code shall be as per IS code 944.

4.5 The pump shall be of the centrifugal type and so designed as to afford easy access to the impeller. The pump shall be tested for its performance duties stipulated in IS: 944.

4.6 The Trailer frame shall incorporate two semi-elliptic spring and axle. The trailer pumps, Towing eye and Draw Bar shall fulfil the requirements of IS code 944.

4.7 The Instruction book, accessories and equipment etc. and marking, on the Trailer pumps shall be as per IS:-944

5.0 FIRE SUITS

Fire suit shall be provided to as per relevant IS code along with accessories.

Specification of Fire Entry Suit are detailed as under:

- 5.1 Coat with hood should be sewed fastly together. The hood should have visor with golden reflexive and un-sweaty modification, double protective glass, double fastening metal zip and Velcro being located in to the area of hood.
- 5.2 The coat should have a provision of wearing a breathing apparatus.
- 5.3 The trousers should be having regular braces, the belt for marking the waist slimmer in the lower parts of trousers, a metal zip for more comfortable putting up the shoes on the feet.
- 5.4 Leggings: - Steel in lay on the in step, the lower steel support for fasting the shoes and protecting against getting up the leggings.
- 5.5 Gloves: - 05 fingers with membrane against liquid at the wrist with knitting, to use over where over the gloves for protection against heat.
- 5.6 Shoes & Overcoat: - The shoes should have back side double fasting, metal zip and Velcro fasting belt for shoe inside the aluminised overcoat. The entire fire entry suit should be provided with gloves, leggings, shoes overcoat and breathing apparatus pouch. The suit shall have enough space to accommodate inside a self-contained breathing apparatus set in complete protected manner. The weight of total suit should not be more than 08Kgs.

The entire suit should be certified as per EN-1486 standards and should archive level III with the weight not exceeding more than 08Kgs. Shelf life should not be less than 05 years under any circumstances.

Temperature Parameters:- The following temperature parameters should be met by the suit certified by the manufacturer :

- A) The highest direct flame temperature protection should be offered by the suit.
 - i) 1500 deg.C to 1800degC for a continuous period of 10 seconds.
 - ii) 1400 degC for a continuous period of 30 seconds.
 - iii) 1200 deg C for a continuous period of 03 (Three) minutes.
- B) The highest direct radiant temperature protection should be offered by the suit:

- i) 1500 deg. C for a continuous period of 10 seconds.
- ii) 1420 deg. C for a continuous period of 30 seconds.
- iii) 1220 deg. C for a continuous period of 03 (Three) minutes.
- iv) 1200 deg. C for a continuous period of >7 minutes at distance of 1.5 meters from the flame wall. Operations, maintenance, storage and cleaning guidelines along with the catalogues/booklets. Precautions to use the suit and the conditions under which the suit is not be used. Vendor to provide label on his suit as per EN 1486- Level III.

The bidder shall submit the copy of the certificate from the approved certifying agency clearly stating that the suit is meeting all EN 1486 and the vendor is authorized to use the label/mark from the certifying agency (e.g.) or any other reputed International Organization in the regard. Additionally, vendor must also certify the compliance w.r.t. additional specifications given above.

Conformity for the testing shall be required for the following:-

- The aluminized outer fabric (DICKSON 4584) is tested and certified to EN, ISO, EN11612 and EN 1486.
- The moisture & thermal barrier (Dickson 5474) is tested to EN 1486 for moisture and thermal protection.
- The Inner layer (Klopman Gemini FR) is tested and certified to EN ISO 11612.
- The helmet is certified to EN 443.
- The visor is certified to EN 166 & 171.
- The shoe is certified to EN20345 for S1P/HRO.

5.7 PACKING

Suit will be supplied in easy to carry nylon bag.

6.0 CARBON COMPOSITE SELF CONTAINED COMPRESSED AIR OPEN CIRCUIT BREATHING APPARATUS

6.1 SCOPE

This specification prescribes requirements of design, performance and practical test for open circuit type breathing apparatus.

6.2 GENERAL REQUIREMENT

6.2.1 Self Contained Breathing Apparatus (SCBA), ergonomically designed, light weight glass and carbon filled nylon composite back plate and intrinsically flame retardant 100% Kevlar webbing and 3 padded harness. Cylinder band should be made up of 100% Kevlar. Two stage pneumatic system comprising positive pressure demand valve with hands free bypass facility, vision 3 face masks with more than 85% field vision and scratch resistance polycarbonate visor should be provided. Warning whistle should have an operating pressure of 55 bars. First stage pressure reducer with single high pressure cylinder connector with steel braided hose. The Apparatus is to be supplied with CCE approved 6/6.8 ltrs, 300 Bar High pressure carbon composite cylinder (duration - 45/46 Mins).

6.2.2 The unit is to be provided as attached with automatic distress signal unit capable of giving analogue and digital reading of the pressure.

6.2.3 Low pressure alarm and ADSU featuring a motion sensor which gives alarm if the user is motionless for 30 seconds.

6.2.4 The BA set has to be CE approved, as per EN137 Class-II 2006 Standard.

6.2.5 The compressed air breathing apparatus shall be so designed so that the wearer can breathe comfortably, without any risk of poisonous gases entering the breathing circuit. The breathing circuit should be so designed so that there is optimum utilization of compressed air stored in the cylinder during Fire Fighting and rescue operations. The set as a whole shall be so designed so that the handling of the set is easy and does not cause any damage to the set. Set shall be capable of being used with cylinders having working pressure up to 300 bars at least. The BA set should have no air losses. No toxic matter can enter the mask back plate should be ergonomically designed for comfort and stability and there should have provision of connection between wearers.

6.2.2. MATERIAL

6.2.2.1 All the materials used in the construction shall have adequate mechanical strength, durability and resistance to deterioration by heat or by contact with seawater or plain water. Such materials shall be antistatic and fire resistant as far as practicable.

6.2.2.2 Exposed parts excluding cylinders, that is, those, which may be subject to impact during practical performance tests, shall not be made of magnesium,

titanium, aluminum or alloys containing such proportions of these metals which on impact give rise to frictional sparks capable of igniting flammable gas mixtures.

6.2.2.3 Materials that may come into contact with the skin shall be non-staining soft, pliable and shall not contain dermatitis substances.

6.2.2.4 The apparatus shall be sufficiently robusted to withstand the rough usage; it is likely to receive in service and designed so that it will continue to function satisfactorily while temporarily accidentally submerged in water at a maximum depth of one meter and thereafter until the air in the cylinder is exhausted.

6.2.3 **SEPARATION OF PARTS**

The design and construction of the apparatus shall permit its components parts to be readily separated for cleaning, Examination and testing. The couplings required to achieve this shall be readily connected and secured, where possibly by hand, and means for sealing used shall be retained in position when the joints and couplings are disconnected during normal maintenance.

6.2.4 **ADJUSTABLE PARTS**

All parts requiring manipulation by wearer shall be readily accessible and easily distinguishable from one another by touch. All adjustable parts and controls shall be so constructed that their adjustment is not liable to accidental alteration during use

6.1.1 **WEIGHT**

The weight of the apparatus shall not exceed 09 Kg. The cylinder used for compressed air should have the approval of Chief Controller of Explosive.

6.2.6 **LEAK TIGHTNESS**

The apparatus shall be of positive pressure type so as to prevent ingress of the external atmosphere. There should be not leakage from any joint.

6.2.7 Airline connection and second user connection and inlet-cum-outlet shall be provided on the pressure reducer for attaching, airline connection for second user connection.

6.3 **FACE MASK**

6.3.1 The face mask should be made either of Neoprene or Silicone. The air inlet valve should connect to the mask by simply clipping it on the enable wearer to switch on the positive pressure at the last minute.

6.3.2 Face mask shall cover the eyes, nose , mouth and chin , it shall be provided with an additional flap for providing adequate sealing on the face of the wearer

of the breathing apparatus against the outside gas, when the skin is drying or moist, when the head is moving and when the water is peaking.

- 6.3.3 The face mask shall have an inner mask to reduce misting and dead space so that the mask is always remain at center.
- 6.3.4 Face mask shall be secured to the face by means of an adjustable./replaceable head harness and they shall be fitted with a neck strap to support them when not being worn. There shall be five head harness but one strap i.e. the top one should
- 6.3.5 Means for speech transmission shall be incorporated and so designed that it is in front of the mouth.
- 6.3.6 The face mask shall be constructed of silicon rubber in order that it is soft, light in weight, comfortable to the wearer to wear for long duration, resistant to chemicals and heat, thus having longer life.
- 6.3.7 The connection for demand valve shall be provided in front of the Face Mask.
- 6.3.8 The visor shall be made of clear polycarbonate.

6.4 **FACE CONNECTOR**

The connection between the face mask and the demand valve shall be of Clickon/Push fit type well secured so that, the set is having fully automatic positive pressure , there is optimum utilization of compressed air stores in the cylinder and the mask by mistake is not used with a filter canister.

6.5 **HEAD HARNESS**

The head harness shall hold the face mask firmly and comfortably in position. It shall be molded from silicon rubber. It should be easily detachable for cleaning and decontamination. There shall be five quick release harnesses out of which only 4 shall need to be tightening with the 5th i.e. top one shall be prefixed to ensure quick donning and center placing of the mask while wearing.

6.6 **BODY HARNESS**

The body harness shall be designed to allow the user to done the apparatus quickly and easily without assistance and shall be adjustable for fit. Buckles fitted to waist and shoulder harness shall be so constructed that once adjusted they will not slip.

6.7 **EXHALATION VALVE**

The apparatus shall be provided with an unidirectional exhalation valve spring loaded to maintain positive pressure in the face mask. The resistance of the valve should not exceed 6 milibars, it shall be protected against dirt and mechanical damage.

6.8 DEMAND VALVE

It shall be fully automatic positive type. Designed to provide a flow rate of at least 50 ltrs /min at all cylinder pressure above 20 bar. It shall be designed to push fit/click on to the mask.

6.9 SUPPLEMENTARY SUPPLY

The apparatus shall be provided with a manually operated push type means on the demand valve itself for supplementary supply.

6.10 HIGH PRESSURE TUBE

It shall be having outer covering of neoprene rubber .The test pressure of the tube shall be above 600 bar. It shall be fitted to the set in a manner that it cannot be separated by hand. The entire high pressure tube shall be covered by a medium pressure tube having medium pressure supply for safety reasons.

6.11 MEDIUM PRESSURE TUBE.

It shall be having outer covering of neoprene rubber. The test pressure of the tube shall be above 20 bar. It shall be so designed that it can be separated by hand and cannot be fitted at the joints where High Pressure Tube is fitted.

6.12 PRESSURE GAUGE

6.12.1 It shall indicate pressure on opening of the cylinder. The range shall be 0-350 bar. It shall be placed that the wearer can easily see the pressure while using the set.

6.12.2 The pressure gauge shall have a blowout release. The blowout release should be so located that in the event of an explosion or fracture of the pressure element of the gauge, the blast will be away from the front. The gauge window shall be made of material of non-splintering glass or of clear plastic materials.

6.12.3 A tap or restrictor shall be provided so that if pressure gauge and connection hose are removed from the apparatus, flow will not exceed 25 lit/Min at full cylinder pressure, if the gauge or flexible connecting tube be damaged after the apparatus has been functioning for a period of time equal to half the nominal working duration with an air consumption of 40 l/min the loss of air from the damaged component shall not reduce the normal effective duration of the apparatus by more than the reserved period.

6.13 WARNING DEVICE

The apparatus shall be provided with warning whistle next to the pressure gauge. It shall be consuming minimum amount of compressed air and should

emit continuous at least 90 dbls sound. Warning whistle next to pressure gauge enables to user to ascertain his whistle and can check the same.

6.14 **BACK PLATE**

It is to be made of light weight glass and carbon filled nylon composite back plate and intrinsically flame retardant 100% Kevlar webbing and 3 padded harness. Cylinder band should be made up of 100% Kevlar.

The back plate shall be so designed that the use can lift the set by having a firm grip of back plate in order to avoid lifting of set from cylinder valve or body harness. The method of fixing cylinder shall be such that 4, 6 and 9 liter cylinder of working pressure 200/207/300 bar can be fitted without any alternation.

6.15 **PRESSURE REDUCER**

The apparatus shall be provided with a diaphragm less piston pressure reducer which is capable of reducing pressure from 300 bars to 7 bar (approx.). The designing ' shall be such that back pressure development shall be minimum, second inept outlet shall be provided on the reducer. High pressure and medium pressure safety shall also be provided on the reducer.

6.16 **COMMUNICATIONS:**

It should be designed for use with standard carbon composite SCBA, this unique radio communication interface should fully interface & integrate with existing standard radios available universally and must be intrinsically safe and approved to ENK136 Class3.

6.17 **ADSU**

- Should be made of solid state technology - infrared motion sensor with no internal contacts to wear out.
- Should be provided with long life lithium magnesium dioxide batteries.
- Should have loud 112 decibel alarm.

6.18 **GAS CYLINDER & MAIN VALVE,**

Cylinder used shall be of steel having 616.8 liter water capacities, 300 bar working pressure 1800 Liters compressed air for 45/46 minute duration. The cylinder & valve should be approved by Chief Controller of Explosive, Nagpur, India.

6.19 **PACKING**

The breathing apparatus shall be packed in hard bag molded plastic or FRP.

6.20 **MARKING**

The trademark of manufacturers Identification shall be marked on the facemask, demand valve, pressure reducer and back plate. The serial number of the set and the date of manufacturing shall also be marked on the back plate.

7.0 FIRST AID KITS

7.1 SCOPE

This standard specifies the contents of portable first-aid kit intended for providing immediate and effective first-aid treatment of common injuries.

First aid kits shall be as per relevant code IS: 13115.

8.0 TELESCOPIC LADDER (ALLOY ALUMINUM)

Alloy Aluminum Telescopic Ladder: An alloy aluminum self-supported extension ladder shall be made from sides of "Round "section Heavy duty and steps 1" Dia non-slip corrugated tubing, complete with all safety devices and limits & rubber Shoes folding platform, safety rings hand rail fitted to extending section, that can lock at any required height. Height shall not less than 25 feet.

8.1 DESCRIPTION;

Telescopic extension ladders shall be easily portable and closed length of 5 feet, extending to a length of 25 Feet and adjustable features wide comfortable treads and an automatic locking system. This ladder shall be easy to store, transport and carry which makes it ideal for fire and rescue use.

- Telescopic design for easy transporting and storage
- Automatic locking mechanism for convenience and security
- Light weighted but strong alloy aluminum construction
- Large slip – resistant feet
- Suitable for firefighting and rescue works

8.2 SPECIFICATION:

a. Closed height	:	5 feet
b. Extended height	:	not less than 25 feet
c. Maximum load	:	200 kg
d. Weight	:	20±5 kg
e. Class use	:	Firefighting and Rescue works
f. Material	:	Alloy Aluminum

9.0 SPECIFICATION OF FIBER GLASS BLANKET

Fiber Glass Blanket shall be made of fiber Glass fabric of 01mm thick fabric an ideal material and made of imported Dual Mirror. Aluminized Glass fiber fabric which will be approved by the center of Environment and Explosive Safety (CFEES).The fire blanket for welding shall be made fiberglass fabric, coated fiberglass fabric or silica fabric and finished with making by edge `wrapping, metal buckles and finished with plastic bag and labels.

The product shall be woven with specific high twisted yarn and then treated; the heat resistance temperature of the blanket shall be about 18000C with special treatment. To meet the heat resistance requirement, the fabric shall bed most suitable to meet the heat resistance requirement. Fire Blankets shall be generally used for covering the area while welding and occasionally for extinguishing the fire. Size of blanket shall be :6 Ft X 6 Ft.

10 MULTIPURPOSE FLOW NOZZLE

The branch shall be made of extruded Aluminum Alloy hard anodized for resistance to corrosion having light in weight and hydraulically efficient design for low back thrust allowing for extended operation with multiple flow settings. It shall be capable for making hollow jet, Spray, and Fog in different fire fighting situations. The variable flow rate shall be adjusted from 360 LPM to minimum 900 LPM at 7 Kgf/cm² and flush without shutting down. It shall have a Spray angle of 160° and horizontal throw in still air around 35 meters at 7-8 bar pressure. Spinning teeth shall be provided at the outlet to give an effective dense fog. A Pistol grip handle of rubber coated shall be provided for easy handling of branch.

The provision to shut-off pressure assisted flush without shutting down shall be provided. WEIGHT : Not more than 3.5 Kg , INLET: 63 mm Instantaneous Male Coupling.

11 PORTABLE THERMAL IMAGING CAMERA

The thermal imaging camera shall be capable help to locate victims in smoke-filled, dark and high-temperature condition. It shall be Identifies live victims by measuring the body temperature up to a distance of 1.2 miles. The thermal imaging camera shall be fully radiometric operating infrared camera system to capture and display thermal images and thermal profiles of objects.

The thermal camera incorporates the latest technology due to a USB 2.0 interface that allows a real-time thermal imaging with 128 images per second and simultaneous real time images with 60 HZ as well as stationary and portable operation that is very well priced. The images shall be archived as snapshots or as video sequences. The thermal camera shall be equipped with a small bolometer (UFPA) with 160 x 120 pixels and 25 x 25 μm pixel size. The high thermal sensitivity allows capturing finest details. The thermal camera shall be ideal equipment in areas of research and development, checkpoints, process automation or for general portable tasks. Via a USB cable the thermal camera shall be connected to a computer and be read-out without further ado.

The temperature data of the thermal camera shall be transferred as a thermal image to the provided software Connect. Based on PI-SPECTRAL technology the real-time picture shall be recorded through a visual channel as a real image (VIS) combined with a thermal image (IR) simultaneously. The software also allows remote-controlling the camera.

Furthermore, the camera features a line scan camera function allowing monitoring moving objects during processing. With a weight of not more than 1.2 kg, the thermal camera shall be very light and compact design without comparison. The thermal camera combines portable and compact application with stationary operation. Some of the application ranges shall be electronic development, process controlling during extruding, process controlling during calendaring or development and processing of solar technology, LCD flat screens or any other electronic types of equipment.

TECHNICAL SPECIFICATION OF THERMAL IMAGING CAMERA:

Imaging Performance	
FOV / Minimum focus distance	25° × 19° / 0.4 m
Spectral range	7.5–13 μm
Image frequency	60 Hz
Focus	Manual
Focal Plane Array (FPA)	Uncooled micro bolometer
Image presentation	
Display	Built-in 3.5" LCD touch screen, 320 × 240 pixels
Measurement	

Accuracy	±2 °C or ±2% of reading
Measurement analysis	
Automatic hot/cold detection	Auto hot or cold spot meter markers within area 0o C to +900oC
Emissivity correction	Variable from 0.01 to 1.0 or selected from list of materials
Measurement corrections	Reflected temperature, optics transmission and atmospheric transmission
Isotherm	Detect high/low temperature/interval
Laser pointer	
Laser alignment	Position is displayed on the IR image
Set-up	
Image controls	Palettes (Arctic, Gray, Iron, Lava, Rainbow and Rainbow HC), image adjustment (auto/manual)
Set-up controls	Local adaptation of units, language, date and time formats; automatic shutdown , display intensity
Image storage	
Format	Standard JPEG - including measurement data on SD memory card
Type	IR/visual images; simultaneous storage of visual and IR images
Power	
Battery type	Lithium-Ion (field replaceable) - 4 hours operating time
Charging system	In camera, AC adaptor, 2-bay charger or 12 V from a vehicle
Power management	Automatic shutdown and sleep mode (user selectable)
AC operation	AC adaptor, 90-260 V AC
Adaptor voltage	12 V output to camera
Environmental specifications	
Operating temperature range	-15 to +50 °C
Storage temperature range	-40 to +70 °C
Humidity	IEC 60068-2-30/24 h 95% relative humidity +25 °C to +40 °C / 2 cycles
Shock / Vibration	25 g (IEC 60068-2-29) / 2 g (IEC 60068-2-6)
Drop	2m



3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: **PE-TS-434-550-A001**

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION: ID

SCOPE OF SUPPLY & DETAIL TECHNICAL REQUIREMENTS.



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
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D1- SCOPE OF SUPPLY FOR FIRE WATER TENDER

&

APPENDIX-1 : SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH FIRE WATER TENDER



BHARAT HEAVY ELECTRICALS LIMITED

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**3 X800 MW PATRATU STPP
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SECTION-I

SUB SECTION-ID

REV. 0

D1: FIRE WATER TENDER

1.0.0 SCOPE

1.1.0 SCOPE OF SUPPLY

- i) Fire water tender (1 no.) ,conforming to IS: 950:2012 & latest Type B, complete with all accessories and equipment's as specified herein & including those specified in **Appendix-1** , Sub Section-ID.
- ii) First fill of chemicals & consumables during performance demonstration.
- iii) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

1.2.0 SCOPE OF SERVICES

Performance demonstration of fire water tender at site and training of owner's personnel.

2.0.0 CODES AND STANDARDS

The design, material of construction, workmanship & finish, performance testing, accessories and equipments of fire water tender and foam tender specified herein shall comply with the requirements of codes/standard as follows:

Latest IS: 950 Type-B - Functional requirements for fire water tender, Type-B for fire brigade use.

3.0.0 DESCRIPTION OF FIRE WATER TENDER

3.1.0 VEHICLE CHASSIS

The chassis for carrying out fabrication work of fire water tender shall be of Make-TATA Chassis model no. 2516/ Ashok Leyland 2516/ equivalent chassis.

3.2.0 GENERAL REQUIREMENTS

The vehicle shall be built conforming to IS 950: 2012

- 3.2.1 The appliance shall incorporate a high and low pressure fire pump of min. 3000 lpm capacity at 0.7 MPa and 300 lpm capacity at 3.5 MPa respectively. The appliance shall carry a water tank of 5000 ltr capacity. It shall carry an extension ladder and shall be capable of towing a trailer pump.
- 3.2.2 The water tender shall be fabricated in a manner so as to conform to the following characteristics:



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- | | | |
|----|--|---|
| a) | Gross vehicle weight | not less than 25000 kg including crew, Water and equipment |
| b) | Maximum speed on level road | 80 km/h (fully laden) |
| c) | Acceleration from a standing start through the gears (fully laden) | 64 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 50 km/h on a level dry surface the foot brake shall be capable of stopping the vehicle within a distance of 15 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 26 cm |
| | Overall width | Not more than 2.50 m |

Note: - The chassis shall meet the prevailing emission norms and shall totally comply with the Central Motor Vehicle Rules.

3.2.3 All parts, which shall form waterways or come into contact with water shall be of corrosion-resisting material or should be made of material duly treated for anti-corrosion. All metal parts exposed to atmosphere shall either be of corrosion-resisting material or treated.

3.2.4 Lubricating nipples shall be provided wherever necessary.

3.2.5 MATERIAL

3.2.5.1 The choice of material to be used in the construction of the appliance shall be made with a view to combining lightness with strength and durability. The following choice of materials shall be followed:

Pump casing and low pressure impeller: Lead tin bronze (Grade LTB2 of IS 318)

High pressure impeller: Phosphor-bronze or Stainless steel or Aluminum bronze (IS 617)

Impeller ring and impeller neck ring: Lead tin bronze (Grade LTB 2 of IS 318)

Pump shaft: Stainless steel (Grade 04Cr18Ni10 of IS 6603)

Pump panel: Aluminum sheets/chequered plates (IS 737) or Mild steel sheets (IS 513)

3.2.5.2 All parts which form water ways or come into contact with water shall be of stainless steel. All metal parts exposed to atmosphere shall either be of corrosion-resisting material or suitably treated to resist corrosion.

	3 X800 MW PATRATU STPP FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT	DOCUMENT NO.: PE-TS-434-550-A001
		SECTION-I
		SUB SECTION-ID
		REV. 0

3.2.5.3 Lubricating nipples shall be provided, wherever necessary.

3.3.0 DESIGN AND CONSTRUCTION

3.3.1 Engine

3.3.1.1 The engine shall be of CI type with radiator cooling system to permit its continuous stationery running without overheating. Indirect cooling system shall be incorporated, if necessary, which shall be of the open circuit type discharging water to the waste. Arrangements shall be made to divert the cooling discharge water to water tank, if necessary.

3.3.1.2 The operating temperature of the engine cooling water shall preferably be thermostatically controlled.

3.3.1.3 The oil in the oil sump shall be prevented from overheating.

3.3.1.4 Suitable gauge for cooling water and glow lamp for lubricating system shall be provided in the driver's cab and on the pump panel. This shall be marked with operating temperature.

3.3.1.5 External filter shall be provided for the lubricating system and a tubular dip-stick to gauge the level of oil in the oil sump shall be provided.

3.3.1.6 The heat exchanger tank shall be made from minimum1.22 mm thick mass sheet and the coil in the coolant tank shall be of copper for effective cooling. The design of the heat exchanger shall be such that the temperature of the engine shall not exceed for the operating temperature specified by the chassis manufacturer when the vehicle is being tested in stationary conditions.

3.3.2 Electrical System

3.3.2.1 A trickle type battery charge shall be provided for recharging the battery *in situ*. Battery will be automatically charged when engine is in operation. A red pilot lamp, indicating when the batteries are being charged from an external supply, shall be provided.

3.3.2.2 All important electrical circuits shall have separate fuses suitably indicated and shall be grouped into a common fuse-box located in an accessible position from driver's 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.

3.3.2.3 **Water Tank** - It shall have minimum capacity of 5000 litres **as per latest IS-950**.

3.3.2.4 A single tank shall be used with a capacity of 5000 liters. The tank body and baffles shall be of minimum 5 mm thick mild steel plates. The tank shall be mounted on the



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

chassis and suitably baffled in a manner keeping in view the proper load distribution on the axles. The baffling provided in the tank shall be able to prevent surge when the vehicle is breaking, cornering or accelerating. The baffles shall be arranged in a manner to facilitate the passage of a man throughout the tank for cleaning purpose. The tank shall be mounted on minimum three cross members to counter act the stresses caused by chassis flexion and shall be so secured that it can be easily removed. The shape of the tank shall be rectangular with convex top and bottom. The tank shall be mounted on the vehicles using metacone mounting. U-bolts shall not be used in the vehicle. Suitable eyes shall be provided on the shell of the tank to enable it to be lifted from the vehicle for repairs/ replacement as and when required.

- 3.3.2.5 The tank shall be fitted with a 100 mm bore overflow pipe. A 63 mm instantaneous hydrant connection, incorporating a strainer, shall be provided close to the pump panel control for filling the tank through 75 mm bore pipe work or feeding the hose reel equipment. Minimum 100 mm bore pipe line shall be taken from the tank to the suction inlet of the pump incorporating minimum 100 mm quick action spherical type valve. Separate valve(s) for performing the function given in 14.3.6 shall be provided to control the flow of water to the hose reel equipment. Drain plugs or drain cocks shall be provided, wherever necessary.
- 3.3.2.6 The tank shall be given adequate anti-corrosive epoxy treatment consisting of one coat of primer with two coats of finish paint after preparing the surface by shot blasting from inside and outside after fabrication if it is not galvanized. The open end of the overflow pipe should be taken down to a point well below the chassis without affecting the effective ground clearance when fully loaded and shall discharge away from the wheels.
- 3.3.2.7 Dial gauge water level indicator for the tank shall be provided preferably in the driver's cab (or a visual level gauge of the glass tube shall be provided at the control panel calibrated 1/4, 1/2, 3/4 and full (preferably calibrated in liters).
- 3.3.2.8 The tank shall have a bolted manhole of 450 mm diameter minimum and shall have a threaded ring and cap of 300 mm diameter for filling the water tank from the top. The manhole cover shall be made from 5 mm thick mild steel plate and epoxy coated from inside and outside. A cleaning hole of at least 250 mm diameter shall also be provided at the bottom. The manhole shall be located at top with ladder for access to bottom.
- 3.3.2.9 The tank shall be connected with the pump and hose reel and valve (s) shall be provided in such a way that any of the following operation are possible:
- Hydrant - tank,
 - Hydrant - reels,
 - Tank-pump-high and low pressure hose reel,
 - Hydrant- pump- high and low pressure hose reel, and
 - Tank-Pump-Monitor



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

f) Off.

3.3.2.10 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.

3.3.2.11 The plumbing between pump and hose reel shall have a clear and unobstructed water way of not less than 25 mm throughout without any obstruction.

3.3.3 Hose Reel

Two nos. hose reel (conforming to IS: 884) shall be provided at the rear of the appliance with 60 m lengths of 20 mm bore hose connected by screw 'C' type quick release couplings and terminating with a control branch and fog nozzle. The reel shall be fitted with over brake or locking device. The gun shall be of constant flow type and shall have a discharge capacity of 150 litre/min approximately. Provision shall be made in the gun controls to achieve combat mode (straight jet) or a fog shield in split second. The fog gun shall be made of stainless steel or aluminum alloy.

3.3.4 Pump

3.3.4.1 A centrifugal pump high and low pressure pump shall be mounted at rear/mid-ship side of the appliance. The low and high pressure sections of the pump may be either single-stage or multi stage type. Anti-friction bearings external to the casing be provided so as to avoid any bearings within the pump casing. The bearing used in the pump shall be of reputed make. The gland shall be of the mechanical self-adjusting type. The pump shall be provided with in-built filter assembly of easily removable type, which shall filter the water before entering into pressure stage impeller. A filter capable of filtering particle size up to 0.75 mm or less shall be used. This filter shall be of stainless steel and shall be easily accessible for cleaning.

The normal and high pressure impeller shall be mounted on a single shaft. The impeller(s) of the low pressure section shall be closed type and shall be dynamically balanced. The impeller(s) of the high pressure section shall be closed or regenerative type. A drain cock plug shall be provided at the bottom of the casing in a way to prevent the cock being opened due to vibrations. Studs, bolts etc., used in the pump casing coming in contact with the water shall be of stainless steel. The castings shall be without any blow holes, internal cracks, etc. The interior of the casting shall be smooth finished. The castings shall withstand the hydraulic pressure as specified against CI. No. 14.5.5.

The bearing housing will be made of C.I. the delivery outlet, delivery valves and high pressure circuitry shall be made of Gun metal conforming to Gr.II of IS:318.

The pump shall be provided inbuilt (integrated in the pump outlet manifold) pressure relief valve which shall operate automatically and shall not allow the high pressure to increase beyond 45 Kg/cm².



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- 3.3.4.2 The pump shall be completely covered. However, all the controls on the panel and the gauges shall be uncovered.

The pump shall be coupled to the prime-mover of the chassis through a power take-off (PTO) capable of transmitting full torque of the engine used for the appliance. All propeller shafts and all fittings used for coupling the PTO, pump, etc., shall be of the same size and type as used by the chassis manufacturer for the drive line.

The PTO shall have a step up gear ratio of not less than 1:1.27. A cooling coil made of copper pipe shall be provided in the bottom of the PTO casing.

A control lever for engaging and disengaging the pump, with suitable locking devices, shall be provided in the driver's cab.

- 3.3.4.3 The pump shall be designed to give its rated output with an engine and pump input at shaft speed safe enough to operate the engine. The pump shall give performance as detailed below when working with strainers (except basket strainer) at 27 ± 2 °C.:

The pump shall be capable of delivering 3000 LPM @ 7 Kg/cm² and 300 LPM @ 35 Kg/cm² at 3 mtrs. suction lift at NTP condition.

The pump shall follow the following performance parameters:

Normal Pressure Output	: 3000 LPM @ 7 Kg/cm ²
High pressure Output	: 300 LPM @ 35 Kg/cm ²
Maximum Pressure in Normal Pressure mode	: 14 Kg/cm ² (shut off pressure)
Maximum Pressure in High Pressure mode	: 45 Kg/cm ²
Deep Lifting Capacity of Pump	: 30 m ³ /sec max. up to 7 M in 30 Sec. at NTP conditions

The above performance data shall be considered when working through 2.54 m lengths of specified suction hose.

The design of pump shall be such that the normal pressure and high pressure stages can be operated simultaneously. Simple mechanism shall be provided to change over from normal pressure to high pressure, preferably a single lever operation. However at any given pump/engine speed, the low pressure registered shall not exceed 1/4th (one quarter) of the registered high pressure.

The pump housing shall have provision to connect normal pressure hose reel and cooling water line.

The efficiency of the pump shall be such that the power and the RPM required shall not be more than that available with the engine.

- 3.3.4.4 The material of construction for pump & its control panel shall be as follows:



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

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|----|---------------------------------------|---|
| a) | Pump casing and low pressure impeller | Lead tin bronze(Grade LTB2 of IS:318) |
| b) | High pressure impeller | Phosphorous-bronze or stainless steel or aluminum bronze (IS 617) |
| c) | Impeller ring and impeller neck ring | Lead tin bronze (Grade LTB2 of IS: 318) |
| d) | Pump shaft | Stainless steel (Grade 04Cr18Ni10 of IS: 6603). |
| e) | Pump panel | Aluminum sheets/ chequered plates (IS 737) or mild steel sheets (IS: 513 ordinary grade) |

3.3.5 Pump Test

When tested in accordance with pump specification, the efficiency shall not deviate from the value specified by the pump manufacturer by more than $\pm 5\%$. However, in no case the efficiency of the pump shall be less than 60 percent. The pump shall run for a period of 4 hours non-stop delivering the rated output at 0.7MPa and for 1 hour at 3.5 MPa with a lift of 3 m.

The pump shall be run dry for a period of minimum two minutes at 3000 RPM to check the integrity of the mechanical carbon seal. After this test there shall not be any leakage of water through carbon seal.

During the test the water shall not be replenished for the cooling system and the temperature of the engine oil should not exceed 115°C or of the engine manufacturer rated temperature for continuous working whichever is less. The engine should show no sign of stress during the test. The temperature of the cooling water (radiator water) tank shall not exceed 85 °C. The PTO sump oil temperature shall not exceed 100 percent of the manufacturers recommended temperature for the grade of oil used. The pump casing and impeller shall be subjected to a hydraulic pressure of 2.1 MPa to detect leakage, perforation, etc. Foam induction test shall be done to check calibration of the metering valve.

3.3.6 Suction inlet and Delivery Valves

- 3.3.6.1 The pump shall have suction inlet(s) having 125 mm standard suction connection as per IS: 902 with internal strainer(s) and blank cap(s). The strainer(s) shall be retained firmly when in use but shall be easily removable. The mesh size of the pump inlet screen shall be smaller than the outlet size of the impeller.
- 3.3.6.2 The pump shall be provided with delivery valves (as per latest IS standard) for the 3000 litres/min pump having 63 mm standard hose couplings as per IS: 903 with screwed wheel type quick closing clack valve conforming to IS: 4928. Blank caps fastened with



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

chains and incorporating means to relieve pressure between the valve and the cap shall be provided one for each delivery valve.

3.3.7 Primer

3.3.7.1 The primer shall be capable of lifting water at least 7.0 m (measured from water level to the center of pump) in not more than 24 seconds and shall preferably be fully automatic. The allowance shall be 30 cm for every 300 m elevation above sea level and 1 percent for 2.5°C rise in water temperature.

3.3.7.2 If case of the reciprocating type primer, means shall be provided to automatically limit the speed of engine while the primer is engaged.

3.3.7.3 The primer shall be constructed of gun metal with stainless steel shaft and shall be fitted with suitable lubricated bearing depending upon the type of primer. The caps of primer and springs shall be properly secured. The primer lever shall be easily accessible from the operator(s) position.

3.3.7.4 In the case of reciprocating type, the primer shall be preferably designed with a view to primer when the pump is running at speed of 1000 to 1500 rpm. The primer shall disengage automatically at pump pressure of 1.5 to 2.0 bars without manual intervention.

3.3.8 Water/Foam Monitor

One water-cum-foam monitor shall be provided on the top at suitable location. The monitor shall conform to IS 8442.

3.3.9 Control Panels

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

a) Rear mounted pump - One control panel at the rear of the appliance.

3.3.9.2 The control panel(s) shall include the following:

a) Throttle control for engine;

b) Pressure gauge -0 to 2 MPa
Pressure gauge – 0 to 5 MPa

c) Compound gauge calibrated as under:
Vacuum - 0 to 75 cm Hg, preferably in black;
Pressure - 0 to 0.6 MPa preferably 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.

	3 X800 MW PATRATU STPP FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT	DOCUMENT NO.: PE-TS-434-550-A001
		SECTION-I
		SUB SECTION-ID
		REV. 0

g) Control for using monitor.

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

a) Water level indicator as described under cl.no. 14.3.4

b) Control valve as described under cl.no. 14.3.6

c) Hydrant connections.

3.4.0 **Body Work and Stowage**

3.4.1 Cabin

3.4.1.1 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. Both the seats shall be independent. The driver's seat shall be adjustable and comfortable. The rear compartment of driver's cabin shall have one removable seat for full width of cab for 5 (five) crew members. The cab floor shall be covered with 3 mm thick aluminium chequered plate rigidly fixed to the frame cross members by means of nuts and bolts or riveting. Trap doors for topping up oil, etc, wherever necessary shall be provided.

One roof light shall be provided in the driver's cabin dwell vision and external rear view mirrors shall be fitted to the cab.

3.4.1.2 The driver-cum-crew cabin shall be provided with full four doors, one for driver, and one for officer and two at the crew compartment. The doors shall be generously sized for easy embarking/disembarking of crew members. All the doors shall be fitted on the super structural members, each hung upon three invisible coach type mild steel stout hinges and fitted with best quality handles.

3.4.1.3 The door handle on outside of driver seat shall have a locking arrangement. Other doors shall be lockable from inside. In addition to the door lock, aluminum tower bolt of 20 mm shall be provided for all the doors from inside, adequate grab rails shall be provided for easily boarding and alighting from the appliance. 5.11.1.5 The windscreen glass shall be provided in the two valves and shall be flat in shape. Each glass shall be fitted in E.P.D.M. rubber beading. The glasses shall be 5 mm thick toughened safety glass. The rubber beading used for fitting glasses and window frame shall be E.P.D.M. rubber.

3.4.2 Seats

3.4.2.1 The driver seat shall be adjustable type vertically, forward and backward. The officer seat shall be fixed type. Both the seats shall be rigidly fixed to the flooring by means of nuts and bolts. The seat cushion shall be of latex foam rubber 75 mm thick upholstered in good quality foam leather cloth. The back seat shall be of latex foam rubber 50 mm thick upholstered in good quality foam leather cloth.

3.4.2.2 Below the crew seat, two lockers shall be provided. One locker for battery box to accommodate two 12 V 13 plates batteries and another for keeping accessories. The extra length of battery cable shall be provided by manufacturer.

	3 X800 MW PATRATU STPP FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT	DOCUMENT NO.: PE-TS-434-550-A001
		SECTION-I
		SUB SECTION-ID
		REV. 0

3.4.2.3

The crew seat shall be rigidly fixed to floor by means of nuts and bolts, running full width of the vehicle suitable for sitting five fireman, covered with 75 mm × 50 mm cushion latex foam rubber upholstered in good quality foam leather of approved shade.

3.4.2.4

Below the crew seat, two lockers shall be provided, one for storage of batteries and another for keeping accessories. The extra length of battery cable shall be provided, if required.

5.4.3

Rear Body

5.4.3.1

The rear body shall be fabricated in continuation and in line. The under frame crew members shall be fabricated from the rolled mild steel channel of 100 mm × 50 mm × 5 mm size. The mild steel runner of 100 mm × 50 mm × 5 mm size shall be provided over the chassis member for the uniform distribution of load over the chassis. Each cross members shall be secured to the chassis frame by 16 mm diameter 'U' clamps with aluminum packing block and self-locking unit. Balata packing of thickness 12 mm shall be provided in between the chassis frame and across members.

3.4.4

Super Structure

3.4.4.1

The super structural of the cabin shall be constructed out of 2 mm mild steel 45 mm × 45 mm × 20 mm pressed 'Top Hat' sections. The super structure shall be strengthened specifically on the members with the lockers doors frames are to be fitted and also the other members by providing brackets and gussets of 2 mm mild steel plate securely welded. The details of super structure are as follows: Under frame cross : 100 mm × 50 mm members × 5 mm Floor longitudinal : 50 mm × 50 mm members × 6 mm Vertical members on even : 45 mm × 45 mm side × 20 mm Skirt member : 45 mm × 45 mm × 20 mm Waist member : 45 mm × 45 mm × 20 mm Top deck longitudinal : 45 mm × 45 mm × 20 mm

3.4.4.2

The cab and lockers shall be of composite construction with sufficient rigidity and reinforcement and shall be kept as light as possible.

3.4.4.3

The structure/frame work shall be of welded constructions and made from 2 mm thick mild steel pressed sections and square tubes. The angles and channels used shall be of minimum 3 mm thickness. The complete structure material shall be treated for anti-corrosion by zinc plating. The plating thickness shall not be less than 20 microns. Two coats of epoxy paint shall be applied to the completely welded structure.

3.4.4.4

The structure shall be so designed so as to avoid any vibration/ratting/deformation in the intended usage of the vehicle.

3.4.4.5

The interior paneling shall be done from 1.22 mm thick aluminium sheets and the exterior paneling shall be done from 1.60 mm thick aluminium sheets.

3.4.4.6

The entire roof of the vehicle, cabin floor and locker floor shall be covered with minimum 1.60 mm thick aluminium chequered plates. All the lockers sides and complete rear of the vehicle shall be covered with minimum 1.22 mm thick aluminium chequered plates.

	3 X800 MW PATRATU STPP FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT	DOCUMENT NO.: PE-TS-434-550-A001
		SECTION-I
		SUB SECTION-ID
		REV. 0
3.4.4.7 Lockers shall be provided for secure stowage of all equipment given in Appendix-1. The height of the lockers from the bottom to the top of the opening shall be not less than 600 mm and the depth shall be not less than 600 mm. All lockers shall be provided with internal automatic lighting arrangement with the master switch in the cab. 3.4.4.8 All lockers above chassis floor shall be covered with aluminium roller shutters. The roller shutters shall be made from extruded aluminium sections with suitable roller, spring, guide channels, etc. All aluminium sections used shall be properly anodized. The roller shutters shall be rolled inwards underneath the roof giving unobstructed access to the equipment lockers and the fire fighting material. These roller shutters shall open in every position of the vehicle even in rough terrain. Guide rails shall support the shutters over entire length on both sides to make them absolutely torsion free. The roller shutters shall have a sturdy lock, preventing accidental opening during movement of vehicle. Roller shutters shall be made of hollow rectangular shaped aluminium links which shall be inter connected with rubber/plastic/PVC profiles sealing the roller shutter watertight when closed. These roller shutters shall be durable, maintenance free, weather and corrosion resistant. 3.4.4.9 Suitable storage space shall be provided to store four 2.5 m lengths of suction hoses in convenient location. 3.5 Miscellaneous 3.5.1 A suitable bumper shall be provided at the rear rigidly fixed to the super structural members by means of nuts and bolts, fabricated from 100 mm × 50 mm × 5 mm mild steel channel. 3.5.2 Two cat ladders made out of stainless steel round or square pipe of 25 mm diameter shall be provided. 3.5.3 Two numbers of 25 mm diameter aluminum pipe railing with sufficient number of aluminum double socket brackets shall be provided to the rear body over the deck. 3.5.4 A heavy duty towing hook shall be provided and fitted the rear bumper by means of nuts and bolts. 3.5.5 Quick removable type wire mesh guard made from 25 mm × 25 mm size mild steel wire mesh of 1.6 mm covered in mild steel angle frame shall be provided to all the glasses of driver-cum-crew cabin. 3.5.6 Provision for Stowage of Equipments For all water fittings like branch pipes, etc, quick release type couplings are provided which enables the operator to locate the desired equipment instantly and thereby save valuable time at the time of fire. These couplings also ensure that none of the item damage the internal paneling and thereby increase the life of the vehicle. Suitable clamps, brackets, holders, etc, are provided for all other items. 3.5.7 Cable Winch An electrically operated cable winch of 6 t capacity shall be provided. The winch unit shall be complete with minimum 5.5 HP 12 V dc series wound electric reversible motor		

	3 X800 MW PATRATU STPP FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT	DOCUMENT NO.: PE-TS-434-550-A001
		SECTION-I
		SUB SECTION-ID
		REV. 0

for increased pulling power, rope drum, and 27 m heavy duty galvanized EIPS wire rope with replaceable self-locking clevis hook and shall be mounted on the front bumper of the vehicle with suitable strong supports.

3.5.8 Telescopic Light Mast or Inflatable Emergency Lighting System
A compact, low profile, roof mounted lighting system, fitted with 4 × 1 000 W metal halide lamps, vertically elevated pneumatically up to 4.6 m shall be installed on the roof of the vehicle. Lighting shall be provided by a 12 V or 24 V dc with remote control, directional lighting system with rotation and tilt lamps to provide total coverage. The remote control unit shall allow a person to operate all the functions of the light mast or inflatable emergency lighting system and accurately aim for complete directional positioning. In addition auto show, a one button command, automatically retracts, turns out the lights and stows the entire system to the compact transport position shall also be included in the remote controller. The complete unit shall comprise of hand held remote control with cable, rotation and tilt positioner, mounting frame with built-in tilt system.

3.5.9 Alternator Unit
A 6.5 kVA capacity portable diesel engine driven generator unit shall be mounted at suitable location with all necessary connections and control panel for providing power to the light mast as well as other electrically operated tools.

3.5.10 Ladder Gallows
Gallows shall be provided to carry a 10.5 m, aluminium trussed type extension ladder. The design shall be such that the ladder can be released without difficulty from a reasonably accessible position and shall embody rollers to permit easy withdrawal by one man. Means shall also be provided for locking the ladder when stowed.

3.5.11 Tool-Kit Container
A specially fitted recessed tray for the normal kit of tools, carried on the appliance, shall be provided.

3.5.12 Stability
The stability of the appliance shall be such that when under fully equipped and loaded conditions (but excluding 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 30° from the horizontal.

4.0.0 INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT

4.1.0 Instruction Book or Books
Instruction book(s) for the guidance of the user(s), including both operating and normal maintenance procedure shall be supplied. The book(s) shall include an itemized and illustrated spare parts list giving reference numbers of all the wearing parts. Further refer IS 950:2012.

5.0.0 WORKMANSHIP AND FINISH

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

	3 X800 MW PATRATU STPP FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT	DOCUMENT NO.: PE-TS-434-550-A001
		SECTION-I
		SUB SECTION-ID
		REV. 0
5.2.0	The appliance shall be painted fire red colour conforming to Shade No. 536 of IS:5. The paint shall conform to IS: 2932	
6.0.0	Accessories	
6.1.0	The following accessories shall be provided in addition to those normally fitted on modern commercial vehicles:	
	a) Fire bells - 250 mm diameter fire bell shall be mounted externally and shall be capable of being operated from within the driving compartment. The bell shall be of the hand-operated type.	
	b) Head lamps - Two.	
	c) Fog lamps - Two.	
	d) Reversing light - Lamp suitably situated to assist reversing.	
	e) Amber blinkers lights - Situated on the head of the driving compartment.	
	f) Trafficators - Illuminated with indicating lights on instrument panel or in any other prominent position in driving compartment.	
	g) Wind screen wipers electrically operated.	
	h) Tools - All tools required for normal routine maintenance of the appliance, which are not included in the kit for the chassis.	
	j) Siren - Battery operated.	
	k) Search light - Adjustable to give flood or beam light, mounted in a convenient position but capable of being readily disconnected and mounted on a tripod away from the appliance, complete with tripod and with not less than 30 mm of TRS cable on a reel mounted on the appliance.	
	m) Spot light - Adjustable, mounted in a convenient position on the near side of the driving compartment.	
	n) Inspection lamp - Protected type on wander lead with plug. A socket shall be provided in the control panel in the driver's cab for plugging in the lamp.	
	p) Tail lamps - Two of combined stop and tail.	
	q) Rear reflectors	
	r) Wind Screen Washer	
	s) Cab, instrument panel and locker, light	



**3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- t) Public address system.

7.0.0 MARKING

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

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

8.0.0 ADDITIONAL ACCESSORIES (over & above accessories mentioned against Cl.17.0.0)

The additional accessories that are normally required to assist in operation of appliance are detailed in enclosed **Appendix-1 (refer sub Section ID)**. Bidder to include these accessories in their scope of supply.

9.0.0 ACCEPTANCE TESTS

The following acceptance tests on various equipment shall be conducted to meet guaranteed parameters and shall be carried out in accordance with relevant IS Code.

- a) Pump test
- b) Primer test
- c) Road test
- d) Stability
- e) Any other test as specified in IS 950:2012 & latest.

Further to this bidder to refer attached sample reference quality plan Appendix-6, for bare minimum test to be conducted during inspection in the present of BHEL and NTPC. Also, bidder to submit the quality plan for tendered project for approval from BHEL and NTPC, any additional test if required during document approval, to be accepted by bidder without any cost implication to BHEL.



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

APPENDIX-1

LIST OF EQUIPMENTS TO BE SUPPLIED WITH THE FIRE WATER TENDER

S.No.	Equipment / Item	Quantity
1.0	Aluminium Extension ladder –10.5 m (IS 4571)	01
2.0	a) Rubber lined delivery hose according to Type-II of IS: 636 in 22.5m or 15 m length fitted with 63 mm delivery hose couplings (IS: 903)	180 m
	b) Unlined flax canvas hose according to IS 4927 in 30m lengths fitted with delivery hose coupling (as per IS 903)	150 m
	c) Controlled percolating hose as per IS8423 in 30 m lengths fitted with delivery hose couplings (as per IS 903)	150 m
3.0	a) Hose clamps (IS: 5612, part-1)	25
	b) Hose bandages (IS: 5612, part-II)	25
	c) Hose slings	20
	d) Hose straps	20
4.0	Suction hose of rubber of 100 mm internal Diameter in 2.5 m length (IS: 2410) fitted with 100 mm suction hose couplings (as per IS 902).	10 m
5.0	3 way suction collecting head 100 mm size (IS: 904)	01
6.0	Suction wrenches for 100mm suction coupling (IS: 4643)	02
7.0	Suction Strainer 100 mm size (IS: 907)	01
8.0	Basket strainer, cylindrical type (IS: 3582)	01
9.0	Dividing breeching with control instantaneous Pattern 63 mm (IS 5131)	1
10.0	Collecting breaching with control instantaneous Pattern 63 mm (IS 905)	01
11.0	a) Hydrant-stand pipe-two way (IS: 5714)	01
	b) Double female coupling (IS: 901)	02
	c) Hydrant connection, 63mm female instantaneous pattern delivery coupling at both end. (IS: 901)	02
12.0	Combined key for hydrant, hydrant cover and lower valve (IS 910)	02
13.0	Fog nozzle with extension applicator with fog head (IS: 952)	01
14.0	Hand controlled branch for 63 mm size hose coupling	01
15.0	Branch pipe universal (IS: 2871)	02
16.0	Branch with revolving head (IS: 906)	01



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

17.0	Branch pipe (IS 903)	4
18.0	Nozzles of sizes 12 mm, 16 mm, 20 mm and 32 mm (two each) (IS: 903)	10
19.0	a) Adopter for 100 mm suction female screw Coupling and 63 mm male instantaneous b) Adopter double female instantaneous pattern 63 mm c) Adopter double male instantaneous pattern 63 mm	02 02 02
20.0	Nozzle spanners (IS: 903)	02
21.0	Portable electric box lamp with rechargeable accumulator.	02
22.0	Hand lamp (torch – 4 cells)	02
23.0	Flame proof lamp (useable in the presence of inflammable gases and vapours.	02
24.0	Self-contained breathing apparatus (compressed air type) complete with spare cylinder and tool kit.(IS 10245 Part 2)	1 set
25.0	Portable fire extinguisher, dry powder type, 2 kg (IS: 2171)	01
26.0	Foam making branch FB-4 with pick up tube (IS 2097)	01
27.0	Lowering Line: 50 mm hemp or terylene 40 m long having two ends spliced in and one end with a running noose (IS: 1084)	01
28.0	Long line, 50mm manila, 30 m long (IS 1084)	01
29.0	Short line, 50mm manila, 15 m long (IS 1084)	01
30.0	Canvas buckets	02
31.0	First aid box for 10 persons	01
32.0	Insulated plier (IS3650) with rubber gloves pair (IS4770) tested to 20000 volts	2 nos.
33.0	Asbestos gauntlets	1 pair
34.0	Axe large (IS: 703)	01
35.0	Spade	01
36.0	Pick Axe (IS: 273)	01
37.0	Crow Bar (IS: 704)	01
38.0	Sledge Hammer (IS: 841) –6.5 Kg	01
39.0	Carpenter saw 60 cm (IS: 5098)	01
40.0	Spanner – adjustable, 30 cm length handle (IS: 6149)	01



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

41.0	Door breaker	01
42.0	Hydraulic jack –7.5 tonnes	01
43.0	Fire Hook (IS 927)	1
44.0	Tool kit	01
45.0	Grease gun	02
46.0	Oil feeder	01
47.0	Can oil – 2 litres	01
48.0	Oil can – 10 litres	01
49.0	Funnel for oil or fuel filling – 250 mm	01



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : ID

D2- SCOPE OF SUPPLY FOR DCP TENDER

&

APPENDIX-2 : SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH DCP TENDER



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

D2: DRY CHEMICAL POWDER TENDER

1.0.0 SCOPE

1.1.0 SCOPE OF SUPPLY

- i) DCP tender (1 no.) ,conforming to IS: 10993 & latest, complete with all accessories and equipment's as specified herein & including those specified in **Appendix-2** ,Sub section-ID.
- ii) First fill of chemicals & consumables during performance demonstration.
- iii) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

1.2.0 SCOPE OF SERVICES

Performance demonstration of foam tender at site and training of owner's personnel.

2.0.0 CODES AND STANDARDS

The design, material of construction, workmanship & finish, performance and accessories of dry powder tender as specified herein shall comply with the requirements of codes / standards as follows:

IS: 14609 – 1999(Reaffirmed-2010) Functional requirements for dry chemical powder (Mono ammonium Phosphate based).

IS: 10993 - Functional requirements for 2000 kg capacity dry powder tender for fire brigade use.

3.0.0 GENERAL REQUIREMENTS

3.1.0 The chassis for carrying out fabrication work of DCP tender shall be of Make-TATA 1613/42 4225 mm WB or equivalent. The chassis shall be equipped with power assisted steering.

3.2.0 The appliance shall have dry powder unit to contain 2000 kg of dry powder in vessel(s). 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.

3.3.0 The appliance shall be fabricated in a manner so as to conform to the following characteristics.

- | | | |
|----|----------------------|---|
| a) | Gross vehicle weight | Not less than 8500 Kg including crew, dry powder and equipment. |
|----|----------------------|---|



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- b) Maximum speed on level road fully laden. 72 Km / h.
- c) Acceleration from a standing start through the gears, fully laden 63 Km/h in 55 seconds
- d) The appliance shall be capable of being started from rest on a gradient of 1 in 4
- e) When travelling at 48 km / h on a level dry surface the foot brake shall be capable of stopping the vehicle within a distance of 15 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 more than 230 mm
 - Overall width not more than 2.50 m

4.0.0 DESIGN AND CONSTRUCTION

4.1.0 Engine

- 4.1.1 The engine shall be compression ignition type and provided with 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.
- 4.1.2 The operating temperature of the engine cooling water shall preferably be thermostatically controlled.
- 4.1.3 The oil in the oil sump shall be prevented from overheating
- 4.1.4 Suitable gauge for indicating temperature of water and for oil pressure shall be provided on the instrument panel in the driver's cab.
- 4.1.5 External filter shall be provided for the engine lubricating system and a tubular dipstick to gauge the level of oil in the oil sump shall be provided.

4.2.0 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.



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

4.2.2 All important electrical circuits shall have separate fuses suitably indicated and shall be grouped into a common fuse box located in an accessible position in driver's 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.

4.3.0 Body Work

4.3.1 The body shall provide enclosed accommodation for two persons including the driver. Both the seats will be independent. The cabin shall have two doors, one on either side. The door shall be hinged in front, opening outward and shall have double catch striking plates. The rear body shall provide accommodation for the dry powder vessels and the equipments mentioned in appendix 2. The flooring of the rear body shall preferably be provided with light alloy chequered plates.

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

4.3.4 The cab and the locker shall be composite construction with sufficient rigidity and reinforcement shall be kept as light as possible. Pressed section of sufficient strength shall be used for the super structure.

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

4.3.6 All light fittings at the rear shall be suitably protected by expanded metal to prevent damage due to movement of crew.

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

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

4.3.9 A battery operated public address system, with amplifier and microphone in the cab, shall be provided.

4.4 Dry Powder fire Extinguishing Equipment

4.4.1 Dry chemical powder (Mono ammonium Phosphate based) shall conform to IS: 14609 – 1999(Reaffirmed-2010). For further details, bidder to refer Customer specification at SUB SECTION -IC.



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- 4.4.2 A long-range monitor shall be mounted on an independent platform just behind the drivers 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 the movement of the operator.
- 4.4.3 The discharge rate of the powder shall be not less than 5 kg per second through each hose reel and through 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 per second at operating pressure. The throw of the monitor shall not be less than 40 m horizontally and 30 m vertically in still air.
The total discharge of the powder shall not be less than 90 percent of the total contents. The vessel shall be provided with the arrangement for discharging the excess expellant gas in to the atmosphere even if the vessel is full with dry powder, the excess air should not affect the powder charge.
- 4.4.4 Efficient means shall be provided for flushing the monitor hose-reel and manifold with the expellant gas after use. The operating lever shall be located at the control panel. An additional connection shall be provided in the common manifold, with required valve connection, to flush out the powder in the monitor and the hose-reel using air from the 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/cm². The gas shall be sufficient to discharge 2000 kg of dry powder through the long-range monitor and hose reel in accordance with the requirement of clause no. 4.4.3
- 4.4.6 Sufficient amount of the expellant gas shall be available in the cylinder to flush the monitor, hose reel and the manifold when the supply of powder is exhausted. Arrangement shall be made to prevent the back flow of the expellant gas.
- 4.4.7 The monitor shall be provided in such 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, or 40 kg/s by pushing or turning the operating lever. It shall be capable to work on any angle up to 360° horizontally and 100° vertically. Suitable control 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, one on either side of the appliance, shall be provided at easily accessible locations so as to facilitate quick withdrawal. Arrangement shall be made to prevent the 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 5 kg of powder per second at a pressure of 14 kgf/cm².
- 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 outlet.
- 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.



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

4.5.0 Control Panel

4.5.1 Adequately illuminated control panel shall be provided at easily accessible position to operate the dry powder system. All controls/items of 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 valve for hose reels;
- d) Switches for lighting arrangement; and
- e) Instruction plate for operation, with line diagram.

4.6 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 on either side, the point on which over turning occurs is not passed at an angle of 25° from the horizontal.

5.0.0 WORKMANSHIP AND FINISH

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

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

5.3.0 The appliance shall be painted in fire red colour conforming to Shade No. 536 of IS: 5. The paint shall conform to IS: 2932-1974.

6.0.0 INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT

6.1.0 **Instruction Book(s)** – Instruction book(s) for the guidance of the user, including both the operating and normal operating procedures, shall be supplied.

6.2.0 Accessories –

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



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- a) Electrically operated siren - 1 number, working on the batteries of the appliance, with its switch in the drivers 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 - Lamp suitably situated to assist reversing.
- d) Airfield obstruction marking lights – two. One of these shall be fitted in the front and the other at the rear of the appliance.
- e) Revolving beacon light – of blue colour, capable of throwing beams of blue light around 360o with beams including upwards, horizontally and downwards. It shall be mounted on cab's 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 30 m of TRS cable on a reel mounted on the appliance.
- g) Spot light - Adjustable, mounted in a convenient position on the near side of the driving compartment.
- h) 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.
- i) Tools - All tools required for normal maintenance of the appliance that are not included in the standard kit of tools for the chassis.
- j) Windscreen wiper – two, electrically operated.

6.3.0 Equipment- The appliance shall be provided with the equipment detailed in **Appendix-2**, Sub section-ID. Bidders to include supply of these equipments in their scope.

7.0.0 MARKING

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

- a) Manufacturer's name, or trademark, if any.
- b) Year of manufacturer
- c) Any other marking as required during detail engineering.

8.0.0 ACCEPTANCE TESTS

The following acceptance tests on various equipment shall be conducted to meet guaranteed parameters and shall be carried out in accordance with relevant IS Code.



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- a) Pump test
- b) Primer test
- c) Road test
- d) Stability
- e) Any other test as specified in latest standard IS 10993.

Further to this bidder to refer attached sample reference quality plan Appendix-6, for bare minimum test to be conducted during inspection in the present of BHEL and NTPC. Also, bidder to submit the quality plan for tendered project for approval from BHEL and NTPC, any additional test if required during document approval, to be accepted by bidder without any cost implication to BHEL.



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE TENDER & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

APPENDIX-2

LIST OF EQUIPMENTS TO BE SUPPLIED WITH THE DCP TENDER

S.No.	Equipment / Item	Quantity
1.0	Fireman's axes (IS: 926)	2
2.0	Axe, large (IS: 5505)	1
3.0	Axe, hand (IS: 5505)	1
4.0	Shove (IS: 274)	1
5.0	Spare expellant gas cylinders, each of 50 litres capacity, filled with gas.	4



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : ID

D3- SCOPE OF SUPPLY FOR FOAM TENDER

&

APPENDIX-3 : SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH FOAM TENDER



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

D3: FOAM TENDER

The foam fire tender including all accessories shall be designed & manufactured as per the following specifications and sound engineering practice.

All the equipments & accessories shall be fixed on the appliance in a compact & neat manner & so placed that each part is easily & readily accessible for use and maintenance. Foam fire tender with aerodynamic design generally confirming to IS 10460.

For further details, bidder to refer Customer specification at **SUB SECTION IC**. However, for all those items for which details are not covered below relevant IS standard (latest revision) may be referred to.

Further to this bidder to refer attached sample reference quality plan Appendix-6, for bare minimum test to be conducted during inspection in the presence of BHEL and NTPC. Also, bidder to submit the quality plan for tendered project for approval from BHEL and NTPC, any additional test if required during document approval, to be accepted by bidder without any cost implication to BHEL.



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

APPENDIX-3

LIST OF EQUIPMENTS TO BE SUPPLIED WITH THE FOAM TENDER

For detailed list of equipments to be supplied with Foam tender, bidder to refer Customer specification at SUB SECTION-IC.

However, for all those items for which details are not covered below relevant IS standard (latest revision) may be referred to.



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : ID

D4- SCOPE OF SUPPLY FOR FIRE JEEP WITH TRAILER PUMP

&

APPENDIX-4 : SCHEDULE OF EQUIPMENTS TO BE SUPPLIED WITH FIRE JEEP WITH TRAILER PUMP



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

D4: FIRE JEEP WITH TRAILER PUMP

1.0.0 SCOPE

1.1.0 SCOPE OF SUPPLY

- i) Fire Jeep with Trailer pump (1 no.) ,conforming to IS: 944 & latest, complete with all accessories and equipment's as specified herein & including those specified in **Appendix-4** ,Sub section-ID.
- ii) First fill of chemicals & consumables during performance demonstration.
- iii) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

1.2.0 SCOPE OF SERVICES

Performance demonstration of foam tender at site and training of owner's personnel.

2.0.0 CODES AND STANDARDS

The design, material of construction, workmanship & finish, performance and accessories for fire jeep with trailer pump as specified herein shall comply with the requirements of codes/standard as follows:

- a) IS: 944 - Functional requirement of trailer pump.

3.0.0 GENERAL REQUIREMENTS

- 3.1.0 The trailer pump shall consist of a pump of capacity of not less than 1800 ltrs./min at 0.7 MN/m² (7.0 kgf/cm²) pressure, driven by an internal combustion engine. The combined unit being permanently mounted on a trailer with the pump at the rear, and shall be capable of being towed to safety by a standard vehicle (Jeep).
- 3.2.0 **Overall Dimensions** - The overall length of the whole unit shall not exceed 3.3 m, the height shall not exceed 1.6 m (with spot light) and the wheel track shall not exceed 1.4 m.
- 3.3.0 **Jeep** - The Jeep to be supplied for carrying trailer pump shall be of reputed make with minimum engine of 2500 cc.

4.0.0 MATERIAL

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



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

4.1.1 All the parts, which shall form waterways or come in contact with water, shall be of corrosion-resisting materials or be treated for corrosion resistance. All metal parts exposed to atmosphere shall either be of corrosion-resisting material or treated in an approved manner to prevent corrosion. The following materials shall be followed:

- | | |
|--|---|
| a) Trailer chassis frame | Suitable mild steel sections |
| b) Axle | Carbon steel or mild steel |
| c) Pump casing | Aluminium alloy Grade 4600 A
of IS:617 or leaded tin bronze
(Grade II of IS: 318) |
| d) Impeller ring and
impeller neck ring | Leaded tin bronze (Grade II of
IS:318) |
| e) Pump shaft | Stainless steel Grade 04 Cr. 18 Nilo
of IS:6603 |
| f) Engine cover and
pump panel | Mild steel sheets (IS: 513
ordinary grade) |

5.0.0 DESIGN AND CONSTRUCTION

5.1.0 **Engine** - The IC engine shall have not less than 4 cylinders and shall conform to IS: 1601. The brake horsepower development shall be at maximum working load. Engine shall have at least 5% power to work the pump at its rated output at 0.7 MN/m² (7 kgf/cm²) pressure and shall have sufficient reserve power. The engine shall also be provided with a generator/alternator for charging 12-volt battery with a capacity of 92 Ah at 10-hour rate. Hand cranking arrangement shall also be provided.

5.1.1 In case of water-cooled engine Indirect-cooling system of the open-circuit type in which water is discharged to waste shall be provided so that engine temperature is maintained in range of temperature recommended by engine manufacturers. This shall consist of header tank incorporating copper coils. Water for cooling in the tank shall be fed from the main centrifugal pump and after having circulated through the coils shall go to waste which shall not exceed 30 min. Drain plug shall be provided. Filter capable of being cleaned readily when the pump is in operation shall also be provided.

5.1.2 Lubricating system shall be provided with an accessible external filter and means to gauge with reasonable accuracy during running, the level of the oil in the sump, preferably by a tubed dipstick. The oil filter shall be so arranged as to permit oil to be replenished while the unit is running.

5.1.3 The engine exhaust shall be arranged so as to discharge as far as possible, away from the pump operation position.



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- 5.1.4 The engine fuel tank and water tank shall be protected by a suitably designed cover so arranged as to give easy access to the engine for operational purpose without removing the whole cover. The engine cover should be louvered so as to permit adequate air circulation. The battery shall be easily removable and shall have covers and held properly so that it is not displaced during towing.

5.2.0 Fuel System

- 5.2.1 A fuel tank of adequate capacity for a minimum continuous run of 2 hours without refuelling and a graduated dipstick should be provided.
- 5.2.2 The filling orifice of ample size shall be positioned away from the exhaust pipe and shall be accessible without removing the engine covers. The cap shall be clearly marked with type of fuel and shall incorporate an anti-flash device.
- 5.2.3 There shall be one fuel pump which shall be mechanically operated. It shall be preferably provided with a drain plug.

5.3.0 Pump

- 5.3.1 The pump shall be of the centrifugal type. It shall be of single its characteristics should match with the engine ratings for continuous running Glands of suitable type shall also be provided. A drain plug shall be provided at the bottom of the casting.
- 5.3.2 The impeller shall be dynamically balanced. The pump shall show no leakage when subjected to a hydraulic pressure of 25 kgf/cm².
- 5.3.3 The pump shall be tested for its performance duties as detailed in 5.3.4 and 5.3.5 at water temperature of 27 ± 2 deg. C and at a pressure of 760 mm Hg.

The following allowances (deductions) shall be made:

Allowance for Output:

- a) 1 percent for every 2.5 deg C rise in water temperature.
- b) 4 percent for every 300 m elevations above mean sea level.
- c) No allowance shall be made for humidity up to 75%. However deduction at the rate of 1 percent of every 5% change in humidity shall be made when humidity changes from 75 to 95% percent.

Allowance for Lift

- a) 30 cm for every 300 cm elevation above mean sea level, and
- b) 1 percent for 2.5 deg. C rise in water temperature.



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- 5.3.4 The pump when tested in conditions as mentioned in 5.3.3 shall be capable of giving requirements given in Table 1 when running at not more than 4000 rev./min of impeller-shaft and working with all internal and external strainers (except basket strainer) fitted.
- 5.3.5 The pump shall run continuously for a period of 4 hours delivering rated output at 3 m lift and at 0.7 MN/m² (7 kgf/cm²) pressure. During this test the water in the engine cooling system shall not be replaced and the temperature of engine lubricating oil shall not exceed the specified value.

TABLE PERFORMANCE DUTIES OF TRAILER FIRE FIGHTING LARGE PUMP 1800-1/min.

(Clause 5.3.4)

OUTPUT	PRESSURE	LIFT (MEASURED VERTICALLY FROM WATER LEVEL TO SUCTION EYE)	CONDITIONS
(1)	(2)	(3)	(4)
1/min 1 800	MN/m ² (kgf/cm ²) 0.7 (7.0)	m 3.0	Working through 5 m, that is two 2.5 – m lengths of specified suction hoses.

- 5.3.6 The make round thread suction eye shall be provided with a standard 100-mm suction connection conforming to IS: 992 with internal strainer and blank cap. The strainer shall be readily removable but shall be retained firmly in position when in use. There shall be two delivery valves conforming to IS: 4928 with 63-mm female instantaneous hose connection, and blank caps. Blank cap shall incorporate means for relieving pressure between the valve and the cap.
- 5.4.0 The primer shall be capable of lifting water at least 7.0 m (measured vertically from water level to the centre of suction eye of the pump) in not more than 24 seconds from the time it is engaged after 24 seconds and shall preferably be fully automatic
- 5.5.0 **Transmission** – The assembly of the pump and engine shall be as compact as possible as possible and preferably a clutch flexible couplings or any other suitable measure shall be incorporated between the pump and the engine. The engine and pump should be mounted on anti vibration mountings so as to reduce vibration to minimum.
- 5.6.0 **Control and Instruments** – The illuminated pump panel provided adjacent to the suction eye and delivery valve shall include the following:



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

- a) Ignition switch:
- b) Throttle control
- c) Ammeter
- d) Choke for petro engine
- e) Gauges
 - 1) Compound gauge calibrated as follows:
Vacuum - 0 to 75 cmHg

Pressure - (0 to 5 kgf/cm²)
- f) Temperature gauge:
- g) Oil pressure gauge:
- h) Pump and pump panel light:
- i) Primer control (if primer is not fully automatic):
- j) Spot light adjustable switch:
- k) Fuel contents gauge:

5.7.0 Trailer

- 5.7.1 The trailer frame shall incorporate two semi-elliptic spring conforming to IS:1135 and axles. Cross country type pneumatic tyres of 6.00 x 16 size. 6 ply shall be used for the unit. The whole unit shall be compact and the pumping unit shall be so mounted as to bring centre of gravity as low as possible.
- 5.7.2 The centre of gravity of the whole unit shall be slightly forward of the wheel axle when the towing eye is 66 cm above the ground level. The trailer shall not tilt backward when resting on front leg. No part of the trailer shall have a clearance less than 23 cm when the trailer is tilted so as to raise the height of the eye 65 cm or to lower it to 45 cm. In towing position the height of the towing eye shall normally be 55 cm above ground level.
- 5.7.3 When the fully laden trailer is being towed at 20 km/h in cross country for 2 km and in normal traffic conditions on tar road for 10 km, the trailer shall hold the road well. The axle shall not distort and the alignment of the wheels is ensured.
- 5.7.4 Efficient brakes shall be provided on the two wheels, operation through compensating gear by over-run. A hand lever situated in an accessible position at the front of the trailer frame shall be provided for operating the brake when the trailer is disconnected from the towing



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

vehicle. The 'OFF' position of the trailer frame shall be towards the front of trailer and there shall be ratchet or similar device to hold the brake in the 'ON' position.

- 5.7.5 Two handles (man-handling bars) of mild steel, each not less than 50 cm long and which can be folded and secured along the frame when not in use shall be provided at the front of the trailer frame. These handles shall be at least 15 cm above the level of the towing eye.
- 5.7.6 Two eyes for the attachment of drag ropes shall be provided in suitable position. Four slinging eyes shall be provided two of which may be drag eyes.
- 5.7.7 Two jacklegs in the rear and one in the front capable of being lowered into position and adequately secured to provide a suitable base for the unit, when pumping or standing unattached, shall be provided. The legs shall have 200 mm round mild steel plates, dished upwards, welded to the base of the pipe legs to prevent penetration into the earth when standing unattached. The legs shall be capable of being positively locked in the 'housed' position.
- 5.7.8 Provision shall be made on the trailer for carrying equipment detailed in Appendix – A.
- 5.8.0 **Stability** – The stability of the whole unit shall be such that under equipped conditions and with the front supported to produce the normal towing position, if the surface on which the appliance stand is tilted to either side to an angle of 25 degrees from the horizontal, the point at which the overturning occurs is not passed.
- 5.9.0 Towing Eye and Draw-Bar**
- 5.9.1 The towing eye and draw bar shall be of substantial construction. The towing eye shall have an internal diameter of 75 mm and shall be of high quality forged steel of not less than (63 x 102 kgf/cm²) ultimate tensile stress or other suitable material capable of giving suitable performance. The shank shall be adequately machined with adequate radius at the shoulders.
- 5.9.2 To ensure that the housing will withstand shock loads inherent under towing condition, it is essential that the design of the eye and housing and the means of fixing the housing the trailer chassis frame will take care of a draw pull of (1100 kg) without being overstressed.
- 5.9.3 The shank of the towing eye shall be mounted in the housing so as to absorb shocks in both directions of movement for forward to cushion, the shock of taking the two load, and backward to regulate the rate of application of brakes. The compensation mechanism shall be such as to give a smooth tow at all reasonable speeds on average road surface.
- 5.10.0 **Mass** – The mass of the complete unit shall not exceed 1150 kg including water, fuel and oil but without equipments as mentioned in Appendix-4.
- 6.0.0 WORKMANSHIP AND FINISH**
- 6.1.0 All parts of the appliance shall have goods workmanship



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

6.2.0 The appliance shall be painted in fire red colour conforming to Shade No.536 of IS: 5. The paint shall conform to IS: 2932.

7.0.0 ACCESSORIES AND EQUIPMENT

7.1.0 Accessories - The following accessories shall be provided:

- a) Electric Taillight with number Plate - The electric cable from this light shall terminate in a plug at the front of the trailer.
- b) Tools – A kit of all essential tools required for normal maintenance of the appliance.
- c) Headlight – Headlight of not more than 150 mm diameter on the trailer pump.

7.2.0 Equipment - The list of the equipments to be provided in the trailer is given in clause no. 9.0.0 and Appendix-4. Bidders to include supply of these equipments in their scope.

8.0.0 MARKING

The trailer pump shall be clearly and permanently marked with the following information:

- a) Manufacturer's name and trade-mark:
- b) The output capacity of the pump in 1/min.: and
- c) Year of manufacture.
- d) Any other marking as required during detail engineering.

9.0.0

EQUIPMENT TO BE PROVIDED IN TRAILER PUMP

Sl. No.	EQUIPMENT	QUANTITY
1.	100-mm suction hose conforming to IS: 241 in 4.5 m lengths with 100-mm suction hose coupling conforming to IS: 902	2 No.
2.	Suction wrenches for 100-mm suction hose couplings conforming to IS: 4643.	2 No.
3.	Suction strainer for 100-mm suction hose conforming to IS: 907.	1 No.
4.	63-mm delivery hose conforming to IS: 4927 in 30 m lengths with instantaneous couplings	4 No.



**3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

conforming to IS:903.

5. Rope, manila – 15 m conforming to IS: 10841 No.
6. Suction adopters 100-mm female to 63-mm instantaneous male. 1 No.
7. Branch pipes 63 mm conforming to IS: 903. 2 No.

10.0.0 ACCEPTANCE TESTS

The following acceptance tests on various equipment shall be conducted to meet guaranteed parameters and shall be carried out in accordance with relevant IS Code.

- a) Pump test
- b) Primer test
- c) Road test
- d) Stability
- e) Any other test as specified in latest standard IS 944.

Further to this bidder to refer attached sample reference quality plan Appendix-6, for bare minimum test to be conducted during inspection in the present of BHEL and NTPC. Also, bidder to submit the quality plan for tendered project for approval from BHEL and NTPC, any additional test if required during document approval, to be accepted by bidder without any cost implication to BHEL.



3 X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

APPENDIX-4
LIST OF EQUIPMENTS TO BE SUPPLIED WITH THE TRAILER PUMP

S.No.	Equipment / Item	Quantity
1.0	63 mm unlined delivery hose or controlled percolating hose 30 m length with male and female couplings.	10 No.
2.0	Aluminium extension ladder, 7.5 m	1 No.
3.0	63 mm rubber lined delivery hose 30 mm length with male and female coupling.	10 No.
4.0	Hose bandages.	6 No.
5.0	Double female couplings 63 mm.	2 No.
6.0	Rubber washers for 63 mm couplings.	40 No.
7.0	Dividing breaching, with control, 63 mm instantaneous	1 No.
8.0	Collecting breaching, 63 mm instantaneous	1 No.
9.0	Hydrant standpipe, double outlet.	1 No.
10.0	Branch with revolving head (with branch pipe) for 63 mm size instantaneous hose couplings.	1 No.
11.0	Branch pipes for 63 mm size instantaneous hose couplings	1 no.
12.0	Nozzles a) 6 mm b) 12 mm c) 20 mm d) 25 mm	2 No. 2 No. 2 No. 2 No.
13.0	Torch flash light, 3 cells	2 No.
14.0	Fire extinguisher, carbon-dioxide type, 2 kg capacity	1 No.
15	Fire extinguisher, dry powder type, 2 kg	1 No.
16.0	First aid box for 10 persons.	1 set
17.0	Rubber gloves	1 pair
18.0	Fireman's axe, large	1 No.
19.0	Shovels	2 No.
20.0	Pick axe, 1 kg weight	1 No.
21.0	Crow bar with chisel and claws 1 m length	1 set
22.0	Hand rip saw 65 mm	1 No.
23.0	Spanner, adjustable, 30 cm	1 No.
24.0	Fire hook	1 No.
25.0	Asbestos gauntlets, 40 cm	2 No.
26.0	Foam compound for producing mechanical foam 20 litres drum	2 No.
27.0	Foam making branch pipe FB5	1 No.
28.0	Head collecting three ways 100 mm	1 No.
29.0	Branch pipe universal	1 No.
30.0	Key hydrant	1 No.
31.0	Rope manila-30 m	1 No.
32.0	Hose clamp	1 No.
33.0	Shears or bolt clippers 60 cm	1 pair
34.0	Jack screw, lifting 4 tonnes	1 No.
35.0	Hand tool bag (leather)	1 No.
36.0	Grease gun	1 No.
37.0	Oil can (2 litres)	1 No.
38.0	Petrol can (9 litres)	1 No.
39.0	Oil filling funnel	1 No.
40.0	Petrol filling funnel	1 No.
41.0	Sledge hammer 6.5 kg	1 No.



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : ID

D4- SCOPE OF SUPPLY FOR FIRE SAFETY EQUIPMENT



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-I

SUB SECTION-ID

REV. 0

D5: SAFETY EQUIPMENTS

1.0.0 SCOPE

1.1.0 SCOPE OF SUPPLY

Fire safety equipment as specified below, conforming to relevant IS standard & latest, complete with all accessories and equipment's.

1.2.0 SCOPE OF SERVICES

Performance demonstration of equipment at site and training of owner's personnel.

2.0.0 CODES AND STANDARDS

The design, material of construction, workmanship & finish, performance and accessories for fire safety equipment as specified herein shall comply with the requirements of codes/standard as follows:

- a) Relevant IS code.

3.0.0 GENERAL REQUIREMENTS:

For details of safety equipment's mentioned below from item number 1 to 7, bidder to refer Customer specification at Sub section IC.

- 1) Four (04) Nos. of fire suits as per relevant IS code.
- 2) Ten (10) Nos. of breathing apparatus as per relevant IS code.
- 3) Two sets of first aid kits as per relevant IS code.
- 4) Two sets of telescopic ladders as per relevant IS code.
- 5) Ten (10) sets of fiber glass blankets as per relevant IS code.
- 6) Four (4) nos. multi-purpose nozzles.
- 7) One (1) no. portable thermal imaging camera.

4.0.0 MAKE

Each Safety equipment mentioned above from item number 1 to 7 shall be designed, constructed, tested and painted in accordance with respective Indian/International Standard and marked with BIS Certification.



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

DOCUMENT NO.: **PE-TS-434-550-A001****SECTION-I****SUB SECTION-ID**

REV. 0

5.0.0 INSPECTION & TESTING

Bidder to furnish the test certificates, internal reports and Certificate of Conformance to BHEL and NTPC for acceptance.



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : ID

APPENDIX-5: LIST OF MAINTENANCE TOOLS & TACKLES



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT**

DOCUMENT NO.: PE-TS-434-550-A001

SECTION-ID

REV. 0

APPENDIX-5

LIST OF MAINTENANCE TOOLS & TACKLES

4 (Four) Sets: One for each type of Fire tender, DCP TENDER, Foam tender and Fire jeep

Sl. No	ITEM	QUANTITY
1.	DE spanner set 6.25 mm	1 set
2.	Ring spanner set 6.25	1 set
3.	Adjustable wrench 200 mm	1 No.
4.	Pliers cutting	1 No
5.	Pliers round nose 150 mm	1 No
6	Pipe wrench 300 mm	1 No
7	Screw driver 150 mm	1 No
8	Screw driver 250 mm.	1 No
9	File half round smooth 150 mm	1 No
10	Hammer ball pen ½ kg.	1 No
11	Grease gun.	1 No
12	Oil feeder.	1 No
13	Carpenter saw 450/500	1 No

Note : Apart from above mentioned tool list, Bidder is required to furnish other tools as recommended by Chassis manufacturer / Fire tender fabricator.



3 X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: I

SUB-SECTION: ID

REV NO : 0

VOLUME - II B

SECTION: I

SUB-SECTION : ID

APPENDIX-6: REFERENCE QUALITY PLAN



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	WATER TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

1.	Chassis	Make, Engine No. & Chassis No.	Major	Correlation	100%		Vehicle Mfr. / authorized dealer documents	Vehicle Mfr. / authorized dealer documents			P	V	V	
2.	Raw Material													
a)	M.S. Plate for Water tank	Chemical & Mechanically property	Major	Chemical & Mechanically property	1 / Lot		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	T.C.	√	P	V	V	Test Report of approved Lab for drawn sample from 1 /Lot
b)	Raw material for Pump casing, impeller and shaft	Chemical & Mechanical		Chemical & Mechanical	1 / Lot		Approved Drg. / DS	Approved Drg. / DS	T.C.	√	P	V	V	Test Report of approved Lab for drawn sample from 1 /Lot

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 1 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:	07.01.2017	ITEM:	WATER TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

3.	Inprocess													
a)	Fabrication of Water tank	Visual & Dimension Incl.	Minor	Dimensional (Visual)	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	√	P	V	V	
b)	Leak test of Water Tank	Leak test	Major	Leak test (0.3 Bar)	100%		Approved Drg. / DS/ IS: 950	No Leakage	IR	√	P	V	V	
c)	Pump casing	Hydro test	Major	21 Kg/cm ²	100%		At 21 Kg/cm ² for 30 min.	No Leakage	IR	√	P	V	V	
d)	Impeller	Dynamic Balancing	Major	Balancing report	100%		ISO 1940 GR. 6.3	ISO 1940 GR. 6.3	Balancing report	√	P	V	V	
e)	Ultrasonic test on shaft for dia. > 50mm	Sub-surface defects	Major	Ultrasonic test	100%		ASTM A 388	When back wall Echo (BWE) set to 100% Full screen Height (FSH), a defect echo > 20% FSH is not acceptable. Also loss of BWE > 20% is not acceptable	Ultrasonic test report	√	P	V	V	

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 2 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	WATER TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

4.	Final Inspection of complete Fire Truck	a) Leakage Test of Pipeline & Valves,	Major	Visual	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	V	V	
		b) Road Test & Braking test	Major	Visual	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	
		c) Pump Running Test & performance	Major	Four Hour run test as per IS: 950 operational	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	
		d) Priming Performance test	Major	Operational as per IS: 950	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	
		e) Control Panel Operation check	Major	Operational	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	
		f) Monitor Performance Test	Major	Functional	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	
		g) Water Hose reels testing	Major	Functional	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	
		h) Electrical Function Test	Major	Functional	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	✓	P	W	W	

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 3 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	WATER TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

		i) Determination of Actual pay load	Major	Visual	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	√	P	W	W	
		j) Static Stability test	Major	Visual	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	√	P	W	W	
		k) Completeness of Equipment	Major	Verification of various accessories	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	√	P	W	W	
		l) Painting Quality (both Internal & External)	Major	DFT, Paint shade	100%		Approved Drg. / DS/ IS: 950	Approved Drg. / DS/ IS: 950	IR	√	P	V	V	

Note:

1. Manufacturer TC for Branch Pipe / Coupling / Nozzle and Hose shall be produced for verification during Final Inspection.
2. Makes of Schedule of Equipments as per Annexure-I of TDS & G.A. of Water Fire Tender (Doc. No. PE-V0-405-550-A001) will be supplied as per manufacturer standard.

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 4 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I



BHEL DOC. NO.: PE-V0-405-550-A003

REVISION 00

DATE: 02.02.2017

REFERENCE QUALITY PLAN FOR FOAM TENDER

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:
				BHEL QAP NO.:
				NTPC QAP NO.:
OWNER:		SUB VENDOR:	N.A.	REV. NO.:
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:
CONTRACT / JOB / P.O. NO.:		ITEM:	FOAM TENDER	ITEM CATEGORY:

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

1.	Chassis	Make, Engine No. & Chassis No.	Major	Correlation	100%		Vehicle Mfr. / authorized dealer documents	Vehicle Mfr. / authorized dealer documents			P	V	V	
2.	Raw Material													
a)	M.S. Plate for Water tank	Chemical & Mechanically property	Major	Chemical & Mechanically property	1 / Lot		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	T.C.	√	P	V	V	Test Report of approved Lab for drawn sample from 1 /Lot
b)	S.S. Plate for Foam tank	Chemical & Mechanically property	Major	Chemical & Mechanically property	1 / Lot		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	T.C.	√	P	V	V	Test Report of approved Lab for drawn sample from 1 /Lot
c)	Raw material for Pump casing, impeller and shaft	Chemical & Mechanical		Chemical & Mechanical	1 / Lot		Approved Drg. / DS	Approved Drg. / DS	T.C.	√	P	V	V	Test Report of approved Lab for drawn sample from 1 /Lot

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 1 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	FOAM TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

3.	Inprocess													
a)	Fabrication of Water and Foam tank	Visual & Dimension Incl.	Minor	Dimensional (Visual)	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	√	P	V	V	
b)	Leak test of Water and Foam Tank	Leak test	Major	Leak test (0.3 Bar)	100%		Approved Drg. / DS/ IS: 10460	No Leakage	IR	√	P	V	V	
c)	Pump casing	Hydro test	Major	21 Kg/cm ²	100%		At 21 Kg/cm ² for 30 min.	No Leakage	IR	√	P	V	V	
d)	Impeller	Dynamic Balancing	Major	Balancing report	100%		ISO 1940 GR. 6.3	ISO 1940 GR. 6.3	Balancing report	√	P	V	V	
e)	Ultrasonic test on shaft for dia. > 50mm	Sub-surface defects	Major	Ultrasonic test	100%		ASTM A 388	When back wall Echo (BWE) set to 100% Full screen Height (FSH), a defect echo > 20% FSH is not acceptable. Also loss of BWE>20% is not acceptable	Ultrasonic test report	√	P	V	V	

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 2 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	FOAM TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		10			11

4.	Final Inspection of complete Fire Truck	a) Leakage Test of Pipeline & Valves,	Major	Visual	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	V	V	
		b) Road Test & Braking test	Major	Visual	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		c) Pump Running Test & performance	Major	Four Hour run test as per IS 10460 operational	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		d) Priming Performance test	Major	Operational as per IS: 10460	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		e) Control Panel Operation check	Major	Operational	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		f) Monitor Performance Test	Major	Functional	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		g) Water Hose reel testing	Major	Functional	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		h) Electrical Function Test	Major	Functional	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 3 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	FOAM TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		10			11

		i) Stowage of DCP 75 Kg. x 02 Nos.	Major	Visual	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	V	V	
		j) Determination of Actual pay load	Major	Visual	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		k) Static Stability test	Major	Visual	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		l) Completeness of Equipment	Major	Verification of various accessories	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	W	W	
		m) Painting Quality (both Internal & External)	Major	DFT, Paint shade	100%		Approved Drg. / DS/ IS: 10460	Approved Drg. / DS/ IS: 10460	IR	✓	P	V	V	

Note:

1. Manufacturer TC for Foam Monitor, Foam compound Proportioner, Branch Pipe / Coupling / Nozzle and Hose shall be produced for verification during Final Inspection.
2. Makes of Schedule of Equipments as per Annexure-I of TDS & G.A. of Foam Fire Tender (Doc. No. PE-V0-405-550-A002) will be supplied as per manufacturer standard.

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P – PERFORM; W – WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 4 of 4			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

**NORTH KARANPURA TPP****(3 X 660 MW)**

BHEL DOC. NO.: PE-V0-405-550-A003

REVISION 00

DATE: 02.02.2017

REFERENCE QUALITY PLAN FOR DCP TENDER

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	DCP FIRE TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		10			11

1.	Chassis	Make, Engine No. & Chassis No.	Major	Correlation	100%		Vehicle Mfr. / authorized dealer documents	Vehicle Mfr. / authorized dealer documents			P	V	V	
2.	Raw Material													
a)	M.S. Plate for DCP tank	Chemical & Mechanically property	Major	Chemical & Mechanically property	1 / Lot		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	T.C.	√	P	V	V	
3.	Final Inspection of complete DCP Fire Truck	a) Leakage Test of DCP Pipeline & Valves,	Major	Visual	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	√	P	V	V	
		b) Road Test & Braking test	Major	Visual	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	√	P	W	W	
		c) Control Panel Operation check	Major	Operational	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	√	P	W	W	
		d) DCP Vessel (2x1000 Kgs.)	Major	Leakage	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	√	P	V	V	

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER / APPROVED LAB; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 1 of 2			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	DCP FIRE TENDER	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

		e) Hose reel, Performance test	Major	Functional	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	✓	P	W	W	
		f) Monitor Performance Test	Major	Functional	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	✓	P	W	W	
		g) Completeness of Equipment	Major	Verification of various accessories	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	✓	P	W	W	
		h) Determination of Actual pay load	Major	Visual	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	✓	P	W	W	
		i) Static Stability test	Major	Visual	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	✓	P	W	W	
		j) Painting Quality (both Internal & External)	Major	DFT, Paint shade	100%		Approved Drg. / DS/ IS: 10993	Approved Drg. / DS/ IS: 10993	IR	✓	P	V	V	

Note:

1. Manufacturer TC for DCP Monitor, DCP vessel, and Hose reel shall be produced for verification during Final Inspection.
2. PESO approved for all Nitrogen Cylinders will be submitted.
3. Makes of Schedule of Equipments as per Annexure-I of TDS & G.A. of DCP Fire Tender (Doc. No. PE-V0-405-550-A004) will be supplied as per manufacturer standard.
4. DCP shall confirm to IS 14609-1999 (Reaffirmed-2010).

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER / APPROVED LAB; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 2 of 2			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

**NORTH KARANPURA TPP****(3 X 660 MW)**

BHEL DOC. NO.: PE-V0-405-550-A003

REVISION 00

DATE: 02.02.2017

REFERENCE QUALITY PLAN FOR FIRE FEED WITH TRAILER PUMP

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	JEEP WITH TRAILER FIRE PUMP	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

1.	Jeep	Make, Engine No., Chassis No. Mahindra Bolero SLE BS-IV Cab Jeep	Major	Correlation	100%		Vehicle Mfr. / authorized dealer documents	Vehicle Mfr. / authorized dealer documents			P	V	V	
2.	Fabricated Items													
a)	TFP Chassis	1. Properties of sheets	Major	Physical & Chemical	1/ Batch heat		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	TC	√	P	V	V	
		2. Channels	Major	Physical & Chemical	1/ Batch heat		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	TC	√	P	V	V	
b)	Fire Water Pump (‘Allied’ make)	1. Raw material for casing, Impeller & shaft	Major	Physical & Chemical	1 / Lot		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	TC	√	P	V	V	Test Report of approved Lab for drawn sample from 1 /Lot
		2. Balancing of Impeller	Major	Dynamic Balancing	100%		Balancing certificate	Balancing certificate	TC	√	P	V	V	
		3. Hydro test of casing	Major	Hydro test	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	TC	√	P	V	V	

		LEGENDS:- * RECORDS, IDENTIFIED WITH “TICK” (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN “N” AS “W”	Page 1 of 3			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:	
				BHEL QAP NO.:	
				NTPC QAP NO.:	
OWNER:		SUB VENDOR:	N.A.	REV. NO.:	
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:	
CONTRACT / JOB / P.O. NO.:		ITEM:	JEEP WITH TRAILER FIRE PUMP	ITEM CATEGORY:	

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

		4. Sub surface defects on shaft dia. > 50mm		UT	100%		ASTM A 388			√				
		5. Performance test	Major	Head & capacity	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	V	V	
c)	Primer Pump (Allied make)	Performance test	Major	Head & capacity	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	V	V	
d)	Diesel Engine (Mahindra Make)	Review of Mfg. Test certificate	Major	BHP, Specific fuel consumption	100%		Mfr. / authorized dealer / Approved Drg. / DS	Mfr. / authorized dealer / Approved Drg. / DS	IR	√	P	V	V	
2.	Final Inspection of complete Trailer Fire Pump	a) Leakage Test of Pipeline & Valves at maximum pressure of TFP	Major	Visual	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	W	W	
		b) Road Test & Braking test	Major	Visual	100%		By running the trailer and operation of hand brake	Satisfactory performance	IR	√	P	W	W	

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 2 of 3			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I

	PROJECT NAME	
NTPC LTD.	QUALITY ASSURANCE PLAN	BHARAT HEAVY ELECTRICALS LIMITED

PROJECT:		VENDOR:		ACB QAP NO.:
				BHEL QAP NO.:
				NTPC QAP NO.:
OWNER:		SUB VENDOR:	N.A.	REV. NO.:
MAIN CONTRACTOR:	BHEL, PEM NOIDA	PACKAGE:	FIRE TENDER	DATE:
CONTRACT / JOB / P.O. NO.:		ITEM:	JEEP WITH TRAILER FIRE PUMP	ITEM CATEGORY:

Sr. No.	Component / Operation	Characteristics	Class of Check	Type of Check	Quantum of Check		Reference Documents	Acceptance Norms	Format of Records		Agency			Remarks
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D	10			11

		c) Pump Running Test & performance	Major	Four Hour run test as per IS 944	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	W	W	
		d) Performance test	Major	Operational as per IS: 944	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	W	W	
		e) Control Panel Operation check	Major	Operational	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	W	W	
		f) Electrical Function Test	Major	Functional	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	W	W	
		g) Overall dimensions & completeness of Equipment	Major	Dimensional	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	W	W	
		h) Painting Quality (both Internal & External)	Major	DFT, Paint shade	100%		Approved Drg. / DS/ IS: 944	Approved Drg. / DS/ IS: 944	IR	√	P	V	V	

Note:

- Makes of Schedule of Equipments as per Annexure-I of TDS & G.A. of Fire Jeep with Trailer Pump (Doc. No. PE-V0-405-550-A003) will be supplied as per manufacturer standard.

		LEGENDS:- * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. M – MANUFACTURER / SUB SUPPLIER; C – BHEL; N – NTPC P - PERFORM; W - WITNESS, V – VERIFICATION AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS "W"	Page 3 of 3			
MANUFACTURER / SUB – SUPPLIER	MAIN SUPPLIER		FOR NTPC USE	REVIEWED BY	APPROVED BY	APPROVAL SEAL
SIGNATURE						

ENGG. DIV / QA & I



**3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

SPEC. NO.: PE-TS-434-550-A001

SECTION: II

ANNEXURE: 1

REV NO: 0

VOLUME - II B

SECTION: II

ANNEXURE-1

DOCUMENTS TO BE SUBMITTED BY BIDDER



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

ANNEXURE-G					
MDL FOR FIRE TENDERS, FIRE JEEP & FIRE SAFETY EQUIPMENT 3 X 800MW PATRATU STPP					
S.N	DRWG NO	DRWG TITLE	CATEGORY	SCHEDULED SUBMISSION (NO. OF WEEKS FROM LOA DATE / PO DATE) or AS SPECIFIED IN NIT, WHICHEVER EARLIER.	RESUBMISSION AFTER COMMENTS INCORPORATION
1	PE-V0-412-550-A001	T.D.S & GA OF WATER TENDER,FOAM TENDER,DCP TENDER AND FIRE JEEP	A-CUST	4	WITHIN 1 WEEK
2	PE-V0-412-550-A002	T.D.S & GA OF FIRE SAFETY EQUIPMENTS	A-CUST	4	WITHIN 1 WEEK
3	PE-V0-412-550-A003	MQP FOR WATER TENDER,FOAM TENDER,DCP TENDER AND FIRE JEEP	A-CUST	4	WITHIN 1 WEEK
4	PE-V0-412-550-A004	O & M MANUAL	A-CUST	8	WITHIN 1 WEEK

Note:

Drawing / Document shall be uploaded by the successful bidder on WRENCH /DMS. Procedure for the same will be informed after award of contract.



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENTS**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: II

ANNEXURE: 2

REV 00

VOLUME - II B

SECTION: II

ANNEXURE-2

**FORMAT FOR OPERATION AND MAINTENANCE
MANUAL**



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENTS**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: II

ANNEXURE: 2

REV 00

Project name :
Project number :
Package Name :
PO reference :
Document number :
Revision number :

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
1.	COVER PAGE				
1.1	Project Name				
1.2	Customer/consultant Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX ,email address , Emergency Contact number				
1.5	Name and sign of prepared by , checked by & approved by				
1.6	Revision history with approval Details				
2.0	INDEX				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	DESCRIPTION OF PLANT/SYSTEM				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)				
3.7	Single line/wiring diagrams				
3.8	Control philosophy /control write-ups				



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENTS**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: II

ANNEXURE: 2

REV 00

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
4.0	COMMISSIONING ACTIVITIES (IF NOT COVERED IN SEPARATE DOCUMENT I.E. ERECTION MANUAL, COMMISSIONING MANUAL)				
4.1	Pre-Commissioning Checks				
4.2	handling of items at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	OPERATION GUIDELINES FOR PLANT PERSONAL/USER/OPERATOR				
5.1	Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.				
5.2	Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned.				
5.3	Do's & Don't of the equipments.				
5.4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5.5	Parameters to be monitored with normal values and limiting values				
5.6	Trouble shooting with causes and remedial measures				
5.7	Routine operational checks, recommended logs & records				
5.8	Changeover schedule if more than one auxiliary for the same purpose is given				
5.9	Painting requirement and schedule				
5.10	Inspection, repair , Testing and calibration procedures				
6.0	MAINTENANCE GUIDELINES FOR PLANT PERSONAL				



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENTS**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: II

ANNEXURE: 2

REV 00

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				
6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				



**3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

SPEC. NO.: PE-TS-434-550-A001

SECTION: III

REV NO : 0

VOLUME - II B

SECTION: III

LIST OF DOCUMENTS TO BE SUBMITTED WITH BID



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

SPEC. NO.: PE-TS-434-550-A001

SECTION: III

REV NO : 0

VOLUME - II B

SECTION: III

SUB SECTION: IIIA

LIST OF DOCUMENTS TO BE SUBMITTED WITH BID



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

	3X660 MW PATRATU STPP FIRE TENDERS & FIRESAFETY EQUIPMENT	SPECIFICATION No: PE-TS-434-550-A001
		SECTION : III
		SUB-SECTION : III A
		REV: 00

BIDDER SHOULD SUBMIT THE SIGNED AND STAMPED COPY OF THE FOLLOWING DOCUMENTS ALONG WITH TECHNICAL BID:

1. Compliance cum confirmation certificate (Section-III B)
2. Pre bid clarification schedule (Section-III C)
3. No deviation certificate(Section-III D)
4. Un-priced price bid indicating “Quoted”

Please note that all the schedules shall be submitted even though they may not be applicable. Under such circumstances it shall be clearly mentioned across such schedules that these are not applicable. (E.g. in case of there are no technical deviation, it shall be mentioned in the deviation schedule that ‘THERE ARE NO DEVIATIONES TO THE TECHNICAL SPECIFICATION’).

Name:
Signature:
Designation:
Company:
Date:

Bidder Stamp



3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: III

REV NO : 0

VOLUME - II B

SECTION: III

SUB SECTION: IIIB

COMPLIANCE CUM CONFIRMATION CERTIFICATE



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENT**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: III

SUB-SECTION: III B

REV. NO. 00

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions
- i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENT**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: III

SUB-SECTION: III B

REV. NO. 00

- j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
- k) As built drawings shall be submitted as and when required during the project execution.
- l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.
- m) Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- n) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- o) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.



3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT

SPEC. NO.: PE-TS-434-550-A001

SECTION: III

REV NO : 0

VOLUME - II B

SECTION: III

SUB SECTION: IIIC

PRE-BID CLARIFICATION SCHEDULE



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA



**3X800 MW PATRATU STPP
FIRE TENDERS, FIRE JEEP & FIRE
SAFETY EQUIPMENTS**

SPECIFICATION No: PE-TS-434-550-A001

SECTION: III

SUB-SECTION: III C

REV. NO. 00

PRE-BID CLARIFICATION SCHEDULE

S. NO.	SECTION/CLAUSE/PAGE NO.	STATEMENT OF THE REFERRED CLAUSE	CLARIFICATION REQUIRED

The bidder hereby clarifies that above mentioned are the only clarifications required on the technical specification for the subject package.

Signature: _____

Name: _____

Designation: _____

Company: _____

Date: _____

Company Seal



**3X800 MW PATRATU STPP
FIRE TENDER, FIRE JEEP & SAFETY
EQUIPMENT**

SPEC. NO.: PE-TS-434-550-A001

SECTION: III

REV NO : 0

VOLUME - II B

SECTION: III

SUB SECTION: IIID

SCHEDULE OF TECHNICAL DEVIATION



BHARAT HEAVY ELECTRICALS LIMITED

POWER SECTOR

PROJECT ENGINEERING MANAGEMENT

NOIDA, INDIA

DEVIATION SHEET (COST OF WITHDRAWAL)**PROJECT:- 3 x 800MW PATRATU STPP****PACKAGE:- FIRE TENDERS, FIRE JEEP & SAFETY EQUIPMENT****TENDER ENQUIRY REFERENCE:-****NAME OF VENDOR:-**

SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
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TECHNICAL DEVIATIONS

COMMERCIAL DEVIATIONS

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATIONS	SIGN & DATE	
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NOTES:

- For self manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
- For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.
- All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
- Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.
- Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.
- Bidder shall furnish price copy of above format along with price bid.
- The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
- Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.
- For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.
- Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
- All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
- Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.
- In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.
- In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.