**TELANGANA STATE POWER GENERATION CORPORATION LTD.**
**(TSGENCO)**

# 5 X 800 MW YADADRI TPS

# TECHNICAL SPECIFICATION

# FOR

# FIRE TENDERS

## SPECIFICATION NO. : PE-TS-417-550-A001

**BHARAT HEAVY ELECTRICALS LIMITED**
**POWER SECTOR**
**PROJECT ENGINEERING MANAGEMENT**
**NOIDA (INDIA)**

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# INTENT OF SPECIFICATION

## 1.0 INTENT OF SPECIFICATION

1.1 The specification is intended to cover design, engineering, fabrication, manufacture, inspection and testing at vendor's/ sub-vendor's works, suitable painting, forwarding, proper packing, shipment and delivery at site, unloading, handling & transportation at site, as required on FOR site basis, performance demonstration at site and handing over of Fire tenders as per details in different sections / volumes of this specification for **5 x 800 MW YADADRI TPS.**

1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve the contractor the responsibility of providing such facilities to complete the supply, performance testing of Fire tenders.

1.3 It is not the intent to specify herein all the details of design and manufacturing. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgement is not in full accordance herewith.

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 The general term and conditions, instructions to tenderer and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification is subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.

1.6 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 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.

1.7 The bidder's offer shall not carry any sections like clarification, interpretations and /or assumptions.

1.8 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 in GCC, all through the specification, the word contractor shall have same meaning as successful bidder /vendor and Customer/ Purchaser/Employer will mean BHEL and /or Telangana State Power Generation Corporation Limited (TSGENCO) including their consultant as interpreted by BHEL in the relevant context.

# SECTION: I

# SUB-SECTION: IB

# PROJECT INFORMATION

# YADADRI THERMAL POWER STATION

## PROJECT INFORMATION

| | | |
|---|---|---|
| 1 | Name of the Project | YADADRI Thermal Power Station |
| 2 | Station Capacity | 5X800 MW ( Coal based ) |
| 3 | Owner | Telangana State Power Generation Corporation Limited ( **TSGENCO** ) |
| 4 | Site Location | Site is located 7 km from the NH5. |
| 5 | Latitude | *16° 42*'20.40 N |
| 6 | Longitude | 79° 34'41.56 E |
| 7 | Nearest Town | 30 Km Miryalaguda |
| 8 | Nearest Railway Station | 6.5 Km Damercherla |
| 9 | Nearest Airport | 130 Kms (Vijayawada) |
| 10 | **Site Conditions** | |
| | Ambient Temperature | |
| | Daily minimum ( average) | 10°C |
| | Daily maximum ( average) | 47°C |
| | Design Ambient Temperature | 50°C |
| | Ambient temperature ( performance) | 38°C |
| | Relative Humidity for design / efficiency | 48-84 % |
| | Annual rainfall, mm | 600 mm |
| | Plant Elevation above MSL | 85 m above MSL |
| | Wind Pressure | As per the latest revision of IS 875/1987 |

# SECTION: I

# SUB-SECTION: IC

# SCOPE OF SUPPLY & SERVICES

## 1.0 SCOPE OF WORK

Design, engineering, fabrication, manufacture, inspection and testing at vendor's/ sub-vendor's works, suitable painting, forwarding, proper packing, shipment and delivery at site unloading, handling & transportation at site as required on FOR basis, performance demonstration at site and handing over of **Fire tenders** as per details in different sections/ volumes of this specification.

## 1.1 SCOPE OF SUPPLY

1.1.1 FOAM TENDER

i) Two numbers Foam tenders, conforming to IS 10460 of Tata /Ashok Leyland /Eicher make complete with all accessories and equipment's as specified in relevant clauses & Annexure-I of technical specification.

ii) First fill of chemicals & consumables during performance demonstration.

iii) Replenishment of consumables & chemicals consumed during performance demonstration of foam tender.

iv) Any other item mentioned under Section D1.

v) Any other items covered under price format.

1.1.2 WATER TENDER

i) Four numbers Water tenders, conforming to IS 950, of Tata /Ashok Leyland / Eicher make complete with all accessories and as specified in relevant clauses & Annexure-II of technical specification.

ii) First fill of chemicals & consumables during performance demonstration.

iii) Replenishment of consumables & chemicals consumed during performance demonstration of water tender.

iv) Any other item mentioned under Section D2.

v) Any other items covered under price format.

1.1.2 DCP TENDER

i) One number DCP tender conforming to IS 10993 of Tata /Ashok Leyland / Eicher make complete with all accessories and as specified in relevant clauses & Annexure-III of technical specification.

ii) First fill of chemicals & consumables during performance demonstration.

iii) Replenishment of consumables & chemicals consumed during performance demonstration of water tender.

iv) Any other item mentioned under Section D3.

v) Any other items covered under price format.

1.1.6 Maintenance tools and tackles as mentioned under Section D4 shall be provided per vehicle i.e. one set with each of the above vehicles -Total 7 sets.

**Note: All the Water tenders, Foam tenders and DCP tender shall comply to BS VI emission norms at the time of delivery and shall totally comply with the Central Motor Vehicle Rules.**

## 1.2 SCOPE OF SERVICES

Scope of services shall include:

i) Performance demonstration of fire water tender, foam tender and DCP tender at site and training of owner's personnel.

ii) Registration, permit & tax, insurance including charges of all the above listed vehicles before handing over to TSGENCO with name transfer.

## 2.0 SERVICES TO BE PROVIDED BY THE CUSTOMER

Relevant services as per GCC, SCC as applicable.

## 3.0 DRAWINGS AND DOCUMENTS TO BE SUBMITTED WITH THE BID

The drawings & documents to be submitted with the bid shall be as per Section – III, Sub section - IIIA

## 4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT

The drawings & documents to be submitted during detail engineering shall be as per Section – II, Sub section - IIB

Other requirements to be followed for submission of drawings and documents during detail engineering shall be as follows:

a). Drawing shall be prepared in AutoCAD latest version. However, required numbers of hardcopies and soft copies shall be furnished as indicated elsewhere in the specification.

b). The revision made by successful bidder in any drawings and documents shall be highlighted by indicating the no. of revisions in a triangle without fail so that the minimum time is required by customer to review the drawings and documents

c). All drawings shall be prepared as per BHEL's title block and bear BHEL's drawing No. and customer's drawing no. which will be forwarded to the successful bidder during detail engineering stage.

d). All the drawings required to be furnished to customer during detailed engineering stage shall include technical parameters, details of paints and lubrication, hardness and BOQ / BOM in tabular form indicating all major components including bought out items and their quantity, material of construction indicating its applicable code / standard, weight, make etc.

e). All the drawings and documents including general arrangement drawing, data sheet, calculation etc. to be furnished to the customer during detailed engineering stage shall include / indicate the following details for clarity w.r.t. inspection, construction, erection and maintenance etc.

- list of all reference drawings including general arrangement.
- plan, elevation, side view, cross - section, skin section, blow - up view; all major self manufactured and bought out items shall be labelled and included in BOQ / BOM in tabular form.
- specification of painting shall also be made as a part of general arrangement drawing of each equipment / items.

## 5.0 EQUIPMENT SELECTION & DESIGN CRITERIA

The minimum design criteria/ technical details to be followed for various equipment shall be as per details placed elsewhere in the specification. In case of any contradictory requirement for specification of particular equipment, and clarifications not having been sought by the bidders, the most stringent requirement as per interpretation of the BHEL will prevail. Successful bidder will furnish detailed data sheets/ specifications for various equipment for customer's/ consultant's approval during detail engineering. For items for which specific technical specification is not enclosed, data sheet / dwgs for such items shall be subject to customer/ consultant approval during detail engineering. All comments made by customer/ consultant shall be incorporated by the successful bidder without any commercial and delivery implication.

## 6.0 DRAWINGS DISTRIBUTION SCHEDULE

Drawing distribution schedule is indicated in the Section III, Sub section - IIID.

## 7.0 CONDITION OF REJECTION

Bid may be rejected if documents as per clause 3.0 are not submitted in totality and complete in all respects and endorsed with company seal.

## 8.0 ADDITIONAL POINTS TO BE NOTED BY BIDDER

8.1.0 The successful bidder will have to depute competent designer (s) at BHEL's office during detailed engineering stage to discuss drawings and other technical documents as and when required by BHEL. However, the vendor will be informed in advance by minimum 7 days.

8.2.0 Basis of design, drawings / schemes and document like datasheet, technical particular etc are subject customer and BHEL approval during detail engineering.

8.3.0 All MQPs shall be subject to customer approval during detail engineering without any commercial implication. Bare minimum requirement is given under chapter Quality Assurance placed under Sec II, Sub section IIA.

# SECTION: I

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# SECTION: I

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# D1- DESCRIPTION OF FOAM TENDER

## D1 DESCRIPTION ON FOAM TENDER

### 1.0.0 CODES AND STANDARDS

The design, material of construction, workmanship & finish, performance, accessories and equipment foam tender shall comply with the requirements of codes/standard as follows:

IS: 10460 - Functional requirements for small foam tender for fire brigade use.

### 2.0.0 VEHICLE CHASSIS

The chassis for carrying out fabrication work of foam tender shall be of TATA/Ashok Leyland /Eicher make. The chassis shall be equipped with Air conditioner, power assisted steering and power brake. The chassis shall carry an extension ladder of 10.5M length and shall be capable of towing a trailer pump.
**Chassis shall be BS-VI compliant and meeting the prevailing emission norms in the country.**

### 3.0.0 GENERAL REQUIREMENTS

3.1.0 The appliance shall incorporate a fire pump of 1800 L/min capacity (minimum), a water tank of 4500 ltr. Capacity, a foam tank of 500 ltr capacity, connected equipment for foam production and supplementary extinguishing agent.

| | | |
|---|---|---|
| a) | Gross vehicle weight. | Not less than 16000 Kg including crew, water and equipment. |
| b) | Maximum speed on level road fully laden. | 72 Km / h. |
| 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 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 less than 230 mm |
| Overall width | not more than 2.50 m |

3.2.0 The monitor shall employ the self-aspiration type of foam production system where aeration is done at the branch pipe. The expansion ratio of the foam produced shall not be less than eight times with the use of foam compound as prescribed in IS: 4989 (latest edition).

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

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

3.5.0 The supplementary agent used for firefighting shall be provided which shall be dry chemical powder (2x75 Kg capacity) and Carbon Di-oxide type (2x4.5 Kg as per IS: 15683).

3.6.0 The unit shall be designed to be as compact as possible, compatible with ease of accessibility to all service parts. The pump and foam making equipment controls shall be so arranged that one man can operate foam or water lines from the pump control panel.

3.7.0 Lever type valve controls shall be preferred throughout.

3.8.0 All parts, which shall form waterways or come into contact with foam solution, shall be of corrosion resisting materials suitably treated with corrosion resistant compound. All metal parts exposed to atmosphere shall either be of corrosion resisting material or treated suitably to resist corrosion.

3.9.0 Lubricating nipples shall be provided wherever necessary.

## 4.0.0 DESIGN AND CONSTRUCTION

### 4.1.0 Engine

4.1.1 The engine shall be 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 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.

4.1.5 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.

**4.2.0 Electrical System**

4.2.1 A sealed maintenance free battery of adequate capacity with a trickle type battery charger shall be provided for recharging the battery in situ. A red pilot lamp, indicating when the batteries are being charged from an external supply, shall be provided.

4.2.2 All important electrical circuits shall have separate fuses suitably indicated 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 Water Tank**

4.3.1 A water tank of not less than 4500 litres capacity shall be mounted on the chassis. It shall be fabricated out of mild steel sheet of minimum 3.0 mm thickness. Bottom sheet shall be minimum 5 mm thick. The tank shall be treated for anti-corrosion with epoxy paint consisting of one coat of primer and two coats of finish paint after shot blasting of inside surface and shall be suitably baffled to prevent surge when the vehicle is braking, accelerating or cornering. The baffle shall be arranged in a manner to facilitate the passage of a man throughout the tank for cleaning purposes. Minimum thickness of baffle plate shall be 3.0 mm. It shall be mounted on the chassis in a manner keeping in view the proper load distribution on the axles and shall be so designed as to bring the centre of gravity as low as possible in the chassis. It shall be rectangular in shape and the mounting of the tank shall be flexible type to prevent the tank's distortion due to the chassis flexion. The mounting shall permit full contents of the tank to flow into the pump. The tank with its fitments shall withstand hydrostatic pressure of 0.3 bar.

4.3.2 Suitable eyes shall be provided on the shell of the tank to enable the tank to be lifted off the vehicle for repairs or replacement as necessary.

4.3.3 The tank shall be fitted with two filling orifices, a drain cock, a manhole and a cleaning hole (at the bottom of the tank). The filling orifice shall be of not less than 250 mm diameter and shall be fitted with a manhole cover of 450 mm dia. minimum and a filler cap clearly marked 'water' preferably cast in metal. In addition, a 63 mm instantaneous hydrant connection, incorporating a strainer, shall be provided close to the pump pane control for filling the tank through 75 mm diameter pipe or feeding the hose reel equipment. A 100 mm dia. pipe line shall be taken from the tank to the suction inlet of the pump incorporating a 100 mm quick action spherical type valve. Separate valve (s) for performing different functions shall be provided to control the flow of water. Manhole shall be located at the top of the tank.
Drain plugs or cocks shall be provided wherever necessary. Cleaning hole of not less than 250 mm diameter shall be provided at the bottom of the tank and it shall be fitted with bolted cover.

4.3.4 The tank shall be fitted with a 100 mm diameter overflow pipe. The discharge ends of the overflow pipe shall be taken down to a point well below the chassis without reducing the effective ground clearance when fully loaded and shall discharge away from the wheels.

4.3.5 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 ¼, ½, ¾ and full. (preferably calibrated in litres).

4.3.6 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.

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

**4.4.0 Hose Reel**

4.4.1 One hose reel conforming to IS: 884 shall be provided at the rear of the appliance with 60 m length of 20 mm bore hose connected by screw 'C' type quick release couplings and terminating with a control branch and 5 mm nozzle. The reel shall be fitted with over brake or locking device. Nozzle shall be dual purpose shut off type.

**4.5.0 Pump (multi stage high pressure)**

The pumps be capable of delivering not less than 1800 L/min (minimum). of water at a pressure not less than 8.5 kg/cm2. The pump shall preferably be of the single stage type. The pump shaft shall preferably be designed with two deep-groove ball bearings lubricated by oil both to ensure long trouble-free service. A mechanical seal shall be provided which shall be capable of running dry for long periods without damage.

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

| | | |
|---|---|---|
| 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) |

**4.5.1 PUMP TEST**

4.5.1.1 The pump shall run for a period of 4 hours non-stop delivering the rated output at 7 kg/cm2 with the lift of 3 m. During the test the water shall not be replenished for the cooling system as the temperature of the engine oil should not exceed 150 deg. C at highest ambient or the engine manufacturers rated temperature for continuous working whichever is less. The engine should show no sign of stress during the stress. The temperature of the cooling water (radiator water) shall not exceed 85 deg.C. The PTO sump oil temperature shall not exceed the manufacturers recommended temperature for the grade of oil used. The pump

casing and impeller shall be subjected to a hydraulic pressure of 21 kgf/cm2 to detect leakages, performance, etc.

4.5.1.2 The pump shall be preferably rear mounted. The pump control panel shall be located on the rear of the appliance.

4.5.1.3 The suction inlet and delivery outlets of the pump shall, as far as possible, be fitted on or near the pump control panel.

4.5.1.4 A removable strainer and blank cap shall be provided for the suction inlets(s) for the pump.

4.5.1.5 The suction inlet shall be fitted with a standard round thread connection of 100 mm size conforming to IS: 902.

4.5.1.6 The delivery outlets of the pumps shall terminate in 63 mm female instantaneous coupling incorporating a blank cap and means for relieving pressure between the valve and the cap. The 63 mm female instantaneous coupling shall be in accordance with IS: 903-1988.

**4.6.0 Primer**

The primer shall be automatic in action and it shall dis-engage automatically as soon as the pump is primed. It shall be integral with the pump. It shall be capable of lifting water at least through 7.0 m at a rate of not less than 30 cm per second.

**4.7.0 Power take off**

The gear ratio shall be suitable for continuous operation of engine at stationary condition.

**4.8.0 Foam Equipment**

4.8.1.0 Foam compound tank of 500 ltr capacity shall be mounted on the chassis in addition to the water tank and as a separate & distinct unit that can be removed separately for replacement.

4.8.1.1 The foam compound tank shall be of rigid type, and shall preferably be of stainless steel (SS-304) welded construction.

4.8.1.2 The tank shall have a filling orifice not less than 150 mm diameter with a removable strainer fitted to it. The strainer shall be of such material so that it shall not be affected by constant contact with foam compound and its total screening area shall be adequate to permit quick filling of foam compound into the tank. The filler cap shall be clearly marked 'FOAM' preferably by pressing, casting or embossing.

4.8.1.3 The tank shall have its top dished tunnelling arrangement and a trough provided to enable easy filling from 20 litre drums. Suitable sharp-edged tin opener may also be provided at the foam tank so that the foam compound drum can be puncture easily for facilitating quick filling of the foam compound directly from the drums into the tank. The tank shall be suitably baffled to prevent surge while the vehicle is in motion or standing on uneven ground or brakes are applied to the moving appliance. 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 shall not pass into the compound line. The draw-off tube shall be fitted with a gauge

strainer of suitable material, mesh, size, and adequate shall be removable and it shall be ensured that the joint body of the tank is leak proof.

staining area. The tank top between the top and the

4.8.1.4 Means shall be provided for automatic venting of the foam compound tank when the foam is being produced or the tank is being filled. This shall not be incorporated with the cap. The device employed shall be as simple as possible and shall not get clogged easily during normal use of the appliance.

4.8.1.5 The draw-off tube shall be connected to the foam compound proportionator / inductor and pump as necessary, and automatic flow control valve shall be incorporated in it so as to maintain a constant induction rate of not more than 6 percent with varying foam output.
The plumbing for this purpose shall have a clear and unobstructed passage of not less than 50 mm throughout and shall:

a) be as short as possible;

b) be capable of being easily dismantled for internal cleaning;

c) be provided with means of thorough flushing after use;

d) not form 'U' bend or abrupt angle at any portion and be capable of being drained easily without dismantling.

4.8.1.6 A suitable transfer pump shall be provided for transferring foam compound from drums to the foam compound tank without causing any frothing in the tank. Necessary connection shall also be provided for transferring the foam compound through this pump.

4.8.1.7 Provision shall also be made for drawing foam compound into the foam producing system from an external source through a pick-up tube while producing foam.

**4.8.2** Foam compound proportionator or inductor automatic proportionating arrangement shall be provided where the induction ratio of foam compound /water solution and flow of water are automatically varied as desired merely by opening and closing the monitor. This shall be achieved without any complex system of linkage that may be susceptible to distortion due to chassis flexion. The system shall be reliable and shall not require frequent calibration checks.

**4.8.3 Foam Monitor**

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

4.8.3.2 The aggregate foam discharge shall be not less than 13500 L/min through a combination of monitors and up to 2 hand lines or 7000 L/min. through monitor only.

4.8.3.3 The monitor shall be capable of projecting the foam discharge to an effective distance of not less than 35 m in still air when operated at the designed pressure in a straight jet pattern without dripping.

**4.9.0 Control panels**

4.9.1 One (1) No. adequately illuminated control panel shall be provided and shall be positioned at the rear of the appliance.

4.9.2 The control panel shall include the following:

a) Throttle control for engine;

b) Pressure gauge 0 to 2.0 N/mm2 (20 Kgf/cm2)

c) Compound gauge calibrated as under;

(i) Vacuum - 0 to 75 cm Hg preferably in black

(ii) Pressure - 0 to 0.6 N/mm2 (6 kgf / cm2); preferably in black

d) Primer control

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

f) Cooling water circuit control.

g) Control for using monitor.

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

a) Control for using monitor;

b) Water level indicator;

c) Hydrant connections;

d) Control for using auxiliary foam compound pic up tube;

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

**4.10.0 Body Work and Stowage**

4.10.1 Enclosed accommodation for six persons (1+1 at front, 1full seat at the rear which will accommodate 4 people) shall be provided in the driver cab-crew compartment including the driver and the in-charge of the crew. Co-driver's seat shall be foldable type. Two doors on each side shall be provided on the driver cab-cum-crew compartment. The doors shall be hinged opening outwards and shall be hung forward and shall have catch locks and flush type handles. Proper foot rest and hand rail shall be provided enabling easy access to vehicle for driver and crew. Front and side wind shield / glass of the vehicle shall be provided with safety grill mesh with suitable openings.

4.10.2 The cab and lockers shall be of composite construction with sufficient rigidity and reinforcement and shall be kept as light as possible. Pressed sections of sufficient strength shall be used for the superstructure.

4.10.3 Two nos. of lockers on each side shall be provided for secure stowage of all equipment as detailed enclosed in **Annexure-I.** The height of the lockers from the bottom to the top of the opening shall be not less than 600 mm and the depth not less than 600 mm. Locker shall have proper partition for storing 22.5m hose at bottom and 15m hose at top. Lockers and hose reel section shall have suitable draining arrangement.

4.10.4 All lockers shall be provided with internal automatic lighting arrangement with the master switch in the cab. The doors of the side lockers shall not be hinged at the bottom.

4.10.5 Hose tunnels shall be provided to carry four 2.5 m lengths of suction hoses in convenient location. The tunnels shall be sloped in such a way so that these allow the water or contents left in the hose after use to flow out.

4.10.6 Ladder Gallows – Gallows shall be provided to carry a 10.5 m extension ladder at a suitable position in a manner that does not provide any obstruction to the working of monitor. 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.

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

**4.11.0 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 titled to either side, the point at which overturning occurs, is not passed at an angle of 30 degrees 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 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 ACCESSORIES

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

a) Fire bell - A 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 the hand-operated type.

b) Hand Lamps - Two

c) Fog lamps – Two .These shall be low mounted in front of the appliance.

d) Reversing Light - Lamp suitably situated to assist reversing.

e) Amber blinker 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 maintenance of the appliance that are not included in the kit for the chassis.

i) Siren - Battery operated.

j) 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.

k) Spot light - Adjustable, mounted in a convenient position on the near side of the driving compartment.

l) 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.

m) Tail lamps - Two of combined stop and tail.

n) Rear reflectors

o) Wind Screen-Washer-Fitted in a suitable location with controls in driving compartment.

p) Cab, Instrument panel and locker, light.

q) Public address system.

r) One electrically operated siren 24 volts, to be mounted externally

s) VHF Radio Telephone set Bracket. A self contained VHF transmitting receiving set for communication.

## 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) Capacity of the pump in litres/minute, capacity of the water tank and foam tank in litres;

c) Year of manufacturer

d) The appliance shall be painted “Fire Red” on the outside with the Fire Service insignia painted in gold and black.

**8.0.0 INSTRUCTION BOOK And ADDITIONAL ACCESSORIES** (over and above accessories mentioned against Cl 6.0.0)

The additional accessories that are normally required to assist in operation of appliance are detailed in enclosed **Annexure I**. Bidder to include these accessories in their scope of supply.

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.

**9.0.0 SUPPLEMENTARY EXTINGUISHING AGENT**

9.1.0 The supplementary extinguishing agent shall be dry chemical powder and Carbon Di-oxide extinguisher.

9.2.0 The total quantity of supplementary agent shall be not less than 150 kg. Of dry powder and shall conform to IS: 4308.

9.3.0 The dry powder system shall comply with the following minimum requirement.

9.4.0 The dry powder system shall comprise of two self-contained units, each having a capacity of 75 kg of dry powder.

9.5.0 The expellant employed for the dry powder units shall be nitrogen. The capacity of the nitrogen cylinders employed for this purpose shall be adequate to ensure complete discharge of the dry powder contents at a rate of not less than 2.25 kg/s from each units. A **well-designed pressure control system** shall be provided to regulate the pressure of nitrogen gas and maintain a constant powder discharge pressure throughout operation of the unit.

9.6.0 The dry powder unit shall have a discharge outlet fitted with not less than 22 m of minimum 25 mm bore hose terminating in a trigger control shut-off nozzle, capable of producing either a straight jet or fan-spray pattern of discharge. The range of jet shall be not less than 12 m.

9.7.0 The hose and nozzle shall be stowed suitably in lockers on either side of the appliance to facilitate speedy run out on arrival at an accident.

**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 I S Code.

a) Pump test
b) Primer test
c) Road test
d) Stability
e) Hydro test (pipes and valves).
f) Any other test as specified in IS 950:2012 & latest.

**ANNEXURE-I**

List of equipment to be supplied with each foam tender

| S.No. | Equipment / Item | Quantity |
|---|---|---|
| 1.0 | Aluminium Extension ladder-10.5 meter (IS: 4571 or IS: 930) | 1 |
| 2.0 | Armoured suction hose 100 mm dia complete with round thread coupling 2.5 m long (see IS : 3549 - 1983 and IS : 902 - 1974 ) | 4 lengths |
| 3.0 | Delivery hose, 63 mm, rubber lined in 30 m lengths (type II of IS: 636) complete with instantaneous couplings (IS: 903) | 10 lengths |
| 4.0 | Suction stainers for item 2.0 (IS: 907) | 1 |
| 5.0 | Basket strainers for item 2.0 (IS: 3582) | 1 |
| 6.0 | Dividing breaching made of light alloy (IS: 905) | 2 |
| 7.0 | Collecting breaching made out of light alloy (IS: 905) | 2 |
| 8.0 | Suction wrenches (IS: 4643) | 1 pair |
| 9.0 | Long lines, 50 mm circumference, 30 m long (IS: 1084) | 2 lengths |
| 10.0 | Short lines, 50 mm circumference, 15 m long (IS: 1084) | 2 lengths |
| 11.0 | Hose, bandages, rubberised (IS: 5612) | 12 |
| 12.0 | Hose clamps (IS: 5612) | 6 |
| 13.0 | Hydrant valve key and bar (IS: 910) | 1 set |
| 14.0 | Protective clothing for fire men complete with suitable face shield made out of material capable of reflecting at least 95% of radiant heat temperature around 1500 to 2000 degree C and afford some protection against direct flame. The suit will be of sufficient size to accommodate a breathing apparatus to users. | 2 sets |
| 15.0 | Fog nozzle (IS: 952) with extension applicator to fog head. | 1 |
| 16.0 | Hand controlled branch for 63 mm size hose coupling. | 1 |
| 17.0 | Branch pipe universal (IS: 2871) | 1 |
| 18.0 | Branch with revolving head (IS: 906) | 1 |
| 19.0 | Branch pipes (IS: 903) | 4 |
| 20.0 | Nozzle of size 12 mm, 16 mm, 20 mm and 32 mm (two each) (IS: 903)<br>a) Adaptor for 100 mm suction female screw coupling and 63 mm male instantaneous.<br>b) Adaptor double female instantaneous pattern 63 mm.<br>c) Adaptor double male instantaneous pattern 63 mm.<br>d) Nozzle of size 19 mm | 10<br>2<br>2<br>2<br>1 |
| 21.0 | Nozzle spanners (IS: 903) | 2 |
| 22.0 | Portable electric box lamp with rechargeable | 2 |

| | | |
|---|---|---|
| | accumulator. | |
| 23.0 | Hand lamp (torch-4 cells) | 2 |
| 24.0 | Flameproof lamp (usable in the present of inflammable gases of vapours) | 2 |
| 25.0 | Self-contained breathing apparatus (compressed air type) complete with spare cylinder and tool kit. | 1 set |
| 26.0 | First aid box for ten persons. | 1 |
| 27.0 | Insulated plier (IS : 3650 ) Rubber gloves (in case) (IS: 4770) | 1 pair |
| 28.0 | Asbestos gauntlets (in case) | 1 pair |
| 29.0 | Axe, large (IS: 703) | 1 |
| 30.0 | Spade | 1 |
| 31.0 | Pick axe (IS: 273) | 1 |
| 32.0 | Crow bar (IS: 703) | 1 |
| 33.0 | Sledge hammer, 6.5 kg (IS: 841) | 1 |
| 34.0 | Carpenter's saw, 60 cm (IS; 5098) | 1 |
| 35.0 | Hydraulic jack-7.5 tonne. | 1 |
| 36.0 | Fire hook (IS: 927) | 1 |
| 37.0 | Tool kit | 1 |
| 38.0 | Dual propose jet and diffuser nozzle with instantaneous connection (see IS : 28713582 - 1983) | 2 |
| 39.0 | Dual head stand pipes (see IS : 5714 - 1981) | 1 |
| 40.0 | 9 kg. capacity DCP fire extinguisher suitable for fighting metal fires in charged condition with applicator (see IS : 11833 - 1986) | 2 |
| 41.0 | Self contained portable emergency lights working on rechargeable batteries | 2 |
| 42.0 | Insulated plier with rubber gloves pair tested to 20000 Volts (see IS : 3650 - 1981) | 2 |
| 43.0 | Copper bolt (see IS : 5200 - 1969) | 1 |
| 44.0 | Hacksaw 300 mm adjustable with 5 spare blades each (see IS : 5169 - 1969) | 2 |
| 45.0 | Hooks (see IS : 927 - 1981) | 1 |
| 46.0 | Axe, drift and rescue (see IS : 273 - 1983) | 1 |
| 47.0 | Axe. Felling (see IS : 703 - 1966) | 1 |
| 48.0 | Fireman's axe with belt firemen and pauches firemen (see IS : 926 - 1970) | 5 |
| 49.0 | Quick release knife (see IS : 5486 - 1985) | 5 |
| 50.0 | Lifting and pulling machine, 3 tonnes (see IS : 5604 - 1984) | 1 |
| 51.0 | Hook grab | 1 |
| 52.0 | Blanker smothering | 1 |
| 53.0 | Motorized barrel transfer pump | 1 set |
| 54.0 | Hydraulic rescue tools | 1 set |
| 55.0 | VHF radio telephone set | 2 |

# SECTION: I

# SUB-SECTION: ID

# D2- DESCRIPTION OF WATER TENDER

## D-2 DESCRIPTION OF FIRE WATER TENDER

### 1.0.0 CODES AND STANDARDS

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

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

### 2.0.0 VEHICLE CHASSIS

The chassis for carrying out fabrication work of fire water tender shall be of Make-TATA/Ashok Leyland/ Eicher. The chassis shall be equipped with Air conditioner, power assisted steering and power brake. The chassis shall be equipped with power assisted steering. It shall carry an extension ladder of 10.5M length and shall be capable of towing a trailer pump.

**Chassis shall be BS-VI compliant and meeting the prevailing emission norms in the country.**

### 3.0.0 GENERAL REQUIREMENTS

The vehicle shall be built conforming to IS 950: 2012

3.1.0 PUMP (Multi stage high pressure)

High and low pressure fire pump of capacity ( Min. 4000 LPM @ 0.7 Mpa and 300 LPM @ 3.5 Mpa), The appliance shall carry a water tank of minimum 7000 Liter capacity.

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

a) Gross vehicle weight — not less than **25000 kg including crew**, water and equipment.

b) Maximum speed on level road fully laden. — 72 km/h

c) Acceleration from a standing start through the gears (fully laden) — 64 km/h in 55 second

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

e) When travelling at 48 km/h on a level dry surface the foot brake shall 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 230mm |
| Overall width | Not more than 2.50 m |

3.3.0 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.

3.4.0 Lubricating nipples shall be provided wherever necessary.

4.0.0 **DESIGN AND CONSTRUCTION**

4.1.0 **Engine**

4.1.1 The engine shall be provided with 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.

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 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.

4.1.5 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.

4.1.6 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.

4.2.0 **Electrical System**

4.2.1 A trickle type battery charge shall be provided for recharging the battery *in situ*. A red pilot lamp, indicating when the batteries are being charged from an external supply, shall be provided.

4.2.2 All important electrical circuits shall have separate fuses suitably indicated 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.

4.3.0 **Water Tank** - It shall have capacity of 7000 ltr. **as per latest IS-950.**

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

4.3.2 The tank shall be fitted with a 50 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.

4.3.3 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 sand 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.

4.3.4 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).

4.3.5 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.

4.3.6 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

a) Hydrant - tank,

b) Hydrant - reel,

c) Tank-pump-high and low pressure hose reel,

d) Hydrant- pump- high and low pressure hose reel, and

e) Tank-Pump-Monitor

f) Off.

4.3.7 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.

4.3.8 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.

4.4.0 **Hose Reel**

4.4.1 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 liter/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. The hose shall be light weight PVC nylon braided hose and working pressure of hose shall not be less than 4 MPa.

4.5.0 **Pump**

4.5.1 A centrifugal pump high and low pressure pump shall be mounted at rear 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 Cl. No. 4.5.5.

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.

4.5.2 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.

4.5.3 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 $^0$C.:

The pump shall be capable of delivering 4000 LPM @ 7 Kg/cm$^2$ and 300 LPM @ 35 Kg/cm$^2$ at 3 mtrs. suction lift at NTP condition.

The pump shall follow the following performance parameters:

| | |
|---|---|
| Normal Pressure Output | :4000 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 m3/sec max. up to 7 M in 30 Sec. at NTP conditions |

The above performance data shall be considered when working through 2.45 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 1/4$^{th}$ (one quarter) of the registered high pressure.

A thermal relief valve (TRV) shall be fitted on the pump discharge side which will control the water temperature within the pump below 48°C (or 80°C – this version shall be used only when there is good operational reason) when the pump is operating in high rpm with
closed discharge. The water discharged from the TRV shall be either taken back to water tank or safely piped away to waste with metallic pipe.

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.

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

| | | |
|---|---|---|
| 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) |

4.5.5 **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 ± 5%. However, in no case the efficiency of the pump shall be less than 60 percent. The pump shall run for a period of 3 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 2000 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.

4.6.0 **Suction inlet and Delivery Valves**

4.6.1 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.

4.6.2 The pump shall be provided with 4 delivery valves for the 2000 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 chains and incorporating means to relieve pressure between the valve and the cap shall be provided one for each delivery valve.

4.7.0 **Primer**

4.7.1 The primer shall be capable of lifting water at least 7.0 m (measured form water level to the center of pump) in not more than 24 seconds when connected with 100 mm suction hose and 36 s when connected with 140 mm suction hose and shall 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.

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

4.7.3 The primer shall be constructed of gun metal/light alloy casting, shall have 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.

4.7.4 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.

4.8.0 **Water/Foam Monitor**

One water-cum-foam monitor shall be provided on the top at suitable location. The monitor shall be Self aspirating type. Flow rate of pump shall be 1800 LPM (min.) with discharge of 45 M (min). monitor shall confirm to IS 8442.

4.9.0 **Control Panels**

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

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

4.9.2 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

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

f) Cooling water circuit control.

g) Control for using monitor.

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

a) Water level indicator as described under cl.no. 4.3.4

b) Five way control valve as described under cl.no. 4.3.6

c) Hydrant connections.

4.10.0 **Body Work and Stowage**

4.10.1 Cabin

4.10.1.1 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; co-driver's seat shall be foldable type. The driver's seat shall be adjustable and comfortable. The rear compartment of driver's cabin shall have independent access on both side and 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 aluminum 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.

4.10.1.2 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. Proper foot rest and hand rail shall be provided enabling easy access to vehicle for driver and crew.

4.10.1.3 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.

4.10.2 Seats

4.10.2.1 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.

4.10.2.2 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.

4.10.2.3 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.

4.10.2.4 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.

4.10.2.5 Front and side wind shield / glass of the vehicle shall be provided with safety grill mesh with suitable openings

4.10.3 Rear Body

4.10.3.1 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.

4.10.4 Super Structure

4.10.4.1 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.

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

4.10.4.3 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.

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

4.10.4.5 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.

4.10.4.6 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.

4.10.4.7 Lockers shall be provided for secure stowage of all equipment given in Annex II except Aluminium extension ladder and fire hook. 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. Locker shall have proper partition for storing 22.5m hose at bottom and 15m hose at top. Lockers and hose reel section shall have suitable draining arrangement.

4.10.4.8 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. Provision shall be made for easy access to roller shutter.

4.10.4.9 Suitable storage space shall be provided to store four 2.5 m lengths of suction hoses in convenient location.

4.11.0 **Miscellaneous**

4.11.1 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.

4.11.2 Two cat ladders made out of stainless steel round or square pipe of 25 mm diameter shall be provided.

4.11.3 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.

4.11.4 A heavy duty towing hook shall be provided and fitted the rear bumper by means of nuts and bolts.

4.11.5 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.

4.11.6 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.

4.11.7 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 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.

4.11.8 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.

4.11.9 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.

4.11.10 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.

4.11.11 Tool-Kit Container

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

4.11.12 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 30º 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 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. These shall be low mounted in front of the appliance.

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.

i) Siren - Battery operated.

j) 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.

k) Spot light - Adjustable, mounted in a convenient position on the near side of the driving compartment.

l) 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.

m) Tail lamps - Two of combined stop and tail.

n) Rear reflectors

o) Wind Screen Washer

p) Cab, instrument panel and locker, light

q) Public address system.

r) One electrically operated siren 24 volts, to be mounted externally

s) VHF Radio Telephone set Bracket. A self contained VHF transmitting receiving set for communication.

## 7.0.0 INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT

7.1.0 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.

## 8.0.0 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 color coded.

j) The appliance shall be painted “Fire Red” on the outside with the Fire Service insignia painted in gold and black.

9.0.0 **ADDITIONAL ACCESSORIES** (over & above accessories mentioned against Cl.6.0.0)

The additional accessories that are normally required to assist in operation of appliance are detailed in enclosed **Annexure-II**. Bidder to include these accessories in their scope of supply.

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) Hydro test (pipes and valves).
f) Any other test as specified in IS 950:2012 & latest.

**ANNEXURE-II**

## List of equipment to be supplied with each 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)<br>b) Hose bandages (IS: 5612, part-II)<br>c) Hose slings<br>d) Hose straps | 25<br>25<br>20<br>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)<br>b) Double female coupling (IS: 901)<br>c) Hydrant connection, 63mm female instantaneous pattern delivery coupling at both end. (IS: 901) | 01<br>02<br>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 |

| | | |
|---|---|---|
| 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<br>b) Adopter double female instantaneous pattern 63 mm<br>c) Adopter double male instantaneous pattern 63 mm | 02<br>02<br>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 |

| | | |
|---|---|---|
| 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 filing – 250 mm | 01 |
| 50.0 | Dual propose jet and diffuser nozzle with instantaneous connection (see IS : 28713582 - 1983) | 2 |
| 51.0 | Dual head stand pipes (see IS : 5714 - 1981) | 1 |
| 52.0 | 9 kg. capacity DCP fire extinguisher suitable for fighting metal fires in charged condition with applicator (see IS : 11833 - 1986) | 2 |
| 53.0 | Self contained portable emergency lights working on rechargeable batteries | 2 |
| 54.0 | Insulated plier with rubber gloves pair tested to 20000 Volts (see IS : 3650 - 1981) | 2 |
| 55.0 | Copper bolt (see IS : 5200 - 1969) | 1 |
| 56.0 | Hacksaw 300 mm adjustable with 5 spare blades each (see IS : 5169 - 1969) | 2 |
| 57.0 | Hooks (see IS : 927 - 1981) | 1 |
| 58.0 | Axe, drift and rescue (see IS : 273 - 1983) | 1 |
| 59.0 | Axe. Felling (see IS : 703 - 1966) | 1 |
| 60.0 | Fireman’s axe with belt firemen and pauches firemen (see IS : 926 - 1970) | 5 |
| 61.0 | Quick release knife (see IS : 5486 - 1985) | 5 |
| 62.0 | Lifting and pulling machine, 3 tonnes (see IS : 5604 - 1984) | 1 |
| 63.0 | Hook grab | 1 |
| 64.0 | Blanker smothering | 1 |
| 65.0 | Motorized barrel transfer pump | 1 set |

| | | |
|---|---|---|
| 66.0 | Hydraulic rescue tools | 1 set |
| 67.0 | VHF radio telephone set | 2 Nos. |
| 68.0 | Protective clothing for fire men complete with gloves, boots, helmets with suitable face shield made out of material capable<br>of reflecting at least 95% of radiant heat temperature around 1500 to 2000 degree C and afford some protection against direct flame. The suit will be of sufficient size to accommodate a breathing apparatus to users. | 2 Set |
| 69.0 | 9 litre foam type portable fire extinguisher | 1 |
| 70.0 | File bastard of 30cm | 1 |

# SECTION: I

# SUB-SECTION: ID

# D3- DESCRIPTION OF DCP TENDER

## D-3 DESCRIPTION OF DCP TENDER

### 1.0.0GENERAL REQUIREMENTS

1.1.0 The chassis for carrying out fabrication work of DCP tender shall be of Make-TATA/Ashok Leyland/Eicher. The chassis shall be equipped with power assisted steering and power brake. Chassis shall be BS-VI compliant.

1.2.0 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.

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

a) Gross vehicle weight — Not less than 16000 Kg including crew, dry powder and equipment.

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 |

### 2.0.0 DESIGN AND CONSTRUCTION

### 2.1.0 Engine

2.1.1 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.

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

2.1.3 The oil in the oil sump shall be prevented from overheating

2.1.4 Suitable gauge for indicating temperature of water and for oil pressure shall be provided on the instrument panel in the driver's cab.

2.1.5 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.

**2.2.0 Electrical System**

2.2.1 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.

2.2.2 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 writing shall be single pole and shall not be exposed to the atmosphere. Conduits shall be used wherever necessary.

**2.3.0 Body Work**

2.3.1 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.

2.3.2 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.

2.3.3 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.

2.3.4 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.

2.3.5 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.

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

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

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

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

**2.4.0 Dry Powder fire Extinguishing Equipment**

2.4.1 **Dry chemical powder (Mono ammonium Phosphate based) shall confirm to IS: 14609 – 1999(Reaffirmed-2015).**

2.4.2 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.

2.4.3 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 threw 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.

2.4.4 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.

2.4.5 The expellant gas system shall preferably have nitrogen gas in cylinders of capacity not less than 50 litres each, having filling pressure of not less than 200 kgf/cm$^{2.}$ The gas shall be sufficient to discharge 2000 kg of dry powder through the long-range monitor and hose reel in accordance with the requirement of clause no. 4.4.3

2.4.6 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.

2.4.7 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$^{o}$ horizontally and 100$^{o}$ 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.

2.4.8 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 ruber hose fitted with trigger type pistol grip nozzle capable of discharging 5 kg of powder per second at a pressure of 14 kgf/cm$^{2.}$

2.4.9 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.

2.4.10 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.

**2.5.0 Control Panel**

2.5.1 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.

2.5.2 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.

**2.6.0 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$^{o}$ from the horizontal.

**3.0.0 WORKMANSHIP AND FINISH**

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

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

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

**4.0.0 INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT**

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

4.2.0 **Accessories** –

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

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.

k) One electrically operated siren 24 volts, to be mounted externally.

l) Users Hand Book and part identification manual.

4.3.0 **Equipment**- The appliance shall be provided with the equipment detailed in **ANNEXURE-III** ,. Bidders to include supply of these equipment in their scope.

## 5.0.0 MARKING

5.1.0 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.

## 6.0.0 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) Hydro test (pipes and valves).
f) Any other test as specified in latest standard IS 10993.

**ANNEXURE-III**

**Schedule of equipment to be supplied with 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 |

**All other accessories shall be provided as per clause 6.2 of IS 10993.**

# SECTION: I

# SUB-SECTION: ID

# D4- MAINTENANCE TOOLS & TACKLES

## List of Maintenance Tools & Tackles

| 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:**

1. The above list is bare minimum, if any other maintenance tools and tackles are required as per the vehicle requirement, same shall be provided to BHEL without any cost implication.
2. The above items shall be supplied with each vehicle.

# SECTION: II

# SUB-SECTION: II A

# QUALITY ASSURANCE PLAN

**QUALITY PLAN FOR MANUFACTURE OF EQUIPMENT:**

1.0 The Quality plan for manufacture is a document, which presents in a tabular form, the Quality Control checks to be exercised by the Contractor during the various stages of manufacture and despatch in order to meet the requirements of this Contract. This plan shall detail the components manufactured, characteristics being controlled and acceptance norms for this characteristic and the agency responsible for performance and witnessing the checks.

2.0 The detailed quality plans to be followed during manufacture of equipment shall be furnished by contractor during detailed engineering. These quality plans shall be approved by the Owner.

3.0 The details of the quality assurance / quality checks envisaged by the Contractor during manufacturing of the equipment supplied by him or procured through his sub-vendors / sub-contractors shall be detailed out in the quality plans to be submitted by the Contractor. The contractor may also furnish any additional information regarding quality assurance / quality checks in the additional sheets, if required. Quality plans for major equipment manufactured by the Contractor or procured through his sub-vendors / sub-contractors shall be submitted during engineering. The contractor shall ensure that the approved quality plans are followed scrupulously by him and by his sub-vendors / sub-contractors and manufacturing of the items covered under the quality plans shall be taken up only after Owner has approved the quality plan.

4.0 Reference quality plan for water tender and foam tender are attached. These quality plans along with those to be submitted for DCP tender will be subject to customer approval during detail engineering. Any comment made by customer will be taken care by the vendor without any commercial implication.

# REFERENCE MQP FOR WATER TENDER

| | Manufacturer's name & address | Manufacturing Quality Plan. | | **BHEL DOC. NO.-** |
|---|---|---|---|---|
| | | Item Name-<br>Fire Water Tender<br>P.O. NO.: | MQP No:<br>Rev No:0<br>Date: | **Project:**<br>**Package:** FIRE TENDERS<br>**Contractor:** BHEL |

| Sl. No. | Component /Operation<br>**First stage Inspection** | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norm | Format of record | Agency | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | N | C | |
| 1.1 | CHASSIS & ENGINE | Model & make (25 TON) | Major | Visual | 100% | Technical Specification | Chassis Doc. | Inspection Report | V | V | V | |
| 1.2 | Under Process Fabrication work of Superstructure | Visual | Major | Visual | 100% | **Approved Doc./Drg.** | **Approved Doc./Drg.** | Inspection Report | P | V | V | |
| 1.3 | Material of Water & Foam Tanks | **Mechanical/ Chemical** | Major | Review of MTC | 100% | **Approved Doc.** | MTC | Inspection Report | P | V | V | |
| 1.4 | Structural work of water tank & foam tank | Analysis & Measurement | Major | Analysis & Measurement | 100% | **Approved Doc.** | **Approved Doc.** | Inspection Report | P | V | V | |

| | LEGEND: | | DOC NO. | | |
|---|---|---|---|---|---|
| MANUFACTURER/ SUB-CONTRACTOR | M: MANUFACTURER/SUBCONTRACTOR<br>N: BHEL/NOMINATED INSPECTION TEAM,<br>C: CUSTOMER ,<br>P : PERFORMANCE, W- WITNESS AND "V" VERIFICATION | FOR BHEL USE | | | |
| SIGNATURE | | REVIEWED BY | NAME & SIGN OF APPROVING AUTHORITY & SEAL | | MFGR. AGREED BY |

| Sl. No | **Component / Operation**<br>**Second Stage Inspection** | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norm | Format of record | Agency | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | N | C | |
| 2.1 | Fire Pump | 4000 LPM @7KG/CM2 300LPM @35 KG/CM2 | Major | Visual | 100% | **Approved Doc.** | **Approved Doc.** | Inspection Report | P | W | V | |
| 2.2 | Hydro-Test Of Tank | Leakage | Critical | Test | 100% | **Approved Doc.** | No Leakage. | Inspection Report | P | W | V | |
| 2.3 | Compete Super structure of tender | Visual | Major | **Visual** | 100% | **Approved Doc./Drg** | **Approved Doc./Drg.** | Inspection Report | P | V | V | |
| 2.4 | Primer coating on Super structure | Visual | Major | **Visual** | 100% | **Approved Doc.** | **Approved Doc.** | Inspection Report | P | V | V | |

| | LEGEND: | | DOC NO. | | |
|---|---|---|---|---|---|
| MANUFACTURER/ SUB-CONTRACTOR | M: MANUFACTURER/SUBCONTRACTOR<br>N: BHEL/NOMINATED INSPECTION TEAM,<br>C: CUSTOMER ,<br>P : PERFORMANCE, W- WITNESS AND "V" VERIFICATION | FOR BHEL USE | | | |
| SIGNATURE | | REVIEWED BY | NAME & SIGN OF APPROVING AUTHORITY & SEAL | | MFGR. AGREED BY |

| Sl. No. | Component /Operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norm | Format of record | Agency | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Final Inspection** | | | | | | | | M | N | C | |
| 3.1 | Performance test of PUMP | Pump Run | Major | Functional Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.2 | Priming Test | Performance | Major | Functional Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.3 | PTO Unit Test | **Make &Performance** | Major | Functional Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.4 | Monitor, hose Reel | **Test** | Major | Operational | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.5 | Control panel & Electrical Item | **Test** | Major | Functional | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.6 | Major Equipment Test | **Performance** | Major | Functional | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.7 | Stability test vehicle / Tilting Test/Road Test | **Performance** | Major | Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.8 | Accessories | **Physical Verification** | Major | Visual | 100% | Technical Specification | Technical Specification | Inspection Report | P | V | V | |

| | LEGEND: | | DOC NO. | | |
|---|---|---|---|---|---|
| MANUFACTURER/ SUB-CONTRACTOR | M: MANUFACTURER/SUBCONTRACTOR<br>N: BHEL/NOMINATED INSPECTION TEAM,<br>C: CUSTOMER ,<br>P : PERFORMANCE, W- WITNESS AND "V" VERIFICATION | FOR BHEL USE | | | |
| SIGNATURE | | REVIEWED BY | NAME & SIGN OF APPROVING AUTHORITY & SEAL | | MFGR. AGREED BY |

# REFERENCE MQP FOR FOAM TENDER

| | Manufacturer's name & address | Manufacturing Quality Plan. | | **BHEL DOC. NO.-** |
|---|---|---|---|---|
| | | Item Name-<br>Foam Tender<br>P.O. NO.: | MQP No:<br>Rev No:<br>Date: | **Project:**<br><br>**Package:** FIRE TENDERS<br>**Contractor:** BHEL |

| Sl. No. | Component /Operation<br>**First stage Inspection** | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norm | Format of record | Agency | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | N | C | |
| 1.1 | CHASSIS & ENGINE | Model & make (16 TON) | Major | Visual | 100% | Technical Specification | Chassis Doc. | Inspection Report | V | V | V | |
| 1.2 | Under Process Fabrication work of Superstructure | Visual | Major | Visual | 100% | **Approved Doc./Drg.** | **Approved Doc./Drg.** | Inspection Report | P | V | V | |
| 1.3 | Material of Water & Foam Tanks | **Mechanical/ Chemical** | Major | Review of MTC | 100% | **Approved Doc.** | MTC | Inspection Report | P | V | V | |
| 1.4 | Structural work of water tank & foam tank | Analysis & Measurement | Major | Analysis & Measurement | 100% | **Approved Doc.** | **Approved Doc.** | Inspection Report | P | V | V | |

| | LEGEND: | | DOC NO. | | |
|---|---|---|---|---|---|
| MANUFACTURER/ SUB-CONTRACTOR | M: MANUFACTURER/SUBCONTRACTOR<br>N: BHEL/NOMINATED INSPECTION TEAM,<br>C: CUSTOMER ,<br>P : PERFORMANCE, W- WITNESS AND "V" VERIFICATION | FOR BHEL USE | | | |
| SIGNATURE | | REVIEWED BY | NAME & SIGN OF APPROVING AUTHORITY & SEAL | | MFGR. AGREED BY |

| Sl. No | **Component / Operation**<br>**Second Stage Inspection** | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norm | Format of record | Agency | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | N | C | |
| 2.1 | Fire Pump | 1800 lpm @ 8.5 Kg/Cm2 | Major | Visual | 100% | **Approved Doc.** | **Approved Doc.** | Inspection Report | P | W | V | |
| 2.2 | Hydro-Test Of Tanks (Water & Foam) | Leakage | Critical | Test | 100% | **Approved Doc.** | No Leakage. | Inspection Report | P | W | V | |
| 2.3 | Compete Super structure of tender | Visual | Major | **Visual** | 100% | **Approved Doc./Drg** | **Approved Doc./Drg.** | Inspection Report | P | V | V | |
| 2.4 | Primer coating on Super structure | Visual | Major | **Visual** | 100% | **Approved Doc.** | **Approved Doc.** | Inspection Report | P | V | V | |

| | LEGEND: | | DOC NO. | | |
|---|---|---|---|---|---|
| MANUFACTURER/ SUB-CONTRACTOR | M: MANUFACTURER/SUBCONTRACTOR<br>N: BHEL/NOMINATED INSPECTION TEAM,<br>C: CUSTOMER ,<br>P : PERFORMANCE, W- WITNESS AND "V" VERIFICATION | FOR BHEL USE | | | |
| SIGNATURE | | REVIEWED BY | NAME & SIGN OF APPROVING AUTHORITY & SEAL | | MFGR. AGREED BY |

| Sl. No. | Component /Operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Document | Acceptance Norm | Format of record | Agency | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Final Inspection** | | | | | | | | M | N | C | |
| 3.1 | Performance test of PUMP | Pump Run | Major | Functional Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.2 | Priming Test | Performance | Major | Functional Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.3 | PTO Unit Test | **Make &Performance** | Major | Functional Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.4 | Monitor, hose Reel & Foam making equipments | **Test** | Major | Operational | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.5 | Control panel & Electrical Item | **Test** | Major | Functional | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.6 | Major Equipment Test | **Performance** | Major | Functional | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.7 | Stability test vehicle / Tilting Test/Road Test | **Performance** | Major | Test | 100% | Technical Specification | Technical Specification | Inspection Report | P | W | V | |
| 3.8 | Accessories & Extinguisher(2x75kg) | **Physical Verification** | Major | Visual | 100% | Technical Specification | Technical Specification | Inspection Report | P | V | V | |

| | LEGEND: | | DOC NO. | | |
|---|---|---|---|---|---|
| MANUFACTURER/ SUB-CONTRACTOR | M: MANUFACTURER/SUBCONTRACTOR<br>N: BHEL/NOMINATED INSPECTION TEAM,<br>C: CUSTOMER ,<br>P : PERFORMANCE, W- WITNESS AND "V" VERIFICATION | FOR BHEL USE | | | |
| SIGNATURE | | REVIEWED BY | NAME & SIGN OF APPROVING AUTHORITY & SEAL | | MFGR. AGREED BY |

# SECTION: II

# SECTION: II B

# MASTER DRAWING LIST WITH SCHEDULE OF SUBMISSION

| MDL FOR FIRE TENDERS<br>5 X 800 MW YADADRI TPS | | | | | |
|---|---|---|---|---|---|
| **S.No.** | **BHEL DRWG NO** | **DRWG TITLE** | **CATEGORY** | **SCHEDULED SUBMISSION (NO. OF WEEKS FROM LOA DATE / PO DATE)** | **RESUBMISSION AFTER COMMENTS INCORPORATION** |
| 1 | PE-V0-417-550-A001 | T.D.S & GA OF WATER TENDER | A-CUST | AS SPECIFIED IN NIT | AS SPECIFIED IN NIT |
| 2 | PE-V0-417-550-A002 | TDS & G.A OF FOAM TENDER | A-CUST | | |
| 3 | PE-V0-417-550-A004 | T.D.S & GA OF DCP TENDER | A-CUST | | |
| 4 | PE-V0-417-550-A006 | MQP FOR WATER TENDER | A-CUST | | |
| 5 | PE-V0-417-550-A007 | MQP FOR FOAM TENDER | A-CUST | | |
| 6 | PE-V0-417-550-A009 | MQP FOR DCP TENDER | A-CUST | | |
| 7 | PE-V0-417-550-A011 | O & M MANUAL FOR FIRE TENDER | A-CUST | | |

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

# SECTION II
# SUB-SECTION IIC

# FORMAT FOR OPERATION AND MAINTENANCE MANUAL

| | | |
|---|---|---|
| Maharatna Company | **5 X 800 MW YADADRI TPS**<br><br>**FIRE TENDERS** | **SPECIFICATION No: PE-TS-417-550-A001**<br>**SECTION: II**<br>**SUB-SECTION: II C**<br>**REV 00** \| **DATE: MAR 2021** |

**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<br>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 | | | | |

| 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** | | | | |

| 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** | | | | |

# SECTION: III

# DOCUMENTS TO BE SUBMITTED BY BIDDER

# SECTION: III

## SUB-SECTION: III A

# LIST OF DOCUMENTS TO BE SUBMITTED WITH BID

**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. Deviation Schedule, if any, in the format attached with GCC.
4. Un-priced price bid indicating “Quoted / Not quoted / Not applicable” as the case may be.
5. Documents for meeting the Pre-Qualification Requirement

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

# SECTION: III

## SUB-SECTION: III B

# COMPLIANCE CUM CONFIRMATION CERTIFICATE

**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

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.

# SECTION: III

## SUB-SECTION: III C

# PRE BID CLARIFICATION SCHEDULE

## 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

# SECTION: III

# SUB-SECTION: III D

# DRG/DOCUMENT DISTRIBUTION SCHEDULE

**ANNEXURE-1**

**DISTRIBUTION SCHEDULE**

| S. No | Description | TSGENCO | | | | | | | | M/S DCPL, KOLKATA | | | Equipment Vendor | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Director Projects | Director Technical | CE/Civil Thermal Projects Hyd. | CE/ TPC-I, Hyd | CE/ O&M/ KTPS | SE/ Civil KTPS | SE/E&M / KTPS | DE Constr. KTPS | Kolkata | HYD | KTPS | | |
| A | **Letter Of Intent or Contract Documents** | 1 | 1 | 1 | S | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | |
| B | **Vendor Drawings** | | | | | | | | | | | | | |
| 1. | Preliminary | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 12 | 1 | - | S | |
| 2. | Return preliminary with comments | - | - | 1 | 2 | 1 | 1 | 1 | 1 | S | 1 | - | 1 | |
| 3. | Final and any revision thereof | | | | | | | | | | | | | |
| | a. Civil | 1 | 1 | 6+1T | 1 | 1 | 6+1T | 1 | - | 2+1T | 1 | 1 | S | |
| | b. E&M | 1 | 1 | 1 | 6+1T | 1 | 1 | 6+1T | 1 | 2+1T | 1 | 1 | S | |
| C. | **Design Drawings** | | | | | | | | | | | | | |
| 1. | Preliminary | | | | | | | | | | | | | |
| | a. Civil | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 4 | 1 | 1 | S | |
| | b. E&M | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 4 | 1 | 1 | S | |
| 2. | Released for construction | | | | | | | | | | | | | |
| | a. Civil | 1 | 1 | 2 | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 2 | S | |
| | b. E&M | 1 | 1 | 1 | 1 | 2 | 1 | 6 | 1 | 1 | 1 | 2 | S | |
| 3. | Return marked 'As built' | | | | | | | | | | | | | |
| | a. Civil | - | - | 1 | - | - | 1 | - | - | 1 | 1 | S | 1 | |
| | b. E&M | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | S | 1 | |
| 4. | As built drawings | | | | | | | | | | | | | |
| | a. Civil | - | - | 1+1T | - | 2+1T | 5+1T | - | 1 | 1+1T | - | 1 | S | |
| | b. E&M | - | - | 1 | 2+1T | 2+1T | - | 5+1T | 1+1T | 1+1T | - | 1 | S | |

| S. No | Description | TSGENCO | | | | | | | | M/S DCPL, KOLKATA | | | Equipment Vendor | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Director Projects | Director Technical | CE/Civil Thermal Projects Hyd. | CE/ TPC-I, Hyd | CE/ O&M/ KTPS | SE/ Civil KTPS | SE/E&M / KTPS | DE Constr. KTPS | Kolkata | HYD | KTPS | | |
| D | Progress Report Monthly | | | | | | | | | | | | | |
| 1. | Equipment vendor | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | S | |
| 2. | M/s DCPL, Kolkata | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | S | 1 | 1 | Nil | |
| E | Test & Inspection Reports | | | | | | | | | | | | | |
| 1. | Equipment manufacturer | | | | | | | | | | | | | |
| | a. Civil | 1 | 1 | 1 | 2 | 1 | 1 | 1 | - | 11 | 1 | 1 | S | |
| s | b. E&M | 1 | 1 | - | 2 | 1 | - | 1 | 1 | 11 | 1 | 1 | S | |
| 2. | M/s DCPL, Kolkata | 1 | 1 | - | 2 | 1 | - | 1 | 1 | S | - | 1 | - | |
| F | Instruction Manuals/Data Books | | | | | | | | | | | | | |
| 1. | Equipment manufacturer | | | | | | | | | | | | | |
| | a. Civil | 1 | 1 | 1+1T | 1 | 1 | 6+1T | 1 | 1 | 2+1T | 1 | 1 | S | |
| | b. E&M | 1 | 1 | - | 3+1T | 1 | - | 6+1T | 2 | 3+1T | 1 | 1 | S | |
| 2. | M/s DCPL, Kolkata | 1 | 1 | - | 10+1T | 1 | - | 15+1T | - | S | 1 | 1 | Nil | |
| G | M/s DCPL, Kolkata Criteria | 1 | 1 | 1 | 8+1T | 1 | 1 | 2 | 1 | 1 | 1 | 1 | S | |
| H | Design Calculations | 1 | 1 | 1 | 8+1T | 1 | 1 | 2 | 1 | 1 | 1 | 1 | S | |
| I | Final consulting Engineering Report | 1 | 1 | 1 | 10 | 1 | 1 | 2 | 1 | S | 1 | 1 | Nil | |

S – Source, T – Transparency & Soft Copy on CD,

TSGENCO : Telangana State Power Generation Corporation Limited

Director, Projects, Hyd : Director/ Projects, TSGENCO, Vidyut Soudha, Hyderabad – 500 082

| | | |
|---|---|---|
| Director, Technical, Hyd | : | Director/ Technical, TSGENCO, Vidyut Soudha, Hyderabad – 500 082 |
| CE/ Civil, Hyd | : | Chief Engineer/Civil, Thermal Projects, TSGENCO, Vidyut Soudha, Hyderabad – 500 082 |
| CE/ TPC-I, Hyd | : | Chief Engineer/TPC, TSGENCO, Vidyut Soudha, Hyderabad – 500 082 |
| CE/ O&M/ KTPS | : | Chief Engineer(O&M), KTPS, Kothagudem, Telangana |
| SE/Civil, KTPS | : | Superintending Engineer (Civil), KTPS, Kothagudem, Telangana |
| SE/E&M, KTPS | : | Superintending Engineer (E&M), KTPS, Kothagudem, Telangana |
| DE/Constr./ KTPS | : | Divisional Enginer/Constrcution, KTPS, Kothagudem, Telangana |
| M/s DCPL, Kolkata | : | M/s DCPL, Kolkata. |
| M/s DCPL, Hyd | : | M/s DCPL, Hyderabad. |
| M/s DCPL, KTPS | : | M/s DCPL, KTPS, Kothagudem, Telangana |

| | | | |
|---|---|---|---|
| | **PROJECT: 5 X 800 MW YADADRI TPS** | PE-PQ-417-550-A001 | |
| | | DATE | 17/03/2021 |
| | **PRE-QUALIFICATION REQUIREMENT- FIRE TENDER** | REV NO | 00 |

| | |
|---|---|
| 1.0 | The bidder is required to meet the provneness criteria and / or qualification requirement for Fire Tender package as per criteria stipulated below:<br><br>The bidder should have capabilities for design/ manufacture and having in-house/ out-sourced facility for testing of Fire tenders: Water / Foam / DCP type.<br><br>The above Fire tender should have been running successfully for one (1) year minimum as on date of bid opening. |
| 2.0 | The supplier has to submit following supporting documents meeting above mentioned pre-qualifying requirement<br>Copy of one (1) performance certificate in English from end user along with copy of related Purchase Order (PO) or letter of intent (LOI) or letter of award (LOA) or work order (WO) in support of PQR clause mentioned at S. No. 1.0 above. |
| 3.0 | Bidder shall submit other relevant documents to substantiate technical parameters specified in PQR, if the same is not mentioned in performance certificate/purchase order. |
| 4.0 | Minimum one (1) no. Purchase order shall be submitted which should not be more than seven (7) years old as on date of bid submission, for establishing continuity in business. This is over and above the requirement of PO mentioned at S. No. 2.0 above. |
| 5.0 | Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted. |
| 6.0 | Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/ collaborator to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL. |
| 7.0 | Consideration of offer shall be subject to customer's approval of bidder, if applicable. |
| 8.0 | After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender. |
| 9.0 | The bidder shall meet PQR based on its own credentials. Bid from joint venture (JV) company/Consortium bid is not acceptable. |

**MDL FOR FIRE TENDERS**

**5 X 800 MW YADADRI TPS**

**ANNEXURE-A**

| BHEL Drawing No | Drawing Title | Primary/Secondary |
|---|---|---|
| PE-V0-417-550-A001 | TDS & GA of Water Tender | Primary |
| PE-V0-417-550-A002 | TDS & GA of Foam Tender | Primary |
| PE-V0-417-550-A004 | TDS & GA of DCP Tender | Primary |
| PE-V0-417-550-A006 | MQP of Water Tender | Primary |
| PE-V0-417-550-A007 | MQP of Foam Tender | Primary |
| PE-V0-417-550-A009 | MQP of DCP Tender | Primary |
| PE-V0-417-550-A010 | BOM Fire Tender | Secondary |
| PE-V0-417-550-A011 | O&M manual for Fire Tender | Secondary |