

# **UTTAR PRADESH RAJYA VIDYUT UTPADAN NIGAN LIMITED**

**1X660 MW PANKI TPP EXTN.**

## **TECHNICAL SPECIFICATION FOR FIRE TENDERS AND SAFETY EQUIPMENT**

**SPECIFICATION NO.: PE- TS- 426- 550- A001, Rev 01**



**BHARAT HEAVY ELECTRICALS LIMITED**

**POWER SECTOR**

**PROJECT ENGINEERING MANAGEMENT**

**NOIDA, INDIA**

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**INTENT OF SPECIFICATION**



**1X660 MW PANKI TPA  
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**1.0 INTENT OF SPECIFICATION**

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

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

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



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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.

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



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**Note:**

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

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



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**SECTION: I**

**SUB-SECTION: IB**

**PROJECT INFORMATION**

## 1.0 PROJECT INFORMATION

|        |                                                          |   |                                                                                                                                                                                 |               |
|--------|----------------------------------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1.1    | Owner                                                    | : | <b>UTTAR PRADESH RAJYA VIDYUT UTPADAN NIGAM LIMITED, LUCKNOW</b>                                                                                                                |               |
| 1.2    | Project Title                                            | : | Panki Thermal Power Station (1x660MW)                                                                                                                                           |               |
| 1.3    | Owner's Engineer                                         | : | <b>DEVELOPMENT CONSULTANTS PVT. LTD and NTPC</b>                                                                                                                                |               |
| 1.4    | Project Site Location                                    | : | Place                                                                                                                                                                           | Panki         |
|        |                                                          |   | District                                                                                                                                                                        | Kanpur        |
|        |                                                          |   | State                                                                                                                                                                           | Uttar Pradesh |
|        |                                                          |   | Country                                                                                                                                                                         | India         |
| 1.5    | Latitude & Longitude of project site                     | : | North                                                                                                                                                                           | N26°28'20"    |
|        |                                                          |   | East                                                                                                                                                                            | E 80°14'32"   |
| 1.6    | Nearest Railway Station                                  | : | Panki                                                                                                                                                                           | 5 km          |
| 1.7    | Nearest Town                                             | : | Kanpur                                                                                                                                                                          | 16km          |
| 1.8    | Nearest Highway                                          | : | National Highway - 25                                                                                                                                                           |               |
| 1.9    | Nearest Airport                                          | : | Kanpur                                                                                                                                                                          | 25 km         |
|        |                                                          |   | Lucknow                                                                                                                                                                         | 80 Km         |
| 1.10   | Nearest Commercial Airport                               | : | Delhi                                                                                                                                                                           | 140 km        |
| 1.11   | Nearest Water Body                                       | : | Lower Ganga Canal, adjacent to site                                                                                                                                             |               |
| 1.12   | Land                                                     | : | Land is in possession of UPRVUNL.                                                                                                                                               |               |
| 1.13   | Station Graded Level Elevation from Mean sea level (MSL) | : | Plant FGL → RL(+) 126.0M → EI(-) 0.500M<br>Plant FFL → RL(+) 126.5M → EI(+/-) 0.000M                                                                                            |               |
| 1.14   | Water                                                    |   |                                                                                                                                                                                 |               |
| 1.14.1 | Nearest Water Source                                     | : | Lower Ganga Canal system running adjacent for project site                                                                                                                      |               |
| 1.14.2 | Water Requirement for station                            | : | ~ 1927 m <sup>3</sup> /hr considering closed cooling cycle with NDCT.<br>Additional 700m <sup>3</sup> /hr for ash slurry preparation during emergency ash disposal to ash dyke. |               |
| 1.14.3 | Raw Water Analysis from Upper Ganga Canal                | : | Refer Appendix - I                                                                                                                                                              |               |
| 1.15   | Site Ambient Condition                                   |   |                                                                                                                                                                                 |               |
| 1.15.1 | Monthly mean (DBT)                                       | : | Maximum                                                                                                                                                                         | 44.4 °C       |
|        |                                                          | : | Minimum                                                                                                                                                                         | 3.8 °C        |
| 1.15.2 | Extreme Recorded (DBT)                                   | : | Maximum                                                                                                                                                                         | 47.3 °C       |
|        |                                                          |   | Minimum                                                                                                                                                                         | -0.9 °C       |
| 1.15.3 | Monthly mean (WBT)                                       | : | Maximum                                                                                                                                                                         | 27.3 °C       |
|        |                                                          |   | Minimum                                                                                                                                                                         | 9.2 °C        |
| 1.15.4 | Relative Humidity                                        | : | Maximum                                                                                                                                                                         | 84 %          |
|        |                                                          |   | Minimum                                                                                                                                                                         | 28 %          |
| 1.15.5 | Average relative humidity                                |   | Annual Average                                                                                                                                                                  | 65 %          |
| 1.15.6 | Rainfall                                                 | : | Annual average                                                                                                                                                                  | 832.6 mm      |

|        |                    |   |                                                                                                     |                           |
|--------|--------------------|---|-----------------------------------------------------------------------------------------------------|---------------------------|
|        |                    |   | Heaviest fall recorded in 24 hrs                                                                    | 247.4 mm                  |
| 1.15.7 | Basic Wind Speed   | : | 47.00 m/s                                                                                           | As per IS: 875 part – III |
|        |                    |   | For wind resistance design of structure & equipment refer relevant civil section                    |                           |
| 1.15.8 | Climatic condition | : | For detailed information refer attached Climatological data as published by IMD for Kanpur station. |                           |
| 1.16   | Seismic data       | : | Zone – III                                                                                          | As per IS: 1893           |
|        |                    |   | For earthquake resistance design of structure & equipment refer relevant civil section              |                           |



**1x660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

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SECTION: I

SUB-SECTION: IC

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**VOLUME - II B**

**SECTION: I**

**SUB-SECTION: IC**

**SCOPE OF SUPPLY & DETAIL TECHNICAL  
 REQUIREMENTS.**

|                                                                                   |                                                                                                                 |                                     |                  |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------|
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## 1.0.0 SCOPE

### 1.1.0 SCOPE OF SUPPLY

#### 1.1.1 FOAM TENDER

- i) One number Foam tender {including 16 ton vehicle chassis, pump capacity (3000LPM@8.5 Kg/cm<sup>2</sup> (g) minimum), Water tank (5000 liter capacity)} conforming to IS: 10460, complete with all accessories and equipment's as specified herein & including those specified in **Annexure-I** of this specification.
- ii) First fill of chemicals & consumables during performance demonstration.
- iii) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

#### 1.1.2 WATER TENDER

- i) Two number Water tenders {including 16 T vehicle chassis, Pump of Capacity (3000 LPM @ 0.7 Mpa and 300 LPM @ 3.5 Mpa), Water Tank (5000 Liter Capacity)} conforming to IS: 950:2012, complete with all accessories and equipment's as specified herein & including those specified in **Annexure-II** of this specification.
- ii) First fill of chemicals & consumables during performance demonstration.
- iii) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

#### 1.1.3 FIRE JEEP WITH TRAILER PUMP

- i) One number Fire Jeep, minimum 2500 cc engine capacity.
- ii) One number Trailer pump, conforming to IS: 944 & latest, complete with all accessories and equipment's as specified herein & including those specified in **Annexure III** of this specification.
- iii) First fill of chemicals & consumables during performance demonstration.
- iv) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

#### 1.1.4 DCP TENDER

- i) One number DCP tender {including 16 T vehicle chassis}, conforming to IS: 10993 & latest, complete with all accessories and equipment's as specified herein & including those specified in **Annexure IV** of this specification.
- ii) First fill of chemicals & consumables during performance demonstration.
- iii) Replenishment of consumables & chemicals consumed during performance demonstration of tenders.

|                                                                                   |                                                                        |                                     |                  |
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### 1.1.5 FIRE SAFETY EQUIPMENT

- i) Fire entry suits – 04 nos.
- ii) Breathing apparatus with oxygen cylinder – 10 nos.
- iii) First Aid Kit – 02 sets.
- iv) Fiber glass blanket – 10 sets.
- v) Portable thermal imaging camera. – 01 no.
- vi) Multipurpose nozzle. – 04 nos.

**1.1.6** Maintenance tools and tackles as mentioned in **Annexure V** of this specification shall be provided with each vehicle.

### 1.2.0 SCOPE OF SERVICES

- i) Performance demonstration of fire water tender, foam tender, fire jeep, trailer pump, DCP tender and safety equipment at site and training of owner's personnel.
- ii) Registration, permit, insurance of all the above listed vehicles before handing over to end customer with name transfer.

|                                                                                   |                                                                        |                                     |                  |
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## **D1 - DESCRIPTION ON FOAM TENDER**

### **2.0.0 CODES AND STANDARDS**

The design, material of construction, workmanship & finish, performance testing, 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.

### **3.0.0 VEHICLE CHASSIS**

The chassis for carrying out fabrication work of foam tender shall be of Make-TATA/Ashok Leyland/Eicher/equivalent. The chassis shall be equipped with power assisted steering and power brake. Chassis shall be BS-VI compliant and meeting the prevailing emission norms in the country.

### **4.0.0 GENERAL REQUIREMENTS**

4.1.0 The appliance shall incorporate a fire pump of 3000 L/min capacity, a water tank of 5000 ltr. Capacity, a foam tank of 500 ltr capacity, connected equipment for foam production and supplementary extinguishing agent (S.No. 10.0.0).

- |    |                                                                                                                                                                                                                                                                                                                    |                                                             |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 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 260 mm                                        |
|    | Overall width                                                                                                                                                                                                                                                                                                      | not more than 2.50 m                                        |

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

- 4.2.0 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).
- 4.3.0 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.
- 4.4.0 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.
- 4.5.0 The supplementary agent used for firefighting shall be dry chemical powder (2x75 Kg capacity) and Carbon Di-oxide type (2x4.5 Kg as per IS: 15683).
- 4.6.0 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.
- 4.7.0 Lever type valve controls shall be preferred throughout.
- 4.8.0 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.
- 4.9.0 Lubricating nipples shall be provided wherever necessary.

## **5.0.0 DESIGN AND CONSTRUCTION**

### **5.1.0 Engine**

- 5.1.1 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.
- 5.1.2 The operating temperature of the engine cooling water shall preferably be thermostatically controlled.
- 5.1.3 The oil in the oil sump shall be prevented from overheating
- 5.1.4 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.
- 5.1.5 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.



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## **5.2.0 Electrical System**

- 5.2.1 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.
- 5.2.2 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.

## **5.3.0 Water Tank**

- 5.3.1 A water tank of not less than 5000 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.
- 5.3.2 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.
- 5.3.3 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.
- 5.3.4 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.
- 5.3.5 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  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  and full. (preferably calibrated in litres).



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5.3.6 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.

5.3.7 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.

#### **5.4.0 Hose Reel**

5.4.1 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.

#### **5.5.0 Pump**

The pump shall preferably be made of any suitable alloy, compatible with all types of synthetic protein foam compound, with stainless steel shaft suitable for use with brackish water. The pumps be capable of delivering not less than 3000 l/min. of water at a pressure not less than 8.5 kg/cm<sup>2</sup>. 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.

#### **5.5.1 PUMP TEST**

5.5.1.1 The pump shall run for a period of 4 hours non-stop delivering the rated output at 7 kg/cm<sup>2</sup> 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/cm<sup>2</sup> to detect leakages, performance, etc.

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

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

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

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

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5.5.1.6 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.

#### 5.6.0 Primer

The primer may 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.

#### 5.7.0 Power take off

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

#### 5.8.0 Foam Equipment

5.8.1 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.

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

5.8.1.2 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.

5.8.1.3 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 staining area. The tank top shall be removable and it shall be ensured that the joint between the top and the body of the tank is leak proof.

5.8.1.4 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.

5.8.1.5 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.

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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.

5.8.1.6 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.

5.8.1.7 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.

**5.8.2** 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.

### **5.8.3 Foam Monitor**

5.8.3.1 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.

5.8.3.2 The aggregate foam discharge shall be not less than 7000 L/min. through monitor.

5.8.3.3 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.

### **5.9.0 Control panels**

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

5.9.2 The control panel shall include the following:

- a) Throttle control for engine;
- b) Pressure gauge 0 to 2.0 N/mm<sup>2</sup> (20 Kg/cm<sup>2</sup>)

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- c) Compound gauge calibrated as under;
  - (i) Vacuum - 0 to 75 cm Hg preferably in black
  - (ii) Pressure - 0 to 0.6 N/mm<sup>2</sup> (6 kgf / cm<sup>2</sup>); preferably in black
- d) Primer control (if the primer is not fully automatic);
- e) Gauge for cooling water and glow lamp for lubricating system;
- f) Cooling water circuit control.
- g) Control for using monitor.

5.9.3 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 pick up tube;
- e) Control(s) for flushing out the foam making equipment and its plumbing;

#### 5.10.0 Body Work and Stowage

- 5.10.1 Enclosed accommodation for six persons (1+1 at front, 1 full 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.
- 5.10.2 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.
- 5.10.3 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.



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- 5.10.4 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.
- 5.10.5 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.
- 5.10.6 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.
- 5.10.7 Tool Kit Container – A specially fitted recessed tray for the normal kit of tools, carried on the appliance shall be provided.
- 5.11.0 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 tilted to either side, the point at which overturning occurs, is not passed at an angle of 30 degrees from the horizontal.

## **6.0.0 WORKMANSHIP AND FINISH**

- 6.1.0 All parts of the appliance shall be of good workmanship and shall have streamlined finish
- 6.2.0 The appliance shall be painted in fire red colour conforming to Shade No. 536 of IS: 5. The paint shall conform to IS: 2932-1974.

## **7.0.0 ACCESSORIES**

- 7.1.0 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
  - 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.



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- 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.

### 8.0.0 MARKING

8.1.0 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

### 9.0.0 ADDITIONAL ACCESSORIES (over and above accessories mentioned against CI 7.0.0)

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.

### 10.0.0 SUPPLEMENTARY EXTINGUISHING AGENT

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

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- 10.2.0 The total quantity of supplementary agent shall be not less than 150 kg. Of dry powder and shall conform to IS: 4308.
- 10.3.0 The dry powder system shall comply with the following minimum requirement.
- 10.4.0 The dry powder system shall comprise of two self-contained units, each having a capacity of 75 kg of dry powder.
- 10.5.0 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.
- 10.6.0 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.
- 10.7.0 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.

#### 11.0.0 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



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### ANNEXURE-I

List of equipments to be supplied with the foam tender

| S.No. | Equipment / Item                                                                                                                                                                                                                                                                                                         | Quantity   |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1.0   | Extension ladder-10.5 meter (IS: 4571 or IS: 930)                                                                                                                                                                                                                                                                        | 1          |
| 2.0   | Armoured suction hose complete with round thread couplings to suit the pump inlet-2.5 m long (IS: 2410 and IS: 902)                                                                                                                                                                                                      | 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 strainers 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)                                                                                                                                                                                                                                                        | 10         |
|       | a) Adaptor for 100 mm suction female screw coupling and 63 mm male instantaneous.                                                                                                                                                                                                                                        | 2          |
|       | b) Adaptor double female instantaneous pattern 63                                                                                                                                                                                                                                                                        | 2          |



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|      |                                                                                                     |        |
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|      | mm.                                                                                                 | 2      |
|      | c) Adaptor double male instantaneous pattern 63 mm.                                                 |        |
| 21.0 | Nozzle spanners (IS: 903)                                                                           | 2      |
| 22.0 | Portable electric box lamp with rechargeable accumulator.                                           | 2      |
| 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 | 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      |

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## **D2 - 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/equivalent. The chassis shall be equipped with power assisted steering and power brake. 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 The appliance shall incorporate:**

- a) High and low pressure fire pump of capacity (3000 LPM @ 0.7 Mpa and 300 LPM @ 3.5 Mpa), The appliance shall carry a water tank of minimum 5000 Liter capacity.

It shall carry an extension ladder and shall be capable of towing a trailer pump.

#### **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 <b>16000 kg including crew, water and equipment.</b> |
| 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.

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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  |

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

- 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 minimum 1.22 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.



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- 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 5000 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,



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- 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 litre/min approximately. Provision shall be made in the gun controls to achieve combat mode (straight jet) or a fog shield in split second. The fog gun shall be made of stainless steel or aluminum alloy.

#### 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. 14.5.5.

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



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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/cm<sup>2</sup>.

- 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 °C.:

The pump shall be capable of delivering 3000 LPM @ 7 Kg/cm<sup>2</sup> and 300 LPM @ 35 Kg/cm<sup>2</sup> at 3 mtrs. suction lift at NTP condition.

The pump shall follow the following performance parameters:

|                                          |                                                                      |
|------------------------------------------|----------------------------------------------------------------------|
| Normal Pressure Output                   | :3000 LPM @ 7 Kg/cm <sup>2</sup>                                     |
| High pressure Output                     | : 300 LPM @ 35 Kg/cm <sup>2</sup>                                    |
| Maximum Pressure in Normal Pressure mode | : 14 Kg/cm <sup>2</sup> (shut off pressure)                          |
| Maximum Pressure in High Pressure mode   | : 45 Kg/cm <sup>2</sup>                                              |
| Deep Lifting Capacity of Pump            | : 30 m <sup>3</sup> /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<sup>th</sup> (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

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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  $\pm 5\%$ . However, in no case the efficiency of the pump shall be less than 60 percent. The pump shall run for a period of 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.



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#### 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 4000 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 from water level to the center of pump) in not more than 24 seconds and shall preferably be fully automatic. The allowance shall be 30 cm for every 300 m elevation above sea level and 1 percent for 2.5°C rise in water temperature.

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 conform 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

|                                                                                   |                                                                        |                                     |                  |
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- c) Compound gauge calibrated as under:  
Vacuum - 0 to 75 cm Hg, preferably in black;  
Pressure - 0 to 0.6 MPa preferably in black;
- d) Primer control (if the primer is not fully automatic)
- e) Gauge for cooling water and glow lamp for lubricating system;
- f) Cooling water circuit control.
- 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. 14.3.4
- b) Five way control valve as described under cl.no. 14.3.6
- 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 aluminium chequered plate rigidly fixed to the frame cross members by means of nuts and bolts or riveting. Trap doors for topping up oil, etc, wherever necessary shall be provided.

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

- 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

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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 foldable 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.



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- 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 B. 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.
- 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.

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- 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.



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**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 30° 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.
- d) Reversing light - Lamp suitably situated to assist reversing.
- e) Amber blinkers lights - Situated on the head of the driving compartment.
- f) Trafficators - Illuminated with indicating lights on instrument panel or in any other prominent position in driving compartment.
- g) Wind screen wipers electrically operated.
- h) Tools - All tools required for normal routine maintenance of the appliance, which are not included in the kit for the chassis.
- j) Siren - Battery operated.
- k) Search light - Adjustable to give flood or beam light, mounted in a convenient position but capable of being readily disconnected and mounted on a tripod away from the appliance, complete with tripod and with not less than 30 mm of TRS cable on a reel mounted on the appliance.
- m) Spot light - Adjustable, mounted in a convenient position on the near side of the driving compartment.
- n) Inspection lamp - Protected type on wander lead with plug. A socket shall be provided in the control panel in the driver's cab for plugging in the lamp.



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- p) Tail lamps - Two of combined stop and tail.
- q) Rear reflectors
- r) Wind Screen Washer
- s) Cab, instrument panel and locker, light
- t) Public address system.

## **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/cm<sup>2</sup>
- 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.

## **9.0.0 ADDITIONAL ACCESSORIES (over & above accessories mentioned against Cl.16.0.0)**

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 with each fire water tender.

## **10.0.0 ACCEPTANCE TESTS**



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

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

**ANNEXURE-II**

List of equipments 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)                                                                                                         | 25       |
|       | b) Hose bandages (IS: 5612, part-II)                                                                                                      | 25       |
|       | c) Hose slings                                                                                                                            | 20       |
|       | d) Hose straps                                                                                                                            | 20       |
| 4.0   | Suction hose of rubber of 100 mm internal Diameter in 2.5 m length (IS: 2410) fitted with 100 mm suction hose couplings (as per IS 902).  | 10 m     |
| 5.0   | 3 way suction collecting head 100 mm size (IS: 904)                                                                                       | 01       |
| 6.0   | Suction wrenches for 100mm suction coupling (IS: 4643)                                                                                    | 02       |
| 7.0   | Suction Strainer 100 mm size (IS: 907)                                                                                                    | 01       |
| 8.0   | Basket strainer, cylindrical type (IS: 3582)                                                                                              | 01       |
| 9.0   | Dividing breeching with control instantaneous Pattern 63 mm (IS 5131)                                                                     | 1        |
| 10.0  | Collecting breeching with control instantaneous Pattern 63 mm (IS 905)                                                                    | 01       |
| 11.0  | a) Hydrant-stand pipe-two way (IS: 5714)                                                                                                  | 01       |
|       | b) Double female coupling (IS: 901)                                                                                                       | 02       |
|       | c) Hydrant connection, 63mm female instantaneous pattern delivery coupling at both end. (IS: 901)                                         | 02       |

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| 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             |



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| 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 filling – 250 mm              | 01 |

|                                                                                   |                                                                        |                                     |                  |
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### **D3 - DESCRIPTION OF FIRE JEEP WITH TRAILER PUMP**

#### **1.0.0 CODES AND STANDARDS**

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

IS: 944 - Functional requirement of trailer pump.

#### **2.0.0 FIRE JEEP**

Fire Jeep to be supplied shall be of minimum 2500 cc engine capacity and capable to tow trailer pump. Fire jeep shall have 1.5T capacity tow hook at the rear of the vehicle. One number, 50mm circumference, 15m length manila rope as per IS: 1084 shall also be supplied with Fire Jeep. Fire Jeep shall be minimum BS VI compliant and meeting the prevailing emission norms in the country. Fire jeep shall have seating capacity for minimum 4 persons and preferably open from back side (pick-up type) for storing fire extinguishing items.

#### **3.0.0 GENERAL REQUIREMENTS**

3.1.0 The trailer pump shall consist of a pump of capacity of not less than 1800 ltrs./min at 0.7 MN/m<sup>2</sup> (7.0 kgf/cm<sup>2</sup>) pressure, driven by an internal combustion engine. The combined unit being permanently mounted on a trailer with the pump at the rear, and shall be capable of being towed to safety by a Fire Jeep.

3.2.0 **Overall Dimensions** - The overall length of the whole unit shall not exceed 3.3 m, the height shall not exceed 1.6 m (with spot light) and the wheel track shall not exceed 1.4 m.

#### **4.0.0 MATERIAL**

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

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

- |                          |                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------|
| a) Trailer chassis frame | Suitable mild steel sections                                                            |
| b) Axle                  | Carbon steel or mild steel                                                              |
| c) Pump casing           | Aluminium alloy Grade 4600 A<br>of IS:617 or leaded tin bronze<br>(Grade II of IS: 318) |

|                                                                                   |                                                                        |                                     |                  |
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- |                                         |                                                 |
|-----------------------------------------|-------------------------------------------------|
| d) Impeller ring and impeller neck ring | Leaded tin bronze (Grade II of IS:318)          |
| e) Pump shaft                           | Stainless steel Grade 04 Cr. 18 Nilo of IS:6603 |
| f) Engine cover and pump panel          | Mild steel sheets (IS: 513 ordinary grade)      |

## 5.0.0 DESIGN AND CONSTRUCTION

**5.1.0 Engine** - The IC engine shall have not less than 4 cylinders and shall conform to IS: 1601. The brake horsepower development shall be at maximum working load. Engine shall have at least 5% power to work the pump at its rated output at 0.7 MN/m<sup>2</sup> (7 kgf/cm<sup>2</sup>) pressure and shall have sufficient reserve power. The engine shall also be provided with a generator/alternator for charging 12-volt battery with a capacity of 92 Ah at 10-hour rate. Hand cranking arrangement shall also be provided.

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

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

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

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

## 5.2.0 Fuel System

**5.2.1** A fuel tank of adequate capacity for a minimum continuous run of 2 hours without refuelling and a graduated dipstick should be provided.

**5.2.2** The filling orifice of ample size shall be positioned away from the exhaust pipe and shall be accessible without removing the engine covers. The cap shall be clearly marked with type of fuel and shall incorporate an anti-flash device.

|                                                                                   |                                                                        |                                     |                  |
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5.2.3 There shall be one fuel pump which shall be mechanically operated. It shall be preferably provided with a drain plug.

### 5.3.0 Pump

5.3.1 The pump shall be of the centrifugal type. It shall be of single its characteristics should match with the engine ratings for continuous running Glands of suitable type shall also be provided. A drain plug shall be provided at the bottom of the casting.

5.3.2 The impeller shall be dynamically balanced. The pump shall show no leakage when subjected to a hydraulic pressure of 25 kgf/cm<sup>2</sup>.

5.3.3 The pump shall be tested for its performance duties as detailed in 5.3.4 and 5.3.5 at water temperature of 27 ± 2 deg. C and at a pressure of 760 mm Hg.

The following allowances (deductions) shall be made:

Allowance for Output:

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

Allowance for Lift

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

5.3.4 The pump when tested in conditions as mentioned in 5.3.3 shall be capable of giving requirements given in Table 1 when running at not more than 4000 rev./min of impeller-shaft and working with all internal and external strainers (except basket strainer) fitted.

5.3.5 The pump shall run continuously for a period of 4 hours delivering rated output at 3 m lift and at 0.7 MN/m<sup>2</sup> (7 kgf/m<sup>2</sup>) pressure. During this test the water in the engine cooling system shall not be replaced and the temperature of engine lubricating oil shall not exceed the specified value.



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**TABLE PERFORMANCE DUTIES OF TRAILER FIRE FIGHTING LARGE PUMP 1800 l/min.**

(Clause 5.3.4)

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

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5.3.6 The make round thread suction eye shall be provided with a standard 100-mm suction connection conforming to IS: 992 with internal strainer and blank cap. The strainer shall be readily removable but shall be retained firmly in position when in use. There shall be two delivery valves conforming to IS: 4928 with 63-mm female instantaneous hose connection, and blank caps. Blank cap shall incorporate means for relieving pressure between the valve and the cap.

5.4.0 The primer shall be capable of lifting water at least 7.0 m (measured vertically from water level to the centre of suction eye of the pump) in not more than 24 seconds from the time it is engaged after 24 seconds and shall preferably be fully automatic

5.5.0 **Transmission** – The assembly of the pump and engine shall be as compact as possible as possible and preferably a clutch flexible couplings or any other suitable measure shall be incorporated between the pump and the engine. The engine and pump should be mounted on ant vibration mountings so as to reduce vibration to minimum.

5.6.0 **Control and Instruments** – The illuminated pump panel provided adjacent to the suction eye and delivery valve shall include the following:

- a) Ignition switch:
- b) Throttle control
- c) Ammeter
- d) Choke for petro engine

|                                                                                   |                                                                        |                                     |                  |
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e) Gauges

- 1) Compound gauge calibrated as follows:  
 Vacuum - 0 to 75 cmHg  
 Pressure - (0 to 5 kgf/cm<sup>2</sup>)

f) Temperature gauge:

g) Oil pressure gauge:

h) Pump and pump panel light:

i) Primer control (if primer is not fully automatic):

j) Spot light adjustable switch:

k) Fuel contents gauge:

#### 5.7.0 Trailer

- 5.7.1 The trailer frame shall incorporate two semi-elliptic spring conforming to IS:1135 and axles. Cross country type pneumatic tyres of 6.00 x 16 size. 6 ply shall be used for the unit. The whole unit shall be compact and the pumping unit shall be so mounted as to bring centre of gravity as low as possible.
- 5.7.2 The centre of gravity of the whole unit shall be slightly forward of the wheel axle when the towing eye is 66 cm above the ground level. The trailer shall not tilt backward when resting on front leg. No part of the trailer shall have a clearance less than 23 cm when the trailer is tilted so as to raise the height of the eye 65 cm or to lower it to 45 cm. In towing position the height of the towing eye shall normally be 55 cm above ground level.
- 5.7.3 When the fully laden trailer is being towed at 20 km/h in cross country for 2 km and in normal traffic conditions on tar road for 10 km, the trailer shall hold the road well. The axle shall not distort and the alignment of the wheels is ensured.
- 5.7.4 Efficient brakes shall be provided on the two wheels, operation through compensating gear by over-run. A hand lever situated in an accessible position at the front of the trailer frame shall be provided for operating the brake when the trailer is disconnected from the towing vehicle. The 'OFF' position of the trailer frame shall be towards the front of trailer and there shall be ratchet or similar device to hold the brake in the 'ON' position.
- 5.7.5 Two handles (man-handling bars) of mild steel, each not less than 50 cm long and which can be folded and secured along the frame when not in use shall be provided at the front of the trailer frame. These handles shall be at least 15 cm above the level of the towing eye.
- 5.7.6 Two eyes for the attachment of drag ropes shall be provided in suitable position. Four slinging eyes shall be provided two of which may be drag eyes.
- 5.7.7 Two jacklegs in the rear and one in the front capable of being lowered into position and adequately secured to provide a suitable base for the unit, when pumping or standing



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unattached, shall be provided. The legs shall have 200 mm round mild steel plates, dished upwards, welded to the base of the pipe legs to prevent penetration into the earth when standing unattached. The legs shall be capable of being positively locked in the 'housed' position.

5.7.8 Provision shall be made on the trailer for carrying equipment detailed in Appendix – A.

5.8.0 **Stability** – The stability of the whole unit shall be such that under equipped conditions and with the front supported to produce the normal towing position, if the surface on which the appliance stand is tilted to either side to an angle of 25 degrees from the horizontal, the point at which the overturning occurs is not passed.

### 5.9.0 Towing Eye and Draw-Bar

5.9.1 The towing eye and draw bar shall be of substantial construction. The towing eye shall have an internal diameter of 75 mm and shall be of high quality forged steel of not less than (63 x 102 kgf/cm<sup>2</sup>) ultimate tensile stress or other suitable material capable of giving suitable performance. The shank shall be adequately machined with adequate radius at the shoulders.

5.9.2 To ensure that the housing will withstand shock loads inherent under towing condition, it is essential that the design of the eye and housing and the means of fixing the housing the trailer chassis frame will take care of a draw pull of (1100 kg) without being overstressed.

5.9.3 The shank of the towing eye shall be mounted in the housing so as to absorb shocks in both directions of movement for forward to cushion, the shock of taking the two load, and backward to regulate the rate of application of brakes. The compensation mechanism shall be such as to give a smooth tow at all reasonable speeds on average road surface.

5.10.0 Mass – The mass of the complete unit shall not exceed 1150 kg including water, fuel and oil but without equipments as mentioned in Appendix – A.

### 6.0.0 WORKMANSHIP AND FINISH

6.1.0 All parts of the appliance shall have goods workmanship

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

### 7.0.0 ACCESSORIES AND EQUIPMENT

7.1.0 Accessories - The following accessories shall be provided:

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

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

#### 8.0.0 MARKING

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

- Manufacturer's name and trade-mark:
- The output capacity of the pump in 1/min.: and
- Year of manufacture.

#### 9.0.0

##### EQUIPMENT TO BE PROVIDED IN TRAILER PUMP

| Sl. No. | EQUIPMENT                                                                                                          | QUANTITY |
|---------|--------------------------------------------------------------------------------------------------------------------|----------|
| 1.      | 100-mm suction hose conforming to IS: 241 in 4.5 m lengths with 100-mm suction hose coupling conforming to IS: 902 | 2 No.    |
| 2.      | Suction wrenches for 100-mm suction hose couplings conforming to IS: 4643.                                         | 2 No.    |
| 3.      | Suction strainer for 100-mm suction hose conforming to IS: 907.                                                    | 1 No.    |
| 4.      | 63-mm delivery hose conforming to IS: 4927 in 30 m lengths with instantaneous couplings conforming to IS:903.      | 4 No.    |
| 5.      | Rope, manila – 15 m conforming to IS: 1084                                                                         | 1 No.    |
| 6.      | Suction adapters 100-mm female to 63-mm instantaneous male.                                                        | 1 No.    |
| 7.      | Branch pipes 63 mm conforming to IS: 903.                                                                          | 2 No.    |



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### Annexure III

Schedule of equipments to be supplied with Trailer pump.

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



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| 38.0 | Petrol can (9 litres) | 1 No. |
| 39.0 | Oil filling funnel    | 1 No. |
| 40.0 | Petrol filling funnel | 1 No. |
| 41.0 | Sledge hammer 6.5 kg  | 1 No. |

|                                                                                   |                                                                      |                                     |                  |
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#### **D4 – DESCRIPTION OF DCP TENDER**

##### **2.0.0 CODES AND STANDARDS**

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

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

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

##### **3.0.0 GENERAL REQUIREMENTS**

3.1.0 The chassis for carrying out fabrication work of DCP tender shall be of Make-TATA/Ashok Leyland/Eicher/equivalent. The chassis shall be equipped with power assisted steering and power brake. Chassis shall be BS-VI compliant and meeting the prevailing emission norms in the country.

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

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

- |    |                                                                                                                                                                                                                                                                                                                    |                                                                  |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| a) | Gross vehicle weight                                                                                                                                                                                                                                                                                               | Not less than 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                                             |

|                                                                                   |                                                                   |                                     |                  |
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|---------------|----------------------|
| Overall width | not more than 2.50 m |
|---------------|----------------------|

**4.0.0 DESIGN AND CONSTRUCTION**

**4.1.0 Engine**

4.1.1 The engine shall be compression ignition type and provided with cooling system to permit its continuous stationary running without overheating. Indirect cooling system shall be incorporated which shall be of the open circuit type discharging water to the waste.

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

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

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

4.1.5 External filter shall be provided for the engine lubricating system and a tubular dipstick to gauge the level of oil in the oil sump shall be provided.

**4.2.0 Electrical System**

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

4.2.2 All important electrical circuits shall have separate fuses suitably indicated and shall be grouped into a common fuse box located in an accessible position in driver’s cab and fitted with means for carrying spare fuses. The wiring shall be single pole and shall not be exposed to the atmosphere. Conduits shall be used wherever necessary.

**4.3.0 Body Work**

4.3.1 The body shall provide enclosed accommodation for two persons including the driver. Both the seats will be independent; co-driver seat shall be foldable type. The cabin crew shall also have two doors, one on either side. Proper foot rest and hand rail shall be provided enabling easy access to vehicle for driver and crew. 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 A. The flooring of the rear body shall preferably be provided with light alloy chequered plates. Proper drainage arrangement of rear body floor shall be provided to drain excess water used for cleaning.

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

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

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

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

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

4.3.7 A suitably fitted recessed tray for the normal kit of tools carried on the appliance shall be provided. Mounting arrangement for BA sets shall be provided at the back side of crew cabin. Arrangement shall be such that easy access for BA set is allowed to firemen.

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

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

**4.4 Dry Powder fire Extinguishing Equipment**

4.4.1 A quantity of 2000 kg of dry powder of the foam compatible type, conforming to IS: 14609 shall be stored either in a single vessel or in two vessels of 1000 kg each. Each vessel shall be provided with a separate filling aperture with a cover, drain plug, safety valve, pressure gauge, isolation valve, etc, at suitable locations. Arrangement shall be provided to expel the powder through the monitor or 2 hose reels or both at a time. Where two vessels are used, a common manifold shall preferably be provided for discharge. The two vessels shall not have any interconnections. Each vessel shall be connected with a separate expellant gas supply and fitted with a pressure-reducing valve. The vessel have treatment for anti-corrosion on internal surface, either of lead-tin alloy (tin not less than 10 percent) having a minimum thickness of 0.12 mm, or of epoxy paint.

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

4.4.3 The discharge rate of the powder shall be not less than 5 kg per second through each hose reel and through shall be not less than 10 m horizontally and 8 m vertically while working with both the lines. The discharge through the monitor shall be adjustable at 15, 25 and 40 kg per second at operating pressure. The throw of the monitor shall not be less than 40 m horizontally and 30 m vertically in still air.  
The total discharge of the powder shall not be less than 90 percent of the total contents. The vessel shall be provided with the arrangement for discharging the excess expellant gas in to the atmosphere even if the vessel is full with dry powder, the excess air should not affect the powder charge.

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

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| <p>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.</p> <p>4.4.5 The expellant gas system shall preferably have nitrogen gas in cylinders of capacity not less than 50 litres each, having filling pressure of not less than 200 kgf/cm<sup>2</sup>. 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</p> <p>4.4.6 Sufficient amount of the expellant gas shall be available in the cylinder to flush the monitor, hose reel and the manifold when the supply of powder is exhausted. Arrangement shall be made to prevent the back flow of the expellant gas.</p> <p>4.4.7 The monitor shall be provided in such a manner so as to enable the operator to move it easily. The monitor shall rest on a clamp, properly secured, while not in use. The monitor shall have in built arrangement to regulate the powder discharge at 15, 25, or 40 kg/s by pushing or turning the operating lever. It shall be capable to work on any angle up to 360° horizontally and 100° vertically. Suitable control shall be provided near the grip of the handle to facilitate the operator to control and regulate the discharge of the powder.</p> <p>4.4.8 Two hose reels, one on either side of the appliance, shall be provided at easily accessible locations so as to facilitate quick withdrawal. Arrangement shall be made to prevent the over running of the reels. Each reel shall be provided with 30 m long high-pressure rubber hose fitted with trigger type pistol grip nozzle capable of discharging 5 kg of powder per second at a pressure of 14 kgf/cm<sup>2</sup>.</p> <p>4.4.9 Suitable device shall be provided or arrangement made to restore the fluidity of the powder to ensure its capability to flow through the fittings, valves and pipelines to the outlet.</p> <p>4.4.10 All valves, discharge nozzles, pipes and fittings, pressure gauges, etc, shall be of approved type and of non-corrosive/non-reactive material compatible with the dry powder.</p> <p><b>4.5.0 Control Panel</b></p> <p>4.5.1 Adequately illuminated control panel shall be provided at easily accessible position to operate the dry powder system. All controls/items of equipment shall be clearly marked or identified by fixing suitable labels to facilitate easy operation.</p> <p>4.5.2 The control panel shall include the following:</p> <ol style="list-style-type: none"> <li>a) Pressure gauge for expellant gas cylinders;</li> <li>b) Pressure gauge to indicate operating pressure;</li> <li>c) Operating levers for: <ol style="list-style-type: none"> <li>1) expellant gas valve,</li> <li>2) monitor valve,</li> <li>3) valves for hose reels,</li> <li>4) pressure release valve,</li> <li>5) flushing valve for monitor, and</li> <li>6) flushing valve for hose reels:</li> </ol> </li> <li>d) Switches for lighting arrangement; and</li> <li>e) Instruction plate for operation, with line diagram.</li> </ol> |                                                                                                                                  |                                     |                  |

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| <p><b>4.6 Stability</b><br/>The stability of the appliance shall be such that when under fully equipped and loaded conditions, excluding the crew, if the surface on which the appliance stands is tilted on either side, the point on which over turning occurs is not passed at an angle of 25° from the horizontal.</p> <p><b>5.0.0 WORKMANSHIP AND FINISH</b></p> <p>5.1.0 All parts of the appliance shall be of good workmanship and shall have streamlined finish.</p> <p>5.2.0 All metallic surfaces coming in contact with the dry powder shall be suitably treated against corrosion.</p> <p>5.3.0 The appliance shall be painted in fire red colour conforming to Shade No. 536 of IS: 5. The paint shall conform to IS: 2932-1974.</p> <p><b>6.0.0 INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT</b></p> <p><b>6.1.0 Instruction Book(s)</b> – Instruction book(s) for the guidance of the user, including both the operating and normal operating procedures, shall be supplied.</p> <p><b>6.2.0 Accessories –</b><br/>The following accessories shall be provided in addition to those normally fitted on modern commercial vehicles.</p> <ol style="list-style-type: none"> <li>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.</li> <li>Fog lamps - Two</li> <li>Reversing Light - Lamp suitably situated to assist reversing.</li> <li>Airfield obstruction marking lights – two. One of these shall be fitted in the front and the other at the rear of the appliance.</li> <li>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.</li> <li>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.</li> <li>Spot light - Adjustable, mounted in a convenient position on the near side of the driving compartment.</li> </ol> |                                                                                                               |                                     |                  |

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| <p>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.</p> <p>i) Tools - All tools required for normal maintenance of the appliance that are not included in the standard kit of tools for the chassis.</p> <p>j) Windscreen wiper – two, electrically operated.</p> <p>6.3.0 <b>Equipment-</b> The appliance shall be provided with the equipments detailed in Annexure IV. Bidders to include supply of these equipments in their scope.</p> <p><b>7.0.0 MARKING</b></p> <p>7.1.0 The appliance shall be clearly and permanently marked with the following information:</p> <p>a) Manufacturer's name, or trademark, if any.</p> <p>b) Year of manufacturer</p> |                                                                                                        |                                     |                  |



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FIRE TENDER AND SAFETY EQUIPMENT

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### Annexure IV

Schedule of equipments to be supplied with dry powder 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        |

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## **D5 - DESCRIPTION OF FIRE SAFETY EQUIPMENT**

### **1.0 FIRE ENTRY SUITS**

Fire entry suit shall be provided to as per relevant IS code along with accessories. Specification of Fire Entry Suit are detailed as under:

- 1.1 Coat with hood should be sewed fastly together. The hood should have visor with golden reflexive and un-sweaty modification, double protective glass, double fastening metal zip and Velcro being located in to the area of hood.
- 1.2 The coat should have a provision of wearing a breathing apparatus.
- 1.3 The trousers should be having regular braces, the belt for marking the waist slimmer in the lower parts of trousers, a metal zip for more comfortable putting up the shoes on the feet.
- 1.4 Leggings: - Steel in lay on the in step, the lower steel support for fasting the shoes and protecting against getting up the leggings.
- 1.5 Gloves: - 05 fingers with membrane against liquid at the wrist with knitting, to use over where over the gloves for protection against heat.
- 1.6 Shoes & Overcoat: - The shoes should have back side double fasting, metal zip and Velcro fasting belt for shoe inside the aluminised overcoat. The entire fire entry suit should be provided with gloves, leggings, shoes overcoat and breathing apparatus pouch. The suit shall have enough space to accommodate inside a self-contained breathing apparatus set in complete protected manner.  
The weight of total suit should not be more than 08Kgs.  
The entire suit should be certified as per EN-1486 standards and should archive level III with the weight not exceeding more than 08Kgs. Shelf life should not be less than 05 years under any circumstances.

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

A) The highest direct flame temperature protection should be offered by the suit.

- i) 1500 deg.C to 1800degC for a continuous period of 10 seconds.
- ii) 1400 degC for a continuous period of 30 seconds.
- iii) 1200 deg C for a continuous period of 03 (Three) minutes.

B) The highest direct radiant temperature protection should be offered by the suit:

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

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

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

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

#### **1.7 PACKING**

Suit will be supplied in easy to carry nylon bag.

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## **2.0 CARBON COMPOSITE SELF CONTAINED COMPRESSED AIR OPEN CIRCUIT BREATHING APPARATUS**

### **2.1 SCOPE**

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

### **2.2 GENERAL REQUIREMENT**

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

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

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

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

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

#### **2.2.2. MATERIAL**

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

2.2.2.2 Exposed parts excluding cylinders, that is, those, which may be subject to impact during practical performance tests, shall not be made of magnesium, titanium, aluminum or alloys containing such proportions of these metals which on impact give rise to frictional sparks capable of igniting flammable gas mixtures.

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

2.2.2.4 The apparatus shall be sufficiently robusted to withstand the rough usage; it is likely to receive in service and designed so that it will continue to function satisfactorily while temporarily

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accidentally submerged in water at a maximum depth of one meter and thereafter until the air in the cylinder is exhausted.

### 2.2.3 SEPARATION OF PARTS

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

### 2.2.4 ADJUSTABLE PARTS

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

### 2.2.5 WEIGHT

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

### 2.2.6 LEAK TIGHTNESS

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

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

## 2.3 FACE MASK

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

2.3.2 Face mask shall cover the eyes, nose, mouth and chin, it shall be provided with an additional flap for providing adequate sealing on the face of the wearer of the breathing apparatus against the outside gas, when the skin is drying or moist, when the head is moving and when the water is peaking.

2.3.3 The face mask shall have an inner mask to reduce misting and dead space so that the mask is always remain at center.

2.3.4 Face mask shall be secured to the face by means of an adjustable./replaceable head harness and they shall be fitted with a neck strap to support them when not being worn. There shall be five head harness but one strap i.e. the top one should.

2.3.5 Means for speech transmission shall be incorporated and so designed that it is in front of the mouth.

2.3.6 The face mask shall be constructed of silicon rubber in order that it is soft, light in weight, comfortable to the wearer to wear for long duration, resistant to chemicals and heat, thus having longer life.

2.3.7 The connection for demand valve shall be provided in front of the Face Mask.

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2.3.8 The visor shall be made of clear polycarbonate.

#### 2.4 FACE CONNECTOR

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

#### 2.5 HEAD HARNESS

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

#### 2.6 BODY HARNESS

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

#### 2.7 EXHALATION VALVE

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

#### 2.8 DEMAND VALVE

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

#### 2.9 SUPPLEMENTARY SUPPLY

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

#### 2.10 HIGH PRESSURE TUBE

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

#### 2.11 MEDIUM PRESSURE TUBE.

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

#### 2.12 PRESSURE GAUGE

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

2.12.2 The pressure gauge shall have a blowout release. The blowout release should be so located that in the event of an explosion or fracture of the pressure element of the gauge, the blast will be

|                                                                                   |                                                                                                                 |                                     |                  |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------|
|  | <p align="center"><b>1X660 MW PANKI TPS</b></p> <p align="center"><b>FIRE TENDER &amp; SAFETY EQUIPMENT</b></p> | SPEC NO.: <b>PE-TS-426-550-A001</b> |                  |
|                                                                                   |                                                                                                                 | SECTION: I                          |                  |
|                                                                                   |                                                                                                                 | SUB-SECTION: ID                     |                  |
|                                                                                   |                                                                                                                 | REV NO: 01                          | DATE: 15.05.2020 |

away from the front. The gauge window shall be made of 'material of non-splintering glass or of clear plastic materials.

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

### 2.13 WARNING DEVICE

The apparatus shall be provided with warning whistle next to the pressure gauge. It shall be consuming minimum amount of compressed air and should emit continuous at least 90 dbls sound. Warning whistle next to pressure gauge enables to user to ascertain his whistle and can check the same.

### 2.14 BACK PLATE

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

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

### 2.15 PRESSURE REDUCER

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

### 2.16 COMMUNICATIONS:

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

### 2.17 ADSU

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

### 2.18 GAS CYLINDER & MAIN VALVE,

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

### 2.19 PACKING

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

|                                                                                   |                                                                        |                                     |                  |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------|------------------|
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## 2.20 MARKING

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



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### **3.0 FIRST AID KITS**

#### **3.1 SCOPE**

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

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



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#### **4.0 SPECIFICATION OF FIBER GLASS BLANKET**

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

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



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### **5.0 MULTIPURPOSE FLOW NOZZLE**

The branch shall be made of extruded Aluminum Alloy hard anodized for resistance to corrosion having light in weight and hydraulically efficient design for low back thrust allowing for extended operation with multiple flow settings. It shall be capable for making hollow jet, Spray, and Fog in different fire fighting situations. The variable flow rate shall be adjusted from 360 LPM to minimum 900 LPM at 7 Kgf/cm<sup>2</sup> and flush without shutting down. It shall have a Spray angle of 160° and horizontal throw in still air around 35 meters at 7-8 bar pressure. Spinning teeth shall be provided at the outlet to give an effective dense fog. A Pistol grip handle of rubber coated shall be provided for easy handling of branch.

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



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## 6.0 PORTABLE THERMAL IMAGING CAMERA

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

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

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

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

### TECHNICAL SPECIFICATION OF THERMAL IMAGINE CAMERA:

|                              |                                                                |
|------------------------------|----------------------------------------------------------------|
| Imaging Performance          |                                                                |
| FOV / Minimum focus distance | 25° × 19° / 0.4 m                                              |
| Spectral range               | 7.5–13 $\mu\text{m}$                                           |
| Image frequency              | 60 Hz                                                          |
| Focus                        | Manual                                                         |
| Focal Plane Array (FPA)      | Uncooled micro bolometer                                       |
| Image Presentation           |                                                                |
| Display                      | Built-in 3.5" LCD touch screen, 320 × 240 pixels               |
| Measurement                  |                                                                |
| Accuracy                     | ±2 °C or ±2% of reading                                        |
| Measurement Analysis         |                                                                |
| Automatic hot/cold detection | Auto hot or cold spot meter markers within area 0o C to +900oC |



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



**1X660 MW PANKI TPS**  
**FIRE TENDER & FIRE SAFETY EQUIPMENT**

DOCUMENT NO.: **PE-TS-426-550-A001**

SECTION: I

REV NO.: 01

DATE: 15.05.2020

SUB-SECTION: ID

**ANNEXURE-V**  
**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.



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SECTION: II

SUB-SECTION: II A

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**SECTION: II**

**SUB-SECTION: II A**

**QUALITY ASSURANCE PLAN**



# 1X660 MW PANKI TPS

## FIRE TENDER & SAFETY EQUIPMENT

SPEC. NO.: PE-TS-426-550-A001

SECTION: II

SUB-SECTION: II A

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### 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 equipments 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.

|  |                                           | MANUFACTURING QUALITY PLAN                                                                             |                                                                                                                                                      |                                                                                          |                  |                                                                  |                                                                |                         |        |     |     |         |
|----------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------|----------------------------------------------------------------|-------------------------|--------|-----|-----|---------|
|                                                                                  |                                           | ITEM                                                                                                   | WATER TENDER                                                                                                                                         | BHEL QAP. NO. PE-VO-374-550-A005                                                         |                  |                                                                  |                                                                |                         |        |     |     |         |
|                                                                                  |                                           | SUB SYSTEM PO NO DTD                                                                                   | FIRE FIGHTING VEHICLE                                                                                                                                | REV NO. 2                                                                                | DATE :           | PAGE NO. 1                                                       |                                                                |                         |        |     |     |         |
| SR.NO.                                                                           | COMPONENT & OPERATIONS                    | CHARACTERISTICS                                                                                        | CLASSIFICATION                                                                                                                                       | TYPE OF CHECK                                                                            | QUANTUM OF CHECK | REFERENCE DOCUMENT                                               | ACCEPTANCE NORMS                                               | FORMAT OF RECORD        | AGENCY |     |     | REMARKS |
|                                                                                  |                                           |                                                                                                        |                                                                                                                                                      |                                                                                          |                  |                                                                  |                                                                |                         | P      | W   | V   |         |
| 1.0                                                                              | MATERIAL AND COMPONENTS                   |                                                                                                        |                                                                                                                                                      |                                                                                          |                  |                                                                  |                                                                |                         |        |     |     |         |
| A                                                                                | M.S. PLATE FOR WATER TANK                 | CHEMICAL PROPERTY                                                                                      | MINOR                                                                                                                                                | CHEMICAL PROPERTY                                                                        | LOT              | IS : 2062                                                        | IS : 2062                                                      | T.C                     | —      | 2   | 1\3 |         |
| B                                                                                | G.M. (PUMP CASIING)                       | CHEMICAL PROPERTY                                                                                      | MAJOR                                                                                                                                                | CHEMICAL PROPERTY                                                                        | LOT              | IS : 318 GR.2                                                    | IS : 318 GR.2                                                  | T.C                     | —      | 2   | 1\3 |         |
| C                                                                                | S.S. FOR PUMP SHAFT                       | CHEMICAL PROPERTY                                                                                      | MAJOR                                                                                                                                                | CHEMICAL PROPERTY                                                                        | LOT              | SS 304                                                           | SS 304                                                         | T.C                     | —      | 2   | 1\3 |         |
| D                                                                                | G.M. (IMPELLER)                           | CHEMICAL PROPERTY                                                                                      | MAJOR                                                                                                                                                | CHEMICAL PROPERTY                                                                        | LOT              | IS: 318 GR. 2                                                    | IS: 318 GR. 2                                                  | T.C                     | —      | 2   | 1\3 |         |
| 1.A                                                                              | CHASSIS & ENGINE (ASHOK LEYLAND)          | MAKE , TYPE                                                                                            | MINOR                                                                                                                                                | CHASSIS DOCUMENT                                                                         | LOT              | CHASSIS DOCUMENT                                                 | CHASSIS DOCUMENT                                               | CHASSIS DOCUMENT        | —      | 2   | 1\3 |         |
| 2.0                                                                              | IN PROCESS INSPECTION                     |                                                                                                        |                                                                                                                                                      |                                                                                          |                  |                                                                  |                                                                |                         |        |     |     |         |
| A                                                                                | (STRUCTURAL) FABRICATION OF WATER TANK    | VISUAL & DIMENSION INCL. THICKNESS                                                                     | MINOR                                                                                                                                                | DIM. (VISUAL)                                                                            | 100%             | AS PER GA/WT/FT DRAWING                                          | AS PER GA/WT/FT DRAWING                                        | AS PER GA/WT/FT DRAWING | 2      | —   | 1/3 |         |
| B                                                                                | HYDRO TEST OF WATER TANK                  | HYDRO TEST                                                                                             | MAJOR                                                                                                                                                | HYDRO TEST 0.3 BAR                                                                       | 100%             | AS PER SPECIFICATION                                             | NO LEAKAGE                                                     | I.R.                    | 2      | 1/3 | —   |         |
| C                                                                                | PUMP CASING                               | HYDRO TEST                                                                                             | MAJOR                                                                                                                                                | 21KG/ CM. SQ.                                                                            | 100%             | AT 21KG/CM SQ.                                                   | NO LEAKAGE                                                     | I.R.                    | 2      | —   | 1\3 |         |
| D                                                                                | IMPELLER                                  | DYNAMIC BALANCING                                                                                      | MAJOR                                                                                                                                                | —                                                                                        | 100%             | BALANCING CERTIFICATE                                            | BALANCING CERTIFICATE                                          | T.C                     | 2      | —   | 1/3 |         |
| 3.0                                                                              | COMPLETE ASSEMBLY INSPECTION              |                                                                                                        |                                                                                                                                                      |                                                                                          |                  |                                                                  |                                                                |                         |        |     |     |         |
| A                                                                                | PUMP (PRIMER) ASSEMBLY                    | VISUAL CHECK                                                                                           | MAJOR                                                                                                                                                | COMPLETENESS / VISUAL                                                                    | 100%             | AS PER SPECIFICATION                                             | AS PER SPECIFICATION                                           | I.R.                    | 2      | —   | 1/3 |         |
| B                                                                                | HOSE REEL ASSEMBLY                        | VISUAL CHECK                                                                                           | MINOR                                                                                                                                                | -DO-                                                                                     | 100%             | AS PER SPECIFICATION                                             | AS PER SPECIFICATION                                           | I.R.                    | 2      | —   | 1/3 |         |
| 4.0                                                                              | FINAL INSPECTION OF COMPLETE WATER TENDER | PERFORMANCE TEST OF PUMP FOR 4 HOURS & DEEPLIFT TEST OF PRIMER, STABILITY TEST, ROAD TEST TILTING TEST | MAJOR                                                                                                                                                | PERFORMANCE TEST AND VERIFICATION OF LIST OF EQUIPMENT AND ACCESSORIES AS PER DATA SHEET | 100%             | APPROVED DATASHEET, APPROVED DRAWING AS PER IS: 10460 AND PO NO. | APPROVED DATASHEET, APPROVED DRAWING AS PER IS: 950 AND PO NO. | I.R.                    | 2      | 1/3 | —   |         |
| MANUFACTURER SIGNATURE                                                           |                                           |                                                                                                        | LEGEND :<br>**1. BHEL, 2 manufacturer .3 CUSTOMER<br>W: WITNESS<br>P: PERFORMAR<br>V: VERIFIER<br>I.R = INSPECTION REPORT<br>T.C. = TEST CERTIFICATE |                                                                                          |                  |                                                                  |                                                                |                         |        |     |     |         |

|  |  | MANUFACTURING QUALITY PLAN                           |  |                                                                                       |  |                    |  |  |  |
|--|--|------------------------------------------------------|--|---------------------------------------------------------------------------------------|--|--------------------|--|--|--|
|  |  | ITEM : FOAM<br>TENDER<br>SUB-SYSTEM: FIRE<br>TENDERS |  | QP NO.:9464-108-01FS-PVM-Q028<br>REV.NO.: 02.<br>DATE:- 29.11.2010<br>PAGE: 01 OF 03. |  | MAIN-SUPPLIER:BHEL |  |  |  |

| SL. NO | COMPONENT & OPERATIONS                           | CHARACTERISTICS                     | CLASS | TYPE OF CHECK                  | QUANTUM OF CHECK            |       | REFERENCE DOCUMENT         | ACCEPTANCE NORMS          | FORMAT OF RECORD |    | AGENCY |   |   | REMARKS |
|--------|--------------------------------------------------|-------------------------------------|-------|--------------------------------|-----------------------------|-------|----------------------------|---------------------------|------------------|----|--------|---|---|---------|
|        |                                                  |                                     |       |                                | M                           | C / N |                            |                           |                  | D* | M      | C | N |         |
| 1.     | 2.                                               | 3.                                  | 4.    | 5.                             | 6.                          |       | 7.                         | 8.                        | 9.               |    | 10.    |   |   | 11.     |
| 1      | Chassis                                          | Make, Engine No. Chassis no.        | Major | Correlation                    | 100%                        |       | Vehicle Mfgr's Documents   | Vehicle Mfgr's Documents  |                  |    | P      | V | V |         |
| 2      | <u>Raw Material</u>                              |                                     |       |                                |                             |       |                            |                           |                  |    |        |   |   |         |
| a)     | MS plate for water tank.                         | Chemical & Mech property            | Major | Chemical & Mech property       | 1/Lot                       |       | Approved drg./DS/IS 10460  | Approved drg./DS/IS 10460 | T.C.             | ✓  | P      | V | V |         |
| b)     | SS plate for foam tank.                          | Chemical & Mech property            | Major | Chemical & Mech property       | 1/Lot                       |       | Approved drg./DS/IS 10460  | Approved drg./DS/IS 10460 | T.C.             | ✓  | P      | V | V |         |
| c)     | Raw material for pump casing, impeller and shaft | Chemical & Mechanical               |       | Chemical & mechanical property | 1/heat<br>1/batch for shaft |       | -----Approved drg./DS----- |                           | T.C              | ✓  | P      | V | V |         |
| 3      | <u>Inprocess Inspection</u>                      |                                     |       |                                |                             |       |                            |                           |                  |    |        |   |   |         |
| a      | Fabrication of water and foam tank.              | Visual & Dimension incl. Thickness. | Minor | Dimensional (visual)           | 100%                        |       | Approved drg./DS/IS 10460  | Approved drg./DS/IS 10460 | IR               | ✓  | P      | V | V |         |
| b      | Leak test of water and foam tank.                | Leak test.                          | Major | Leak test (0.3 bar)            | 100%                        |       | Approved drg./DS/IS 10460  | No Leakage                | IR               | ✓  | P      | V | V |         |
| c      | Pump casing.                                     | Hydro test.                         | Major | 21 kg/cm.Sq                    | 100%                        |       | at 21 kg/cm2 for 30 min    | No leakage.               | IR               | ✓  | P      | V | V |         |
| d      | Impeller                                         | Dynamic balancing                   | Major |                                | 100%                        |       | ISO 1940 gr 6.3            | ISO 1940 gr 6.3           | balancing report | ✓  | P      | V | V |         |
| e      | Ultrasonic test on shaft for dia > 50 mm         | sub-surface defects                 |       | UT                             | 100%                        |       | ASTM A 388                 | as per note 1             | UT report        | ✓  | P      | V | V |         |

|                               |               |                                                                                                                                                                                                                                                                                             |                    |                             |             |               |
|-------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------|-------------|---------------|
|                               |               | <b>LEGEND:</b> * RECORDS, IDENTIFIED WITH “TICK” (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br>** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC<br>P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUM “N” AS ‘W” |                    | DOC. NO.: REV..... CAT..... |             |               |
| MANUFACTURER/<br>SUB-SUPPLIER | MAIN-SUPPLIER |                                                                                                                                                                                                                                                                                             | FOR<br>NTPC<br>USE |                             |             |               |
| SIGNATURE                     |               |                                                                                                                                                                                                                                                                                             |                    | REVIEWED BY                 | APPROVED BY | APPROVAL SEAL |

FORMAT NO.: QS-01-QAI-P-09/F1-R1

1/3

ENGG. DIV./QA&I

Note 1: when Back Wall Echo (BWE) set to 100% Full Screen Height (FSH) , a defect echo > 20% FSH is not acceptable. Also loss of BWE > 20% is not acceptable.

|                                  |                                          |                                        | MANUFACTURING QUALITY PLAN                                                                                                                                                                                                                                                                      |                                             |                                                                                       |              |                           |                           |                   |             |                 |               |   |  |
|----------------------------------|------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------|--------------|---------------------------|---------------------------|-------------------|-------------|-----------------|---------------|---|--|
|                                  |                                          |                                        | ITEM : FOAM TENDER<br>SUB-SYSTEM: FIRE TENDERS                                                                                                                                                                                                                                                  |                                             | QP NO.:9464-108-01FS-PVM-Q028<br>REV.NO.: 02.<br>DATE:- 29.11.2010<br>PAGE: 01 OF 03. |              | MAIN-SUPPLIER:BHEL        |                           |                   |             |                 |               |   |  |
| 4                                | Final Inspection of Complete Fire Truck. | 1. Leakage Test of Pipe Line & Valves. | Major                                                                                                                                                                                                                                                                                           | Visual                                      | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 | IR                | ✓           | P               | V             | V |  |
|                                  |                                          | 2. Road test & Braking Test.           | Major                                                                                                                                                                                                                                                                                           | Visual                                      | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |                   | ✓           | P               | W             | W |  |
|                                  |                                          | 3. Pump Running Test & Performance.    | Major                                                                                                                                                                                                                                                                                           | 4 hour run test as per IS 10460 Operational | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |                   | ✓           | P               | W             | W |  |
|                                  |                                          | 4. Priming Performance Test.           | Major                                                                                                                                                                                                                                                                                           | Operational<br>as per IS 10460              | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |                   | ✓           | P               | W             | W |  |
|                                  |                                          | 5. Control panel operational check.    | Major                                                                                                                                                                                                                                                                                           | Operational                                 | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |                   | ✓           | P               | W             | W |  |
|                                  |                                          | 6. Monitor Performance Test.           | Major                                                                                                                                                                                                                                                                                           | Functional.                                 | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |                   | ✓           | P               | W             | W |  |
|                                  |                                          | 7. Water Hose Reel Testing.            | Major                                                                                                                                                                                                                                                                                           | Functional.                                 | 100%                                                                                  |              | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |                   | ✓           | P               | W             | W |  |
|                                  |                                          |                                        | <b>LEGEND:</b> * RECORDS, IDENTIFIED WITH "2ICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br>** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC<br>P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE,<br>CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS 'W' |                                             |                                                                                       |              | DOC. NO.:                 |                           | REV..... CAT..... |             |                 |               |   |  |
| MANUFACTURER/<br>SUB-SUPPLIER    |                                          | MAIN-SUPPLIER                          |                                                                                                                                                                                                                                                                                                 |                                             |                                                                                       | FOR NTPC USE |                           | REVIEWED BY               |                   | APPROVED BY |                 | APPROVAL SEAL |   |  |
| SIGNATURE                        |                                          |                                        |                                                                                                                                                                                                                                                                                                 |                                             |                                                                                       |              |                           |                           |                   |             |                 |               |   |  |
| FORMAT NO.: QS-01-QAI-P-09/F1-R1 |                                          |                                        |                                                                                                                                                                                                                                                                                                 |                                             |                                                                                       |              | 1/3                       |                           |                   |             | ENGG. DIV./QA&I |               |   |  |

Digitally signed by Srikrishna  
DN: cn=Srikrishna, c=IN, o=Ntpc,  
ou=CW Eng,  
email=drsrikrishna@ntpceoc.co.in  
Date: 2010.12.13 16:11:37 +05'30'



| MANUFACTURER'S NAME AND ADDRESS |  |                                                 | MANUFACTURING QUALITY PLAN                     |                                      |                                                                                       |  |                           | REVISIONS                 |  |  |   |   |   |
|---------------------------------|--|-------------------------------------------------|------------------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|--|---------------------------|---------------------------|--|--|---|---|---|
|                                 |  |                                                 | ITEM : FOAM TENDER<br>SUB-SYSTEM: FIRE TENDERS |                                      | QP NO.:9464-108-01FS-PVM-Q028<br>REV.NO.: 02.<br>DATE:- 29.11.2010<br>PAGE: 01 OF 03. |  |                           |                           |  |  |   |   |   |
| MAIN-SUPPLIER:BHEL              |  |                                                 |                                                |                                      |                                                                                       |  |                           |                           |  |  |   |   |   |
|                                 |  | 8. Electrical Function Test.                    | Major                                          | Functional                           | 100%                                                                                  |  | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |  |  | P | W | W |
|                                 |  | 9. Determination of Actual pay load.            | Major                                          | Visual                               | 100%                                                                                  |  | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |  |  | P | W | W |
|                                 |  | 10. Static Stability test.                      | Major                                          | Visual                               | 100%                                                                                  |  | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |  |  | P | W | W |
|                                 |  | 11. Completeness of Equipment.                  | Major                                          | Verification of various accessories. | 100%                                                                                  |  | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |  |  | P | W | W |
|                                 |  | 12. Painting Quality (both internal & external) | Major                                          | DFT, Paint Shade.                    | 100%                                                                                  |  | Approved drg./DS/IS 10460 | Approved drg./DS/IS 10460 |  |  | P | V | V |

Notes:

- 1) Manufacturer TC for Foam Monitor, Foam Compound Proportioner, Foam Branch pipe and Hose shall be produced for Verification during final inspection.

/coupling/ nozzle

|                               |               |                                                                                                                                                                                                                                                                                              |                    |                             |             |               |
|-------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------|-------------|---------------|
|                               |               | <b>LEGEND:</b> * RECORDS, IDENTIFIED WITH “TICK” (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.<br>** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC<br>P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN “N” AS ‘W” |                    | DOC. NO.: REV..... CAT..... |             |               |
| MANUFACTURER/<br>SUB-SUPPLIER | MAIN-SUPPLIER |                                                                                                                                                                                                                                                                                              | FOR<br>NTPC<br>USE |                             |             |               |
| SIGNATURE                     |               |                                                                                                                                                                                                                                                                                              |                    | REVIEWED BY                 | APPROVED BY | APPROVAL SEAL |

FORMAT NO.: QS-01-QAI-P-09/F1-R1

1/3

ENG. DIV./QA&I





**1X660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

SPEC. NO.: **PE-TS-426-550-A001**

SECTION: II

Sub-Section: II B

REV NO : 01

DATE: 15.05.2020

**SECTION: II**

**SECTION: II B**

**MASTER DRAWING LIST WITH SCHEDULE OF  
SUBMISSION**

| MDL FOR FIRE TENDERS & FIRE SAFETY EQUIPMENT<br>1 X 660 MW PANKI TPS |                    |                           |                                         |          |                                                                                                                    |                                                    |
|----------------------------------------------------------------------|--------------------|---------------------------|-----------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| S.No.                                                                | BHEL DRWG NO       | NTPC DOC NO               | DRWG TITLE                              | CATEGORY | SCHEDULED SUBMISSION<br>(NO. OF WEEKS FROM LOA<br>DATE / PO DATE) or AS<br>SPECIFIED IN NIT, WHICHEVER<br>EARLIER. | RESUBMISSION<br>AFTER<br>COMMENTS<br>INCORPORATION |
| 1                                                                    | PE-V0-426-550-A001 | 9962-001-PE-151-PVM-Y-201 | T.D.S & GA OF WATER TENDER              | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 2                                                                    | PE-V0-426-550-A002 | 9962-001-PE-151-PVM-Y-202 | TDS & G.A OF FOAM TENDER                | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 3                                                                    | PE-V0-426-550-A003 | 9962-001-PE-151-PVM-Y-203 | T.D.S & GA OF FIRE JEEP                 | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 4                                                                    | PE-V0-426-550-A004 | 9962-001-PE-151-PVM-Y-204 | T.D.S & GA OF DCP TENDER                | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 5                                                                    | PE-V0-426-550-A005 | 9962-001-PE-151-PVM-Y-205 | T.D.S & GA OF FIRE SAFETY<br>EQUIPMENTS | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 6                                                                    | PE-V0-426-550-A006 | 9962-001-PE-151-QVM-Q-207 | MQP FOR WATER TENDER                    | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 7                                                                    | PE-V0-426-550-A007 | 9962-001-PE-151-QVM-Q-208 | MQP FOR FOAM TENDER                     | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 8                                                                    | PE-V0-426-550-A008 | 9962-001-PE-151-QVM-Q-209 | MQP FOR FIRE JEEP                       | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 9                                                                    | PE-V0-426-550-A009 | 9962-001-PE-151-QVM-Q-210 | MQP FOR DCP TENDER                      | A-CUST   | 4                                                                                                                  | WITHIN 1 WEEK                                      |
| 10                                                                   | PE-V0-426-550-A011 | 9962-001-PE-151-QVM-Q-211 | O & M MANUAL FOR FIRE TENDER            | A-CUST   | 8                                                                                                                  | WITHIN 1 WEEK                                      |

Note:

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



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENTS**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: II**

**SUB-SECTION: II C**

**REV 01**

**DATE: 15.05.2020**

**SECTION II  
SUB-SECTION IIC**

**FORMAT FOR OPERATION AND MAINTENANCE  
MANUAL**



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENTS**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: II**

**SUB-SECTION: II C**

**REV 01**

**DATE: 15.05.2020**

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 |         |
| <b>1.</b>         | <b>COVER PAGE</b>                                                                                                                                                                                               |                                 |    |                |         |
| <b>1.1</b>        | Project Name                                                                                                                                                                                                    |                                 |    |                |         |
| <b>1.2</b>        | Customer/consultant Name                                                                                                                                                                                        |                                 |    |                |         |
| <b>1.3</b>        | Name of Package                                                                                                                                                                                                 |                                 |    |                |         |
| <b>1.4</b>        | Supplier details with phone, FAX ,email address , Emergency Contact number                                                                                                                                      |                                 |    |                |         |
| <b>1.5</b>        | Name and sign of prepared by , checked by & approved by                                                                                                                                                         |                                 |    |                |         |
| <b>1.6</b>        | Revision history with approval Details                                                                                                                                                                          |                                 |    |                |         |
| <b>2.0</b>        | <b>INDEX</b>                                                                                                                                                                                                    |                                 |    |                |         |
| <b>2.1</b>        | showing the sections & related page nos<br>All the pages should be numbered section wise                                                                                                                        |                                 |    |                |         |
| <b>3.0</b>        | <b>DESCRIPTION OF PLANT/SYSTEM</b>                                                                                                                                                                              |                                 |    |                |         |
| <b>3.1</b>        | 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 |                                 |    |                |         |
| <b>3.2</b>        | Equipment list and basic parameter with Tag numbers                                                                                                                                                             |                                 |    |                |         |
| <b>3.3</b>        | Data sheets approved by Customer/for information and catalogues provided by original manufacturer                                                                                                               |                                 |    |                |         |
| <b>3.4</b>        | Associated other packages and Interface /terminal points                                                                                                                                                        |                                 |    |                |         |
| <b>3.5</b>        | P&ID & Process Diagrams                                                                                                                                                                                         |                                 |    |                |         |
| <b>3.6</b>        | GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)                                                                        |                                 |    |                |         |
| <b>3.7</b>        | Single line/wiring diagrams                                                                                                                                                                                     |                                 |    |                |         |
| <b>3.8</b>        | Control philosophy /control write-ups                                                                                                                                                                           |                                 |    |                |         |



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENTS**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: II**

**SUB-SECTION: II C**

**REV 01**

**DATE: 15.05.2020**

| Sl.no. & Sections | Description                                                                                                                                                                                                                     | Tick ( V )if included in Manual |    |                | Remarks |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----|----------------|---------|
|                   |                                                                                                                                                                                                                                 | Yes                             | No | Not Applicable |         |
| <b>4.0</b>        | <b>COMMISSIONING ACTIVITIES (IF NOT COVERED IN SEPARATE DOCUMENT I.E. ERECTION MANUAL, COMMISSIONING MANUAL)</b>                                                                                                                |                                 |    |                |         |
| <b>4.1</b>        | Pre-Commissioning Checks                                                                                                                                                                                                        |                                 |    |                |         |
| <b>4.2</b>        | handling of items at site                                                                                                                                                                                                       |                                 |    |                |         |
| <b>4.3</b>        | Storage at site                                                                                                                                                                                                                 |                                 |    |                |         |
| <b>4.4</b>        | Unpacking & Installation procedure                                                                                                                                                                                              |                                 |    |                |         |
| <b>5.0</b>        | <b>OPERATION GUIDELINES FOR PLANT PERSONAL/USER/OPERATOR</b>                                                                                                                                                                    |                                 |    |                |         |
| <b>5.1</b>        | 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.                                                |                                 |    |                |         |
| <b>5.2</b>        | 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. |                                 |    |                |         |
| <b>5.3</b>        | Do's & Don't of the equipments.                                                                                                                                                                                                 |                                 |    |                |         |
| <b>5.4</b>        | Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition                                                         |                                 |    |                |         |
| <b>5.5</b>        | Parameters to be monitored with normal values and limiting values                                                                                                                                                               |                                 |    |                |         |
| <b>5.6</b>        | Trouble shooting with causes and remedial measures                                                                                                                                                                              |                                 |    |                |         |
| <b>5.7</b>        | Routine operational checks, recommended logs & records                                                                                                                                                                          |                                 |    |                |         |
| <b>5.8</b>        | Changeover schedule if more than one auxiliary for the same purpose is given                                                                                                                                                    |                                 |    |                |         |
| <b>5.9</b>        | Painting requirement and schedule                                                                                                                                                                                               |                                 |    |                |         |
| <b>5.10</b>       | Inspection, repair , Testing and calibration procedures                                                                                                                                                                         |                                 |    |                |         |
| <b>6.0</b>        | <b>MAINTENANCE GUIDELINES FOR PLANT PERSONAL</b>                                                                                                                                                                                |                                 |    |                |         |



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENTS**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: II**

**SUB-SECTION: II C**

**REV 01**

**DATE: 15.05.2020**

| Sl.no. & Sections | Description                                                                                                                                                                                                                     | Tick ( V )if included in Manual |    |                | Remarks |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----|----------------|---------|
|                   |                                                                                                                                                                                                                                 | Yes                             | No | Not Applicable |         |
| <b>6.1</b>        | List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.                                                                                      |                                 |    |                |         |
| <b>6.2</b>        | 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. |                                 |    |                |         |
| <b>6.3</b>        | Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given                                                                                                          |                                 |    |                |         |
| <b>6.4</b>        | Long term maintenance schedules especially for structural, foundations etc.                                                                                                                                                     |                                 |    |                |         |
| <b>6.5</b>        | 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.        |                                 |    |                |         |
| <b>6.6</b>        | List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given                                                                             |                                 |    |                |         |
| <b>6.7</b>        | List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.                                                                                              |                                 |    |                |         |
| <b>6.8</b>        | List of mandatory and recommended spare parts list                                                                                                                                                                              |                                 |    |                |         |
| <b>6.9</b>        | Tentative Lead time required for ordering of spares from the equipment supplier                                                                                                                                                 |                                 |    |                |         |
| <b>6.10</b>       | Guarantee and warranty clauses                                                                                                                                                                                                  |                                 |    |                |         |
| <b>7.0</b>        | <b>Statutory and other specific requirements considerations.</b>                                                                                                                                                                |                                 |    |                |         |
| <b>8.0</b>        | <b>List of reference documents</b>                                                                                                                                                                                              |                                 |    |                |         |
| <b>9.0</b>        | <b>Binding as per requirement</b>                                                                                                                                                                                               |                                 |    |                |         |



**1X660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

SPEC. NO.: **PE-TS-426-550-A001**

SECTION: III

REV NO: 01

DATE: 15.05.2020

**SECTION: III**

**DOCUMENTS TO BE SUBMITTED BY BIDDER**



**1X660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

SPEC. NO.: **PE-TS-426-550-A001**

SECTION: III

SUB-SECTION: IIIA

REV NO: 01

DATE: 15.05.2020

**SECTION: III**  
**SUB-SECTION: III A**

**LIST OF DOCUMENTS TO BE SUBMITTED  
WITH BID**



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRESAFETY  
EQUIPMENT**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION : III**

**SUB-SECTION : III A**

**REV: 01**

**DATE: 15.05.2020**

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

1. Compliance cum confirmation certificate (Section-III B)
2. Pre bid clarification schedule (Section-III C)
3. No deviation certificate (Section-III D)
4. Un-priced price bid indicating "Quoted / Not quoted / Not applicable" as the case may be.

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



**1X660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

SPEC. NO.: **PE-TS-426-550-A001**

SECTION: III

SUB-SECTION: III B

REV NO: 01

DATE: 15.05.2020

**SECTION: III**  
**SUB-SECTION: III B**  
**COMPLIANCE CUM CONFIRMATION**  
**CERTIFICATE**



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENT**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: III**

**SUB-SECTION: III B**

**REV. NO. 01**

**DATE: 15.05.2020**

**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



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENT**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: III**

**SUB-SECTION: III B**

**REV. NO. 01**

**DATE: 15.05.2020**

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.



**1X660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

SPEC. NO.: **PE-TS-426-550-A001**

SECTION: III

SUB-SECTION: III C

REV NO: 01

DATE: 15.05.2020

**SECTION: III**  
**SUB-SECTION: III C**

**PRE BID CLARIFICATION SCHEDULE**



**1X660 MW PANKI TPS  
FIRE TENDERS & FIRE SAFETY  
EQUIPMENTS**

**SPECIFICATION No: PE-TS-426-550-A001**

**SECTION: III**

**SUB-SECTION: III C**

**REV. NO. 01**

**DATE: 15.05.20**

**PRE-BID CLARIFICATION SCHEDULE**

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



**1X660 MW PANKI TPS**  
**FIRE TENDER & SAFETY EQUIPMENT**

SPEC. NO.: **PE-TS-426-550-A001**

SECTION: III

SUB-SECTION: III D

REV NO: 01

DATE: 15.05.2020

**SECTION: III**  
**SUB-SECTION: III D**  
**DEVIATION SCHEDULE**

**DEVIATION SHEET (COST OF WITHDRAWAL)**



**PROJECT:- 1 x 660MW PANKI TPS**

**PACKAGE:- FIRE TENDERS & FIRE SAFETY EQUIPMENT**

**TENDER ENQUIRY REFERENCE:-**

**NAME OF VENDOR:-**

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

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**COMMERCIAL DEVIATIONS**

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**PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE**

|             |                     |                        |  |
|-------------|---------------------|------------------------|--|
|             |                     |                        |  |
| <b>NAME</b> | <b>DESIGNATIONS</b> | <b>SIGN &amp; DATE</b> |  |

**NOTES:**

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