

***SECTION -06***

***SPECIFICATIONS***

## 6.1 Scope of Work

The scope of work of the contractor is defined in general and shall include the following, but not limited to the same. The bidder shall also carry out all the related work that are not listed in this document, but required for completion of the entire work as specified in this Bidding Document.

- (i) Removing existing roof plates with all attachments, roof structure, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> shell courses and water drenching line from nearest flange to tank.
- (ii) Supply plates and other materials and installation of new shell courses, roof structure and roof with all attachments
- (iii) Fabrication and installation of new inlet and outlet nozzles, floating suction,
- (iv) Blast cleaning and painting of tank interior and exterior with roof structure
- (v) Fabrication and installation of quick flush system including all valves, pump with motor and other accessories.
- (vi) Hydro test, calibration of the tank and box up the tank

### 6.1.1 Scope of Supply by CPSTL

#### Construction Utilities

- 6.1.1.1 Electricity and drinking water can be supplied to the contractor to undertake this work. The prospective contractor is required to indicate his requirements of electrical power and water from the CPSTL in his offer for evaluation purposes.
- 6.1.1.2 The maximum available electrical power supply available to the contractor is 45kVA, 400V AC, 4 wire (TPN), 50Hz and will be subjected to following 05 conditions.
- i. Electrical power supply will be provided by CPSTL on the request of the Contractor and charge according to the applicable tariff system, or the Contractor shall have to arrange his own power source.
  - ii. The Electrical Section of CPSTL will provide terminating point to feeding cables through a suitable circuit isolating and interrupting devices such as a circuit breaker or a switch fuse at convenient location, within 150 m from the tank shell. This switch gears will remain the property of CPSTL and contractor has no access to it.
  - iii. The maximum load that the CPSTL electrical section can feed will be 63A, 3 Phases.
  - iv. Power supply will be energized after inspection by the Electrical Engineer of CPSTL provided all requirements in clause 6.2.12 are satisfied.
  - v. CPSTL will reserve the right to disconnect the power supply to the contractor without prior notice, if any of the foresaid conditions are violated.
- 6.1.1.3 Water supply will be provided by CPSTL on the request of the contractor and charge according to the meter.

### 6.2 Contractor's Scope of Supply

Contractor shall supply construction equipment, materials, consumables and other requisites as follows;

- 6.2.1 Supply of all construction equipment such as welding machines, metal cutting equipment, air compressors, cranes, soil compacting and cutting equipment, material transportation vehicles, rigging equipment, jacks, scaffolding materials, planks, corrugated metal sheets, fire blankets and tools and other equipment where necessary.
- 6.2.2 Supply of all inspection equipment such as X-ray machines, vacuum testing instruments and gauges to perform necessary inspection and testing.

- 6.2.3 Supply of Carbon Steel plates as per the specification (Clause No 6.3.16.1) for replacement of the roof and shell courses.
- 6.2.4 Supply of materials for all replacement such as manholes, vents, dip hatch, roof structure, nozzles, water drenching line etc as per the specification given in this document.
- 6.2.4 Supply of gasket and nuts & bolts for all replacements and for boxed up the tank as per the specification given in this document.
- 6.2.5 Supply of all consumables such as welding electrodes, gas for cutting, grinding discs, temporary erection material, dye penetrant / X ray films / diesel for inspection, grit for blast cleaning and all other consumables necessary for the proper execution of the job.
- 6.2.6 The paint and thinner required for tank interior & exterior, roof structure, roof exterior with all accessories, stairway and its hand rail, and water sprinkle system shall be provided by the contractor.
- 6.2.7 All direct requirements of field equipment such as fuel, lubrication oil etc. the contractor intends to mobilize at site.
- 6.2.8 Supply of sand, cement, reinforcement, butamine and all necessary material for proper execution of job.
- 6.2.9 Shall submit a bar chart for the total project clearly indicating the various phases of the contract, breakdown of manpower and equipment and organization chart allocated for this contract.
- 6.2.10 Quality assurance records shall be maintained by the contractor and these records shall be given to Engineer upon completion of each job.
- 6.2.11 The Contractor shall submit the performance bond and insurance covers as per Contract Data in Section – 4.
- 6.2.12 Construction Utilities
- i. Contractor shall use his own feeder cables and temporary power distribution board sufficiently rated to power the equipment and machinery used at site, conforming to CEB regulations in consultation / supervision of Electrical Engineer of CPSTL.
  - ii. Contractor's power distribution board should consist of adequate over current and earth leakage protective devices for safety of men and machinery.
  - iii. Contractor shall install the feeder cables from the metering point up to the temporary power distribution board as per the instruction & approval of the CPSTL Electrical Engineer.
  - iv. It is the responsibility of the contractor to maintain his switch gear and cable network in good condition, so as to provide, complete safety to men and machinery.
  - v. All portable electrical appliances used inside the tank shall be at low voltage, 110V, 1 Phase and should be fed through a center earthed transformer.
  - vi. The whole electrical installation of the contractor should conform to IEE wiring regulations (16<sup>th</sup> Edition) published by the Institution of Electrical Engineers (I.E.E), London.

### **6.3 Contractor's Scope of Work and Specifications**

- 6.3.1 All repair work shall conform to API 653 and API 650.
- 6.3.2 Check the existing tank design and structural rigidity for suitability of the proposed method by the bidder for the tank roof plates replacement. Suitability of the method to be informed to CPSTL in writing.
- 6.3.3 The tank would be handed over to the contractor in a clean and gas free state.

- 6.3.4 All drawings, welding sequences, method statements, time schedules, as built drawings and other related documents shall be prepared and submitted by the contractor.
- 6.3.5 Welding Procedure and Welder Qualification
- 6.3.5.1 Qualification of Welding Procedure  
Prepare welding procedure specification (WPS) for all category of welding that are intended to be carried out in tank repair work and perform tests documented by Procedure Qualification Records (PQR) to support the specifications as required by section ix of the ASME code and any additional provisions of API 650 standards.
- 6.3.5.2 Qualification of Welders  
Conduct tests for all welders assigned to manual and semi-automatic welding to demonstrate the welders' ability to make acceptable welds in accordance with section ix of ASME code and API 650 standards.
- 6.3.6 Repairs to Tank
- 6.3.6.1 Existing roof plates and roof structure should be removed including crown handrails, roof accessories and water drenching system.
- 6.3.6.2 All plates of the 8<sup>th</sup>, 7<sup>th</sup> and 6<sup>th</sup> Shell courses shall be removed with reinforcement ring as per the drawing No. 1615-2.
- 6.3.6.3 Supply 7 mm or 9/32 inch thick Carbon Steel plates as per specifications, fabrication and welding of new shell plates for shell course No. 06, 07 and 08 as per the drawing No. 1615-2.
- 6.3.6.4 Supply angle iron for roof structure as per the specifications, fabrication and welding according to drawing No. 1615-1.
- 6.3.6.5 Supply 6mm or ¼ inch thick Carbon Steel plates as per specifications, fabrication, laying and welding of new roof plates. Supply materials as per specifications, fabrication, installation and welding of roof accessories such as manholes, vents, dip hatch etc. The contractor on the approval of the Engineer shall commence laying of the new plates. The plates shall be joined by a suitable welding method using AWS E 7018 series electrode in such a way it will provide a near possible plane surface. AWS E 6013 can be used for joining of roof plates. Subject to approval of the Engineer, the welding sequence adopted should result in least distortion.
- 6.3.6.6 Supply angle iron for the whole roof top angle as per the specifications, fabrication and welding.
- 6.3.6.7 Supply of foam top pourers as per the specifications and fixing to the tank.
- 6.3.6.8 Underside of new roof plates and roof structure shall be blast cleaned and painted as per the specifications given in 6.3.9.1 before installation.
- 6.3.6.9 Tank shell interior and tank bottom shall be blast cleaned and painted as per the specifications given in 6.3.9.1.
- 6.3.6.10 Tank shell exterior including roof and all roof accessories shall be blast cleaned and painted as per the specifications given in 6.3.9.2.
- 6.3.6.11 Supply of materials for crown handrail fabrication with toe plate and fixed to the tank. Painting of handrail shall be power brush cleaned.
- 6.3.6.12 Painting of spiral stairway shall be power brush cleaned and locally repaired.
- 6.3.6.13 Top landing structure shall be replaced.

- 6.3.6.14 Fire water cooling line shall be replaced from flange near tank apron as per the drawing No. 1615-6 and grit blast cleaned and painted as per the specification given in 6.3.9.3.
- 6.3.6.15 Supply of materials, bending pipes and fabrication of foam piping system as per drawing No. 1615-7.
- 6.3.6.16 Foam piping system shall be Grit blast cleaned and hot dip galvanized as per the specification given in 6.3.10.
- 6.3.6.17 Floating suction shall be fabricated and fixed. Flexible metal hose, pipes for floating suction shall be supplied by CPSTL. Floating drums and other materials shall be supplied/fabricated by Contractor as per drawing No. 1615-9 and 1615-11.
- 6.3.6.18 Earthing system shall be designed as per API Standard 650 Twelfth Edition, March 2013 –Clause 5.8.11.3
- 6.3.6.19 Whole reinforcement ring of tank shell shall be replaced by supplying and fabrication of 200x100x9 mm angle iron.
- 6.3.6.20 Demolish the existing concrete apron and brick drain and construct the apron and drain as per the drawing 1615-10.
- 6.3.6.21 Tank shall be marked as “TANK NO 46, CAPACITY 12,000 m<sup>3</sup>” as per the drawing No. 1615-13.
- 6.3.6.22 Supply of materials, fabrication and installation of quick flush drain system including tank and pump shall be attended as per the Drawing No.1615-12. Whole unit shall be painted as per specification given in 6.3.9.1 and 6.3.9.2
- 6.3.6.23 Fix the 450x450x50 mm precast concrete slabs after laying 50 mm quarry dust layer as per the Drawing No. 1615-12.
- 6.3.6.24 Provision shall be provided for installation of radar gauge (1 no. 8” dia. Nozzle with blind flange).
- 6.3.6.25 Existing mechanical level gauge should be replaced by new one with accessories.
- 6.3.6.26 Tank shall be calibrated.
- 6.3.6.27 Tank shall be boxed up.
- 6.3.7 Third party inspection of plates and other relevant materials  
Third party inspection of plates (which are supplied by the contractor) shall be done by a reputed third party inspection company approved by CPSTL and Third Party Inspection reports shall be submitted to CPSTL for the approval. Test certificates shall be in accordance with EN 10204-3.2.
- 6.3.8 Testing and Inspection
- 6.3.8.1 Tank roof welds shall be tested for leaks with vacuum tester (using contractor’s own equipment) in the presence of the representative of Inspection Engineer.
- 6.3.8.2 Tank shell welds shall be tested by Radiographic examination. The report of radiographic examination of welds shall be submitted to the Engineer together with any other relevant information that may be required.
- 6.3.8.3 All inspection and testing of the roof plate weldments and the roof accessories shall be arranged by the contractor as per the requirements of API 650 and API 653.
- 6.3.8.4 Tank hydro test shall be carried out according to the API 653. The Contractor should make the required piping arrangements for Hydro Test. Testing procedure to be mutually agreed. Fresh water shall be supplied by CPSTL.

6.3.9 Painting6.3.9.1 Painting underside of roof plates and roof structure, tank shell interior and tank bottom

The entire roof structure, tank shell interior and tank bottom shall be painted, under side of the roof plates and interior of quick flush tank shall be painted before plates are installed and touch-up paintings shall be done on welding joints as per following paint system after grit blast cleaning specified under clause 6.3.9.6. Application of paint and obtaining of approval for painting shall be carried out as described in clause 6.3.9.7.

Paint preparation & application shall comply with manufactures data sheet.

Description	Thickness	
SIGMA COVER 280 (PDS 7417) or SIGMA COVER 522 (PDS 7420)	50 microns DFT	Primer
SIGMAGUARD 720 (EHB) GREEN (PDS 7433)	150 microns DFT	Intermediate
SIGMAGUARD 720 (EHB) GREY LIGHT (PDS 7433)	150 microns DFT	Finish
Required overall paint thickness	350 microns DFT	
Sigma solvent – Thinner 91-92 or equivalent or as specified in manufactures data sheet.		

6.3.9.2 Painting Tank Exterior

The roof external surfaces with all attachments, tank shell exterior and exterior of quick flush tank and system shall be painted after grit blast cleaning specified under clause 6.3.9.6 as per following painting system. Application of paint and obtaining of approval for painting shall be carried out as described in clause 6.3.9.7.

Paint preparation & application shall comply with manufactures data sheet.

Description	Thickness	
SIGMA COVER 280 – Yellow Green (PDS -7417) or equivalent	60 microns DFT	Primer
SIGMACOVER 456 Grey 5163 Light (PDS 7466) or equivalent	75 microns DFT	Intermediate
SIGMADUR White 7000 ( PDS 6824 ) or equivalent	75 microns DFT	Finish
Required overall paint thickness	210 microns DFT	
Sigma solvent – Thinner 91-92 or equivalent or as specified in manufactures data sheet.		

6.3.9.3 Painting of the water drenching system

Water drenching system shall be painted after grit blast cleaning specified under the clause 6.3.9.6 as per following painting system. Application of paint and obtaining of approval for painting shall be carried out as described in clause 6.3.9.7.

Paint preparation & application shall comply with manufactures data sheet.

Description	Thickness	
SIGMA COVER 280 – Yellow Green (PDS -7417) or equivalent	60 microns DFT	Primer
SIGMA COVER 435/SIGMA CAP MIO - Colour Green (PDS -7465) or equivalent	75 microns DFT	Intermediate
SIGMA DUR 188 Red (PDS 6824) or SIGMA COVER 456 Gray or equivalent	75 microns DFT	Finish
Required overall paint thickness	210 microns DFT	
Sigma solvent – Thinner 21-06 or equivalent or as specified in manufactures data sheet.		

#### 6.3.9.4 Painting of Spiral Stairway

The Spiral Stairway and its hand rail and crown hand rail shall be painted according to their standard colour codes (structure – black, handrail – yellow) as follows after power brush cleaning specified under clause 6.3.9.6. Application of paint and obtaining of approval for painting shall be carried out as described in clause 6.3.9.7. The paint is recommended to apply by brush or Air Spray.

Description	Thickness	
SIGMA COVER 280 – Yellow Green (PDS -7417) or equivalent	60 microns DFT	Primer
SIGMA COVER 435/SIGMA CAP MIO - Colour Green (PDS -7465) or equivalent	75 microns DFT	Intermediate
SIGMA COVER 456- Black (PDS -7466)/ SIGMA COVER 456- Yellow (PDS -7466) or SIGMA DUR 188 Yellow (PDS 6824) or equivalent	75 microns DFT	Finish
Required overall paint thickness	210 microns DFT	
Sigma solvent – Thinner 21-06 or equivalent or as specified in manufactures data sheet.		

#### 6.3.9.6 Surface Preparation

All the surfaces which are to be grit blast cleaned shall conform to Swedish Standard SA 2½. All the surfaces which are to be power brush cleaned shall conform to Swedish Standard St 3.

#### 6.3.9.7 Details of application and approval

- 6.3.9.7.1 All painting work shall be done as per the manufactures’ “datasheet”. The whole area specified above to be painted with primer, intermediate and finish paint. The primer paint, intermediate and finish coats are recommended to apply by Airless spray.
- 6.3.9.7.2 All welding seams, sharp edges and other required areas are to be stripped coated as required.
- 6.3.9.7.3 Approval for painting should be obtained from the Inspection Engineer of CPSTL or his representative as follows.
- Prior to application of first primer coat after satisfactory cleaning of surfaces.
  - Prior to application of first intermediate coat after applying the required thickness of primer.

- c. Prior to application of first finish coat after applying the required thickness of intermediate coat.
- 6.3.9.7.4 Required total DFT indicated in specifications to be applied and the first coat of Paint shall be applied as soon as possible after surface preparation is approved by Engineer. The preparation of paint before application is to be done as per the instruction stated by the paint manufacturer.
- 6.3.9.7.5 Time interval between two coatings shall comply with paint manufactures instructions
- 6.3.9.7.6 The Engineer reserves the authority to accept or reject.
- a. Prepared surface before painting depending on his observations.
- b. Application of paint depending on the preparation of paint and the weather.
- Painting carried out under doubtful weather condition is the responsibility of contractor. If any painting is found to be unacceptable the particular surfaces shall be made paint free and repainted at contractor's expense.
- 6.3.10 All pipes of foam top pourer system including fittings and flanges shall be grit blast cleaned and hot dip galvanized. All galvanizing work shall confirm to ASTM A 123 or BS EN ISO 1461:2009. Average mean coating thickness of galvanizing is 85 microns for all pipes, fittings and flanges.
- Touch up painting with Zn rich paint shall be attended on the galvanized surfaces wherever required after installation.
- Certificate from the galvanizing company stating that all the specifications of the bidding document were met shall be submitted to CPSTL after completion of galvanizing work.
- 6.3.11 Erection of Scaffolding
- Scaffolding should be erected to the approval of the safety department of CPSTL as follows:
- 6.3.11.1 Should be of steel pipes and couplings, toe plates, platforms etc.
- 6.3.11.2 Thickness of 2" timber planks to be used for the platform and to be properly fastened at both ends.
- 6.3.11.3 Ladders should be provided from the ground to the platform.
- 6.3.11.4 After erecting the scaffolding the contractor should obtain a written approval from the safety department of CPSTL before commencement of the work.
- 6.3.11.5 Approval for the screening for grit blasting to be obtained from Fire & Safety Department of CPSTL after erection of scaffolding and prior to the grit blasting.
- 6.3.11.6 A temporary screening for grid blasting shall be erected to cover each sides of the tank using scaffolding and suitable materials for the purpose. It should be in a height of at least 1 meter beyond the tank roof starting from the ground. It should be erected in such a way as to give positive fire isolation. Further pipe rack running by the tank and all valves should be covered by a fire blanket.
- 6.3.11 Erection of Temporary Fire Barrier and Fire Blanket
- A temporary fire barrier shall be erected to cover near tanks as required using corrugated metal sheets. It should be in a height of at least 1 m beyond the tank roof top position. Starting level of fire barrier can be decided to the contractor depending on his design. However it shall be approved by CPSTL. It should be erected in such a



way as to give positive fire isolation. Further pipe rack running by the tank and all valves should be covered by a fire blanket.

#### 6.3.12 Calibration of the Tank

After successful completion of repair work and painting, the tank shall be calibrated. The calibration and tabulations should conform to API 2550, ASTM 1220. The tank calibration should be carried out using one of the following methods by a third party company acceptable to CPSTL.

- MPMS Ch. 2.2B – Calibration of Upright Cylindrical Tanks using the Optical Reference Line Method (ORLM)
- MPMS Ch. 2.2C – Calibration of Upright Cylindrical Tanks using the Optical Triangulation Method (OTM)
- MPMS Ch. 2.2D - Calibration of Upright Cylindrical Tanks using the Internal Electro Optical Distance Ranging Method (EODRM)

#### **MPMS (Manual of Petroleum Measurement Standards)**

The name and address of the 3<sup>rd</sup> party company should be given in the bid for evaluation purposes.

The Contractor shall submit three sets of certified calibration tables and soft copy in the form of spread sheets to the Engineer on or before successful completion of the work.

#### 6.3.13 Box up the Tank

After completion of all works specified the tank shall be boxed up and handed over for operational purposes.

#### 6.3.14 Site cleaning

6.3.14.1 Work site, tank interior, tank exterior and tank farm shall be cleaned and maintained properly until it is handed over to CPSTL.

6.3.14.2 Tank inside, tank exterior and tank farm shall clean after completion of the works and all removed material shall be dumped at a location inside the premises as directed by the engineer.

6.3.14.3 Existing excess materials shall be removed from the site as directed by the Engineer.

#### 6.3.15 Tank Details

Tank Capacity	:	11,859 m <sup>3</sup>
Tank Diameter	:	34.15 m
Tank Height	:	14.86 m
Type of the Tank	:	Fixed/Cone roof, welded, Steel, Vertical Storage Tank at Kolonnawa Installation, CPSTL
Status	:	Without product
Product	:	Jet A1

#### 6.3.16 Specifications of Materials

##### 6.3.16.1 Carbon Steel Plates

##### A) For Roof

- i. Material shall conform to ASTM A 283 Gr. C (Equivalent is not accepted)
- ii. Thickness :- 6mm or ¼ inch
- iii. Size :- 1800mm x 6000mm or 72inchx240inch or Suitable Size

- iv. Identification:-  
Heat/Batch number and material description shall be marked on the plates.
- v. Valid mill test certificate with the heat/batch numbers or any other reference number should be submitted with the plates. The heat /batch numbers or any other reference number marked on plates should tally with that of the certificate for final acceptance at Ceylon Petroleum Storage Terminals Limited (CPSTL) Kolonnawa.
- vi. Tolerance in size, if any, should be mentioned with relevant standards for the purpose of evaluation.

B) For Shell

- i. Material shall conform to ASTM A 283 Gr. C (Equivalent is not accepted)
- ii. Thickness :- 7 mm or 9/32 inch
- iii. Size :- 1830mm x 7650mm or 72inchx300inch or Suitable Size
- iv. Identification:-  
Heat/Batch number and material description shall be marked on the plates.
- v. Valid mill test certificate with the heat/batch numbers or any other reference number should be submitted with the plates. The heat /batch numbers or any other reference number marked on plates should tally with that of the certificate for final acceptance at Ceylon Petroleum Storage Terminals Limited (CPSTL) Kolonnawa.
- vi. Tolerance in size, if any, should be mentioned with relevant standards for the purpose of evaluation.

6.3.16.2 Carbon Steel Line Pipes

- i. Length 5.8m, seamless and Bevel Ends (BE)
- ii. Material shall conform to API Standard 5L-Gr B or ASTM A 106 B. (Equivalent is not accepted)
- iii. Dimensions shall conform to ANSI B 36.10 SCH 40
- iv. Identification: - Heat/Batch number, SCH number, API or ASTM number, seamless and material description shall be marked on the pipes.
- v. Both ends of pipe should have protective sleeves.
- vi. Valid mill test certificate should be supplied with Heat/Batch numbers or any other reference number marked on pipes as well as in the certificates to check once the items are delivered to CPSTL Kolonnawa with reference to the items against the Mill Certificate.

6.3.16.3 Carbon Steel fittings (Elbows, Reducers)

- i. Bevel ends (BE)
- ii. Material shall conform to ASTM A 234 Gr. WPB. (Equivalent is not accepted)
- iii. Dimensions shall conform to ANSI B 16.9, SCH40
- iv. Identification:- SCH number, ASTM number and material description shall be marked on the elbows and reducers.
- v. Valid mill test certificate should be supplied with Identification number or any other reference number marked on elbow as well as in the certificates to check once the items are delivered to Ceylon Petroleum Storage Terminals Limited Kolonnawa with reference to the items against the Mill Certificate.

6.3.16.4 Carbon Steel Flanges

- i. Class 150, Slip on ( 50), Raised Face (RF)
- ii. Material shall conform to ASTM A 105 Normalised. (Equivalent is not accepted)

- iii. Dimensions shall conform to ANSI B 16.5.
- iv. Identification:- ASTM number, ANSI Number, Class and material description shall be marked on the flange.
- v. Flange should be marked with the ASTM specification grade identification symbol and ASTM specification number.
- vi. Valid mill test certificate should be supplied with identification numbers or any other reference number marked on flanges as well as in the Certificate to check once the items are delivered to CPSTL Kolonnawa with reference to the items against the Mill Certificate.

#### 6.3.16.5 Gasket Materials

- i. Maximum Working Pressure - 225 psi
- ii. Nominal Working Temperature - 45°
- ii. Thickness - 3 mm
- iii. To use as packing for flanges of pipe lines and tank manholes for petroleum refined products such as Gasoline, Gas oil, Fuel Oil and Aviation Turbine.
- iv. Gaskets should conform to BS 7531 or equivalent.
- v. Each sheet of jointing shall be indelibly marked with the number of British Standard and manufacturer's identification mark.

#### 6.3.16.6 Angle Iron

- i. Material: ASTM A 36
- ii. Size: As specified in the drawing and as existing in the tank
- iii. Valid mill test certificate shall be supplied

#### 6.3.16.7 Nuts and Bolts

- i. Material of bolts be conformed to ASTM A 193 Gr.B 07 or BS 1506-621 Gr.A and materials of nuts shall conformed to ASTM A 194 Gr. 2H or BS 1506-162.
- ii. Threads should be in accordance with ANSI B 1.1 or BS 1580 Class 2A for bolts and class 2B for nuts.
- iii. Identification marks shall be available on items to conform above standards.

#### 6.3.16.8 Foam Top Pourer

Foam Top Pourers should be designed specifically for the use fixed roof fuel storage tanks. The pourers shall comprise with two elements, a Foam Generator and a Foam Pourer.

- a. Foam Generator which produces expanded foam when supplied with foam solution.

Capacity (Foam solution flow)	- 1250 l/m at 5 bar
Inlet Connection	- 4" RF Flange ANSI Class 150
Outlet Connection	- 8" RF Flange ANSI Class 150
Material Body	- Carbon Steel
Internal Fitting	- Stainless – steel
Frangible Disc	- Glass

- b. Foam Pourer which delivers the foam gently into the fuel surface of the fixed roof fuel storage tank. Foam Pourer should be designed to fix through a standard ANSI class 150 hole cut in the tank shell. Connection of the pourer to the tank shall be 8" RF Flange ANSI Class 150.

Operating Pressure	- 3 bar to 10 bars
Foam Expansion	- Low expansion

## c. Finish - Yellow thermoplastic Powder Coated

Following details to be submitted with the offer.

- i. Make and model.
- ii. Country of origin and Country of manufacture.
- iii. Original Brochures and standard test certificates.
- iv. List of required spare parts for a period of 5 years.
- v. Surface preparation and coating thickness details.

## 6.3.16.9 GI Pipes

Grade : Heavy Duty

Size : As existing in the tank

## 6.3.16.10 C Channel

- i. Material: ASTM A 36
- ii. Size: 205x100x9 mm and as existing in the tank
- iv. Valid mill test certificate shall be supplied

## 6.3.16.11 Pump and Electric Motor

a. **Pump**

- i. Centrifugal pump with end suction comply to API 610
- ii. Capacity: 6.8 m<sup>3</sup>/h
- iii. Minimum Head: 36 m
- iv. Suction size: 2 or 1 ½ inch
- v. Delivery size: 1 inch
- vi. Flange: Class 150, ANSI B 16.5
- vii. Operation and maintenance catalogue shall be submitted

Mechanical Data

Type	: Centrifugal
Direction of rotation (Facing driven end)	: pref. CCW
Pump seal	: Mechanical
Position of nozzles (Facing driven end)	: Yes

Accessories

Base plate	: Combined for pump & motor
Foundation bolts	: Yes
Coupling	: Flexible
Coupling guard	: Yes, Non-sparking
Pressure/Suction Gauges	: Yes

Pump Drive

Electric Motor (50 Hz)

Hydrostatic test and complete unit test shall be done and certificates shall be submitted to CPSTL for approval.

Hydrostatic Test

All pressure casing components shall be hydrostatically tested with liquid at a minimum of 1.5 times the maximum allowable working pressure.

**Complete Unit Test**

The pump and driver train (motor), complete with all auxiliaries that make up the unit, shall be tested together.

**b. Electric Motor**

All the test certificates and conformity certificates and Data for Electrical Motor, including following shall be submitted to CPSTL for approval.

- i. Certificates for Routine Test conducted as specified in the latest EN/IEC 60034-1 standard
- ii. Certificates for AC induction motors intended for use in potentially explosive atmosphere in conformity with latest ATEX directive 94/9/EC.
- iii. Certificates for AC induction motors for flame proof enclosures in conformity with latest EN/IEC 60079-0 0 (General Requirement) and EN/IEC 60079-1 (Flame Proof) standard.
- iv. Motor Dynamic Balancing Test Reports.
- v. ISO-9000 certificate of the motor manufacturer.
- vi. Calibration certificates of all the measuring instruments used for testing.

***Data for Electrical Motor***

Type	:	Squirrel Cage type AC, Three phase Induction Motor
Power Supply	:	400 V $\pm$ 10%, 3 Phase, 50Hz $\pm$ 3%
Starting Frequency	:	Normal
Area Classification	:	As per latest ATEX Directive 94/EC conformity. Motor Group: II (Surface Industry, above ground) Equipment Category : 2 (Zone 01) Surrounding Atmosphere: G (Gas)
		As per latest EN/IEC 60079-0 (General Requirement) and EN/IEC 60079-1 (Flame Proof) Standard Conformity Type of Protection: d (Flame Proof Motor and Terminal Box) Gas Group: IIB Temperature Class: T4
Enclosure	:	TEFC
Ingress Protection Class	:	IP65 (as per latest EN/IEC 60529 standard)
Insulation Class	:	F
Motor Efficiency	:	MEPS-2/IE-1
Direction of Rotating	:	Bi Directional (Pref. CCW)
Capacity	:	Vender to specify
No. of Poles	:	Vender to specify
Frame size	:	Vender to specify
Mounting	:	Vender to specify
Brand	:	Vender to specify
Model	:	Vender to specify
Motor rating and performance shall comply with EN/IEC 60034-1		

**Service Condition**

Ambient Temperature	:	Max 40C, Min 20C
Relative Humidity	:	40-90%
Altitude	:	Less than 2000 meters
Location	:	Outdoor, hazardous area
Duty Type	:	S3-Intermittent
Starting Method	:	Motor shall be suitable for direct on line (DOL) and Star-delta starting with full load (all six terminals should be available at the terminal plate for selecting the proper starting method to end user.)

**Other Condition**

Noise Level	:	Shall not exceed 85dB at 1 meter
Vibration	:	Within the limits specified in ISO 2372 or equivalent

**Construction Requirement**

Cooling Method	:	IC 411 (According to IEC 34-6)
Bearing	:	Ball/Roller bearing with grease lubrication
Earthing	:	Both internal and external earthing terminal shall be provided
Balancing	:	Motor shall be dynamically balance using a half key and test report shall be submitted along with the motor
Stator	:	Shall be made out of cast steel/iron
Cooling fan	:	Non-sparking Bronze alloy
Terminal Box	:	To mounted, 4 ways rotational by 90 steps, shall have a sufficient space to accommodate cables. Cable entry plate shall be mounted separately for easy disconnection of incoming cable.
Thermistors	:	PTC type thermistors (PTC 130°C ) embedded in each phase of winding for sensing winding temperature. The extra terminals of thermistor shall be brought in the same terminal box.
Name plates	:	02 Nos. (Provide extra name plate)
Handling	:	Provide Eye Bolt for handling

**Standards & Codes Applicable**

The motors shall be manufactured and tested according to latest IEC standards, Motors shall have either ATEX certification conformity or IEC Ex certification of conformity to permit the use of motor in the hazardous area as specified in

clause 3.2.0 Data for Electrical Motor. The motor name plates shall be marked accordingly.

6.3.16.12 Valves

Valves shall be complied with API 6d standard

Types and Size of the valves as per the Drawing no. 1615-12