

COCHIN PORT TRUST

Deputy Conservator's Office
Cochin Port Trust
W/Island , Cochin – 682009, KERALA
Tele: 91-0484-2666417/0484-258-2521
website: www.cochinport.gov.in
Email: sajeev.va@cochinport.gov.in



No.MD/DM/UPGRADATION FFS/OTB/2022

Date: 27-01-2022

NOTICE INVITING BUDGETARY OFFER

BACK GROUND.

Cochin Port Trust propose to up-grade the Fire Fighting System of its two Oil handling berths viz. North Tanker Berth(NTB) and South Tanker Berth (STB) commonly known as Oil Tanker Berths (OTB) to the requirement of OISD Standard 156 of 2017 by inviting open e-tenders. The Terminal is located near Foreshore Road of Kochi city and is accessible by road.

NTB Jetty is coming under the category “Tanker Berth is handling Ships of 20,000 Tonnes and above but less than 50,000 Tonnes” and STB is coming under “Tanker Berth handling ships of less than 20,000 Tons” as per the Classification given in OISD –STD-156 of 2017. At present, a common Fire water pump house is provided for catering to the fire water requirement of both the jetties which is equipped with 2 Nos. Diesel Engine Driven Fire Pumps of 500 M³/hr. capacities each. Since the maximum Fire water demand for NTB is higher than that of STB, the proposed up gradation of common Fire Pump Facilities is based on the requirement of NTB as prescribed in OISD –STD-156 of 2017.

In order to upgrade the Fire Fighting facilities to meet the requirement of **OISD –STD-156/2017**, additional one No. Diesel Engine Driven Fire Pump of 500 M³/hr. capacities and 1 No. Jockey Pump of 43 M³/hr. is to be installed. The area of existing Fire Pump House needs to be extended for accommodating the new Fire Pump and Jockey Pump. Installation of Accessories/Equipments/Systems such as Fuel Tanks for Diesel Engines, Fixed Water Curtain System between loading/unloading arms and tanker for segregation of facilities/hazardous areas for both the jetties, 2 Nos. Jumbo **Curtain** Nozzles of capacity 3000 LPM (180 M³/Hr.) at NTB jetty, Automatic gas/smoke/heat detectors, release & inhibit switches for fire suppression etc. are also to be provided at both jetties and common Fire alarm and detection system for both jetties conforming to the latest edition of Indian and International Standards is required. Minor modification to the existing Fire Waterlines to meet the requirements of various sub-systems of Fire fighting facilities is also required. Details of existing Facilities, additional facilities to be provided to up-grade the Fire Fighting System in compliance to OISD Standard 156 of 2017, detailed Scope of Work and Technical Specification etc. are furnished as Annexure-I.

In order to prepare the cost estimates for inviting open tenders for the above work, Cochin Port now invites budgetary offers from reputed firms, as per the Scope of Work enclosed as Annexure-I. Important commercial terms & conditions are also indicated.

The bidders are requested to submit the **Budgetary offers** as per the Price Schedule attached and may be sent in sealed cover superscribing “ *Budgetary offer for upgradation of Fire Fighting Facilities of Oil Tanker Berths (NTB & STB) of Cochin Port Trust to OISD STANDARD 156 OF 2017*”, to the Deputy Conservator, Cochin Port Trust at the address given above so as to reach us on or before **07-02-2022 at 17:00 hrs.**The bidders are advised to indicate the suggestions, if any on the technical specification, scope of work and terms & conditions.

Before preparation of Budgetary offers, the bidders are advised to visit the Oil Tanker Terminal site so as to understand the scope of work clearly. The visit for inspection shall be made on any working day, after obtaining the prior confirmation of Superintending Engineer (M) Tanker Terminals (Mob: 9446314127) or Asst. Engineer(M) Tanker Terminals (Mob: 9847058405), Cochin Port Trust. E-mail: sajeev.va@cochinport.gov.in

The bidders may note that the offers are invited only for **budgetary** purpose. Cochin Port is not bound to award the work to any bidders based on the **budgetary** offer submitted. Cochin Port Trust will not be liable for any financial obligation to the bidders in connection with the preparation of his budgetary offer.

Encl: ANNEXURE-I

Sd/-
SUPDTG.ENGINEER(M)
TANKER TERMINALS
COCHIN PORT TRUST

ANNEXURE-I

SECTION 1- SCOPE OF WORK.

Detailed Scope of Work of the proposed up-gradation of Fire Fighting System at North Tanker Berth(NTB) and South Tanker Berth (STB) commonly known as Oil Tanker Berths (OTB) to the requirement of OISD Standard 156 of 2017 are furnished below:-

Existing Facilities:-

Sl. No.	Installation/Facility/Equipment	Details
A	Fire Pump House (common for both NTB & STB)	Located between NTB and STB berth, constructed on marine piles. Size: 5.38 M x 7.5 M, Fire Control Room (1 st Floor) of Size : (A layout of existing Fire Pump House is enclosed) Fire Pumps available: 2 X 500 M ³ /Hr. capacity, 160 M Head, Vertical Turbine Fire Pumps, Prime Mover: 500 HP Diesel Engine with local panel; Fuel Tanks for Diesel engines: 1 X 1000 litre capacity Main over head Tank 2 independent tanks of 150 litres for each fire pump 1 No. DG set (make: Honda, rated out put 5.5 kva, maximum out put 6.5 kva, single phase, 50 hz., 230 V)
B	Foam Pump House (For the use of NTB)	Located adjacent to Fire Pump House, Foam Tanks : 2 X 10,000 Ltrs. capacity 32 HP Diesel Engine driven Foam Pump of capacity 400 lpm at 12 bar.
C	Fire Control Room (common for NTB & STB Jetty), located in the first floor of Fire Pump House	1) Remote Control Panel for Fire Fighting System, 2) Public Address System and talk back available between Fire Control Room and Fire Staff Crew Room at NTB and STB. 3) Fire detection, alarm (MCP triggered)& communication system.
D	NTB Jetty	1) Tower Monitors - 2 Nos. Water Foam Monitors (capacity 3000 lpm each) - Remotely operated 2) Ground Water Monitors (remote operated) – 2 Nos. (capacity 3000LPM each, Jumbo nozzles with jet/spray). 3) Hydrants :6 Double head hydrants spaced 30 m apart. 4) 5 Nos. MCPs are connected to the main fire alarm panel at control room. Fire Waterlines and Foam pipe line (details as per the lay out drawing attached) 5) Fire Waterlines and Foam pipe line (details as per the lay out drawing attached)
E	STB Jetty	1) Tower Monitors - 2 Nos. Water Foam Monitors (capacity 3000 LPM each)– Remotely operated 2) Ground Water Monitor: 1X 3000 LPM Jumbo Nozzle. (Manually operated) 3) Hydrants :6 Double head hydrants spaced 30 m apart. 4) 5 Nos. MCPs are connected to the main fire alarm panel at control room. 5) Fire Waterlines and Foam pipe line with education (details as per the lay out drawing attached) 6) Foam Tank capacity : 2000 ltrs x 2 (One independent tank for each Tower Monitor).

List of major additional Items to be provided in connection with the upgradation of the Fire Fighting Facilities to meet the OISD –STD-156/2017 :-

Sl.No.	Location of Installation/Facility	Additional items to be provided
1	Fire Pump House (common for both NTB & STB)	<ol style="list-style-type: none"> 1) The area of existing Fire Pump House needs to be extended for accommodating the new Fire Pump and Jockey Pump as per the lay out attached. 2) One No. Diesel Engine Driven Fire Pump of 500 M³/hr. capacity to be installed 3) Individual Fuel Tanks for 3 Diesel Engines; 4) 1 No. Motor driven Jockey Pump of 43 M³/hr. to be installed.
2	Fire Control Room (common for both NTB & STB)	<ol style="list-style-type: none"> 1) Control panel for Engine, Jockey pump and Fire fighting system 2) Fire alarm and detection system for both jetties conforming to the latest edition of Indian and International Standards
3	NTB Jetty	<ol style="list-style-type: none"> 1) Fixed Water Curtain System between loading/unloading arms and Shiptanker for segregation of facilities/hazardous areas. 2) Fixed Water Curtain for Tower Cooling 3) Two Nos. Jumbo Curtain Nozzles of capacity 3000 LPM (180 M³/Hr.) 4) Line modification repairs/replacement works. 5) Automatic gas/smoke/heatdetectors release & inhibit switches for fire suppression.
4	STB Jetty	<ol style="list-style-type: none"> 1) Fixed Water Curtain System between loading/unloading arms and Shiptanker for segregation of facilities/hazardous areas. 2) Fixed Water Curtain for Tower Cooling 3) Line modifications,repairs/ replacement works. 4) Automatic gas/smoke/heat detectors, release & inhibit switches for fire suppression

The detailed Scope of Workare as follows:

1.1 Setting up of a Civil structure

- (i) Construction of a masonry platform (Total area: 35 M²)with brick work enclosure supported on new marine pile foundations on the southern side of existing Fire pump house as an extension of the existing Fire Pump House at the same level and orientation for accommodating 1 No. diesel engine driven Vertical Turbine Fire Pump of capacity 500M³/ Hr and 1 No: motor driven vertical turbine Jockey pump of capacity 43 M³/ Hr.Foundation for the new Fire pump and Jockey pump has to be built on the new platform. Construction of extension of Fire Pump House shall be carried out in accordance with the detailed specification and drawing attached along with the tender document.
- (ii) Steel doors openable outwards has to be installed on western side of the new extension for facilitating transportation of the pumps and other equipments and it shall be in such a way that ingress of rain water into the Pump room to be totally eliminated. I beam for hooking chain block of 5 Ton capacity for lifting arrangement has also to be made inside the new structure.

1.2 Installation of Fire pump

- (i) Supply of one number diesel engine driven Vertical Turbine Fire pump of capacity 500M³/ Hr suitable for sea water intake and install the same on the foundation of the newly built structure. Necessary foundation bolts along with the heavy-duty vibration dampers are to be provided.
- (ii) The diesel engine, fire pump and gear box arrangements should be compatible with each other. All rotating parts should have suitable sheet metal guards.
- (iii) New 10” Fire pump delivery line of 300 # has to be internally cement lined, provided on proper supports, connected with suitable NRV and Gate valve to the existing 300 #, 10” Fire water line. Pipes for Fire water line, flanges, bends, reducers, coupling etc has to be supplied by the contractor and painted as per the painting scheme in the tender. NRV and Gate valve of suitable rating has to be supplied by the contractor. Spiral gaskets of suitable rating have to be used wherever required. Nuts and bolts used should be SS.
- (iv) All the sea water cooling inlet line from Fire pump to the Engine and outlet lines has to be made in SS 316 pipes.
- (v) Pressure gauge with stop valve for taking the new pump delivery pressure has to be supplied and installed by the contractor.
- (vi) Batteries of suitable rating required for the new Fire pump engine and trickle battery charger has to be supplied and electrical connections to be made by the contractor.
- (vii) The newly erected fire pump should have a local control panel located at engine side and should also be remotely operable from the control panel of the centralized Fire control room. The engine should have AUTO /Manual mode selector switch for automation.
- (viii) Pressure switches with stop valves for the 3 Fire pumps has to be supplied and installed by the contractor on proper mountings.
- (ix) Though starting of Fire pump Engines is automated depending on pressure settings, stopping shall only be possible manually by operation of the respective stop push buttons from both local control panel and fire control room panel.

1.3 Individual Fuel Tanks for 3 Diesel Engines

- (i) Existing 1 No. 1000 litre capacity Main over head Tank and 2 independent tanks of 150 litres of fire pumps are to be dismantled, transported and stored at the location identified by CoPT. The dismantled Tanks shall be the property of CoPT.
- (ii) 3 Nos. individual SS 316 grade diesel tanks having wall thickness of not less than 3 mm and all welded construction of capacity 500 L with diesel filling point, air vent, drain valve and level gauge has to be supplied and installed on proper supports.

- (iii) The position and the level at which the tanks to be fixed shall meet the requirements specified by the Engine manufacturers
- (iv) SS 316 grade fuel pipe line of sufficient diameter with flanged stop valve, hose connection and fittings for transfer of fuel from diesel tank to fuel pump and return line from injector leak off to fuel tank are to be supplied and fitted.
- (v) Fuel Suction line with foot valve and strainer has to be provided slightly above the bottom line of the tank, to eliminate any contaminants present in the fuel.

1.4 Installation of Jockey pump

- (i) Supply motor driven vertical turbine Jockey pump of capacity 43 M³/ Hr suitable for sea water intake and install on the foundation of the newly built structure.
- (ii) 4" Jockey pump delivery SS 316 L line of 300# connected with suitable NRV and Gate valve has to be connected to the existing 10" Fire water line of 300#. Pipes for Jockey pump line, flanges, bends, reducers, coupling etc has to be supplied by the contractor and painted as per the painting scheme in the tender. NRV and Gate valve of suitable rating has to be supplied by the contractor. Spiral gaskets of suitable rating has to be used wherever required.
- (iii) All the Electrical panel boards and accessories should meet Flame Proof Standard as per OISD 156 of 2017 (Class II, IP 65 etc.).
- (iv) Pressure gauge with stop valve for taking the jockey pump delivery pressure has to be supplied and installed by the contractor.
- (v) Pressure switch with stop valve for the Jockey pump has to be supplied and installed by the contractor on proper mountings.
- (vi) Working of Jockey pump should be automated depending on the preset lower and upper pressure in the pressure switches and also should be operable from both Control Room and Local panel at Fire pump room with Start /Stop switch having AUTO and Manual mode.
- (vii) Jockey pump should stop working when any one of the main Fire pump engines start.

2.1 Control Panel for Engine, Jockey Pump and Fire fighting system

- (i) The existing control panel at Fire control room which is not automated has to be replaced with new remote control panel for facilitating automation of all the 3 fire pumps and Jockey pump after taking inputs from the pressure switches of the relevant pumps. The automation of pumps are to be PLC controlled and should satisfy the Fire pump automation testing procedure indicated in the tender. Control panel for Deluge Valves and Actuators in Fire Fighting system also has to be incorporated in the Fire control room. The automation of pumps should satisfy the Fire pump automation testing procedure indicated in the tender.

- (ii) Necessary electrical wirings for the work along with applicable protective devices has to be done by the Contractor using FRLS armoured for AC supply / FRLS Flexible cable for DC supply and the cables has to be laid through GI conduits/cable trays on proper supports and neatly tied and marked, provide suitable metal glands and end termination.
- (iii) New Control panel should be compatible to work the upgraded fire fighting system. Electrical drawings of Control Panels has to be submitted by the tenderer for approval.

2.2 Fire Alarm & detection system

- (i) 3 Nos. Gas detectors per berth has to be supplied and installed at NTB and STB to detect the presence of hydrocarbon vapours. The gas detectors should be installed at Zone 1 of both berths to cover the full range of Zone 1. Activation of gas detectors should produce an audible alarm and siren.
- (ii) 4 Nos. IR Flame sensors per berth has to be supplied and installed at NTB and STB to detect radiant heat. Activation of IR Flame sensors should produce an audible alarm and siren.

IR Flame sensors should be installed on each tower monitor at appropriate height facing on-board ship. Flame sensors should also be positioned at left and right extreme of berth facing operational area of berths.

- (iii) A smoke detection System has to be supplied and installed at Fire Control Room as per applicable standards and to be integrated to the Fire Alarm Panel.
- (iv) A hooter for producing audible alarm and 3 KM range siren with acknowledge button has to be provided at Fire Control room.
- (v) Necessary FRLS flexible cabling for gas detectors and IR Flame sensors in proper conduit/cable trays and G.I. supports upto the Fire pump control room from STB and NTB has to be done by the contractor. The work at NTB involves routing the cables through submarine conduits from NTB Jetty to Fire control room. The work at STB involves routing the cables through conduits from STB Jetty to Fire control room.
- (vi) Present MCP alarm system at Fire Control Room has to be integrated to the new alarm panel.
- (vii) A mimic panel to identify location of triggered MCP/gas detector/flame sensor has to be installed at Fire pump control room.
- (viii) Starting/stopping/changeover of the existing DG set at Fire Pump Room has to be facilitated from Fire Control Room.

3.1 Fixed Water Curtain System at NTB

- (i) 2 Nos. X 3000 LPM Jumbo curtain nozzle has to be provided to serve as water curtain between Marine Loading Arms and Ship Tanker for segregation of hazardous areas.
- (ii) Jumbo curtain line of 6" NB Sch.40, ASTM A106 Gr. B/API 5L Gr. B Seamless pipe, internally cement lined (3/8" thick) as per the procedure/specification given with all necessary fittings such as flanges, gaskets, bend, studs, nuts, washers etc. including painting for connecting the Jumbo Curtain Nozzle with Gate valve and Deluge valve arrangement has to be tapped from header line at NTB to satisfy water requirement for Jumbo curtain profile. (9.5 M X 2)
- (iii) Pipes for Jumbo curtain line, flanges, bends, reducers, coupling etc. has to be supplied by the contractor and painted as per the painting scheme in the tender.
- (iv) Deluge valves should be operable from Fire control room and locally operable.
- (v) Electrical lines for the Deluge valve connections from Fire control room to NTB has to be provided by the Contractor. The work involve routing the cables through submarine conduits from NTB to Fire control room.
- (vi) All the electrical cables should be FRLS armoured for AC supply / FRLS Flexible cable for DC supply, properly glanded, conduited or passed through cable trays and neatly laid and marked.

3.2 Fixed Water Curtain for Tower Cooling at NTB

- (i) SS 316 Grade Water curtain line of 2" dia has to be tapped with flanged valves from existing 6" Tower monitor line at NTB (12.5 X 2)
- (ii) 3 Nos. MVWS spray nozzle (k 64) of dia 15 mm per tower arranged vertically one above the other equally spaced upto a height of 10 m has to be provided on Monitor towers frontage at NTB to serve as water curtain for the cooling of Towers.
- (iii) The line should be properly supported on Monitor tower with C-channel and fastened with SS U-bolts and painted as per the painting scheme in the tender.

3.3 Two Nos. Jumbo Curtain Nozzles of capacity 3000 LPM (180 M³/Hr.) at NTB

- (i) 6" NB Sch.40, ASTM A106 Gr. B/API 5L Gr. B Seamless pipe, internally cement lined (3/8" thick) as per the procedure/specification given with all necessary fittings such as flanges, gaskets, bend, studs, nuts, washers etc. including painting for connecting the Jumbo Curtain Nozzle has to be tapped from 6" line of each Base Monitor at NTB and install Jumbo curtain nozzle of 3000 LPM (180 M³/Hr) at a distance of 1 M from the Base Monitor at berth to serve as a water shield for the Firemen approaching the fire.

3.4 Line modification/repairs/replacement works at NTB.

- (i) Existing 6" Fire water line between 10" header line and 8" NJRP line laid under deck has to be replaced with new 8" NB Sch.20, ASTM A106 Gr. B/API 5L Gr. B Seamless pipe, internally cement lined (3/8" thick) as per the procedure/specification given with all necessary fittings such as flanges, gaskets, bend, studs, nuts, washers etc. on proper supports. **(total pipe length : 33.50 m).** 6" line towards Tower Monitor 1, Base Monitor 1, proposed Jumbo Curtain 1 &2 (9.5 m X 2) and 8" NJRP line has to be tapped from the above 8" replaced line.
- (ii) Removed 6" line to be used for laying of Jumbo Curtain line. Pipes for Fire water line, flanges, bends, reducers, coupling etc has to be supplied by the contractor and painted as per the painting scheme in the tender.
- (iii) The contractor is required to carry out hydraulic study at his cost and the fire water lines shall be modified accordingly to ensure that the required performance parameters of all the Systems are met. The Contractor is required to furnish a copy of hydraulic study conducted for the record of Cochin Port Trust.
- (iv) Two nos. existing defective actuator valves with Actuators in Tower monitor lines at NTB has to be replaced with Deluge Valves.
- (v) Two Nos. existing defective actuator of Foam line valve with actuator has to be replaced with new actuator.
- (vi) Existing two Nos. remotely operated water foam Tower Monitors and two Nos. Remotely operated Ground Water Monitors are to be serviced and repaired to make it fully functional in every respect (ie. Vertical & Horizontal movement from RCP, jet/spray conversion etc.).
- (vii) Electrical line faults, if any, from the Fire control room to NTB berth has to be rectified by the contractor.
- (viii) All Gate valves in the fire fighting line needs to be greased and gland packing to be changed if necessary at NTB.
- (ix) NRV in Fire water lines and Foam lines have to be overhauled /repaired.
- (x) Minor leaks in fire waterline and foam line to be rectified prior to pressure testing and conducting commissioning trials.
- (xi) Existing 8" Hydrant line laid upto NJRP has to be further extended by 5 meters to facilitate easy accessibility.
- (xii) Existing defective double headed Hydrant outlets at NTB has to be repaired or serviced.

3.5 Automatic gas/heat detectors, release & inhibit switches for fire suppression at NTB

- (i) Necessary works for installation of gas/heat detectors including supply of items for fire suppression shall be carried out at NTB jetty as detailed at Clause 2.2 "Fire Alarm & detection system".

4.1. Fixed Water Curtain System at STB

- (i) 2 Nos. X 3000 LPM Jumbo curtain nozzle has to be provided to serve as water curtain between Marine Loading Arms and Ship Tanker for segregation of hazardous areas.
- (ii) Jumbo curtain line of 6" NB Sch.40, ASTM A106 Gr. B/API 5L Gr. B Seamless pipe, internally cement lined (3/8" thick) as per the procedure/specification given with all necessary fittings such as flanges, gaskets, bend, studs, nuts, washers etc. including painting for connecting the Jumbo Curtain Nozzle with Gate valve and Deluge valve arrangement has to be tapped from header line at STB to satisfy water requirement for Jumbo curtain profile. (4.5 M X 2)
- (iii) Pipes for Jumbo curtain line, flanges, bends, reducers, coupling etc. has to be supplied by the contractor and painted as per the painting scheme in the tender.
- (iv) Deluge valves should be operable from Fire control room and locally operable
- (v) Electrical lines for the Deluge valve connections from Fire control room to STB has to be provided by the Contractor. The work involves routing the cables from STB to Fire control room.
- (vi) All the electrical cables should be FRLS armoured for AC supply / FRLS Flexible cable for DC supply, properly glanded, conduited or passed through cable trays and neatly laid and marked.
- (vii) CADD drawings for the laying of Jumbo Curtain line has to be furnished and get it approved by the CoPT.

4.2 Fixed Water Curtain for Tower Cooling at STB

- (i) SS 316 Grade Water curtain line of 2" dia has to be tapped with flanged valves from existing 8" Tower monitor line at STB (12.5 M X 2)
- (ii) 3 Nos. MVWS spray nozzle (k 64) of dia 15 mm per tower arranged vertically one above the other equally spaced upto a height of 10 m has to be provided on Monitor towers frontage at STB to serve as water curtain for the cooling of Towers.
- (iii) The line should be properly supported on Monitor tower with C-channel and fastened with SS U-bolts and painted as per the painting scheme in the tender.

4.3 Line modifications/repairs/replacement works at STB.

- (i) The contractor is required to carry out hydraulic study at his cost and the fire water lines shall be modified accordingly to ensure that the required performance parameters of all the Systems are met. The Contractor is required to furnish a copy of hydraulic study conducted for the record of Cochin Port Trust.
- (ii) Two nos. existing defective actuator valves with actuators in Tower monitor lines at STB has to be replaced with Deluge Valves.
- (xiii) Two Nos. existing defective Foam line actuator valves with actuators has to be replaced with new ones. Two Nos. existing defective actuator of Foam line valve with actuator has to be replaced with new actuator.
- (iii) Existing two Nos. Remotely operated Tower Monitors are to be serviced and repaired to make it fully functional in every respect (ie. Vertical & Horizontal movement from RCP, jet/spray conversion etc.). One No. Manually operated Ground Water Monitor is to be serviced and repaired to make it fully functional in every respect (ie. Vertical & Horizontal movement).
- (iv) Electrical line faults, if any, from the Fire control room to STB berth has to be rectified by the contractor.
- (v) All Gate valves in the fire fighting line needs to be greased and gland packing to be changed if necessary.
- (vi) NRV in Fire water lines and Foam lines have to be overhauled /repaired.
- (vii) Minor leaks in fire waterline and foam line to be rectified prior to pressure testing and conducting commissioning trials.
- (viii) Existing defective double headed Hydrant outlets at STB has to be repaired or serviced.

4.4 Automatic gas/heat detectors, release & inhibit switches for fire suppression at STB

- (i) Necessary works for installation of gas/heat detectors including supply of items for fire suppression shall be carried out at STB jetty as detailed at Clause 2.2 "Fire Alarm & detection system".

5. Performance Testing of the Upgraded Fire Fighting System:-

- 5.1.** On completion of work, the entire Fire Fighting shall be tested and the required performance shall be demonstrated to the Employer. Man power required for performance testing shall be to the Contractor's account. Foam Compound and diesel required for testing and commissioning of the System will be supplied by Cochin Port Trust and cost of quantity consumed will be recovered from the Contractor's bill.

5.2. The required performance parameters of the various sub-systems on completion of work and also the procedure of testing are furnished as below:-

PERFORMANCE PARAMETERS				
NTB/ STB				
Sl. No.	Name of the Equipment to be performance tested	Check Point	Observation	Remarks
A	Jumbo Curtain Nozzle			
1	2 Engine Driven Fire Fighting Pumps	Discharge Pressure : 12 kg/cm ²		
2	4 Nos. Jumbo Curtains (2 Nos. at NTB & 2 Nos. at STB) for segregation between Marine Loading Arms and Ship Tanker.	Pressure of JCN: 7 kg/cm ²		
		Height : 14 m (in still wind condition)		
		Width: 33 m(in still wind condition)		
B	Ground Water Monitor			
1	1 Engine Driven Fire Fighting Pump	Discharge Pressure : 8.5 kg/cm ²		
2	3 Nos. Ground Water Monitors (2 Nos. at NTB & 1No. at STB)	Operational check		
		Horizontal throw of water-64 m(in still wind condition)		
3	Remote Point Pressure	7 kg/cm ²		
C	Tower Monitor			
1	2 Engine Driven Fire Fighting Pump	Discharge Pressure : 12 kg/cm ²		
2	4 Nos. water /Foam Monitor (2 Nos. at NTB & 2 Nos. at STB)	Pressure of Water/Foam monitor: 7.5 kg/cm ²		
		Horizontal throw of water-Foam : 90 m (in still wind condition)		
		Vertical throw of water-Foam : 25 m (in still wind condition)		

5.3. Fire pump automation Testing procedure

1. Open all Gate valves in Fire fighting line.
2. Confirm that the Deluge valves of Tower monitors and gate valve of Base monitors are closed.
3. Start Jockey pump and confirm auto stop at 8 kg/cm sq.
4. Open Hydrant line valve and confirm Jockey pump starts at 7 kg/cm sq.
5. Open NTB Tower monitor 1 Deluge valve from remote .
6. Confirm Fire pump Engine 1 starts at 6.5 kg/cm sq
7. Confirm Jockey pump stops on Fire pump Engine 1 start.
8. Open NTB Tower monitor 2 Deluge valve from remote.
9. Confirm Fire pump 2 starts at 6 kg/cm sq
10. If Fire pump Engine 3 didn't start, automation is ok.
11. Open NTB Jumbo Curtain Deluge Valve from remote;
12. Open NTB foam line actuator valves from remote.
13. Start NTB foam pump from remote.
14. Check foam mixing through NTB Tower monitors.
15. Stop Foam pump, Fire pump Engine 1 & 2 manually.

16. Close NTB Tower monitor 1 & 2 Deluge valves, Jumbo Curtain Deluge valves and foam line actuator valve from remote.
17. Confirm Jockey pump pressurizes line back to 8 kg/cm sq.

Repeat the procedure for fail start options of Engine 1

1. Disconnect Engine 1 battery connections.
2. Open Hydrant line Valve and confirm Jockey pump starts at 7 kg/cm sq.
3. Open STB Tower monitor 1 Deluge valve from remote.
4. Confirm Fire pump Engine 2 starts at 6.5 kg/cm sq
5. Confirm Jockey pump stops on Fire pump Engine 2 start.
6. Open STB Tower monitor 2 Deluge valve from remote.
7. Confirm Fire pump 3 starts at 6 kg/cm sq.
8. Open STB Jumbo Curtain Deluge valves from remote
9. Open STB Foam line actuator valves from remote.
10. Check foam mixing through STB Tower monitors.
11. Stop Engine 2 &3 manually.
12. Close STB Tower monitor 1&2 Deluge valves, Jumbo Curtain Deluge Valves and foam line actuator valves from remote.
13. Confirm Jockey pump pressurizes line back to 8 kg/cm sq.

Repeat the procedure for fail start options of Engine 2

1. Reconnect Engine 1 battery connections and disconnect Engine 2 battery connections.
2. Open Hydrant line valve and confirm Jockey pump starts at 7 kg/cm sq.
3. Open STB Tower monitor 1 Deluge valve from remote.
4. Confirm Fire pump Engine 1 starts at 6.5 kg/cm sq
5. Confirm Jockey pump stops on Fire pump Engine 1 start.
6. Open STB Tower monitor 2 Deluge valve from remote.
7. Confirm Fire pump 3 starts at 6 kg/cm sq
8. Stop Engine 1 & 3 manually.
9. Close STB Tower monitor 1&2 Deluge valves from remote.
10. Confirm Jockey pump pressurizes line back to 8 kg/cm sq.

5.4. Testing and Commissioning

1. The entire Fire fighting line has to be hydro tested to a test pressure of 14 kg/cm sq for a holding period of 12 hrs and commissioning trials to be conducted as per the Fire pump automation testing procedure.
2. 10% of welded joints of renewed Fire Water line to be tested for radiography.
3. Fire detection system needs to be tested for alarm, siren activation and location identification on activation of MCP/ Gas detector/ Flame sensor.
4. Public address system needs to be tested.

6. Third Party Inspection:--

Contractor shall appoint a Third Party Inspection Agency (TPIA) for inspection and certification to the effect that the materials used, brought out items supplied and the performance of Fire Fighting System installed are meeting the tender specifications/tender requirement. Inspection shall be performed by TPIA as per the QAP/ITP approved by Cochin

Port Trust. TPIA shall be any one of the IACS Member Classification Society. Cost of appointment of TPIA shall be met by the Contractor.

Third party inspections shall be carried out at least but not limited to the following stages in connection with the work.

- a) Material inspection and acceptance.
- b) Review test certificate and functional test witness of machineries and components at manufacturer's premises.
- c) Welding procedure qualifications.
- d) Welder's qualification.
- e) Welding inspection.
- f) Review and certification of NDT.
- g) Cement lining of pipes including test block preparation and load test.
- h) Surface preparation and DFT of each coat of paint.
- i) Erection of facilities at site.
- j) Hydrostatic pressure test and commissioning.
- k) Final inspection for compliance to statutory regulations/contract conditions.

7. Documentation:

The Contractor shall furnish 3 sets each of the following Documents/ Manuals (Soft copies shall be furnished in the form of CD ROM also).

- a) Inspection and Maintenance Manual of pumps, engine, motor, actuator valves, deluge valves etc.
- b) Operation Manual.
- c) Spare Parts Manual.
- d) As-built drawing. The contractor shall submit test/inspection certificates from Third Party Inspectors at appropriate stages before proceeding to the next stage of work. Any defects noticed during inspection/ test/ trials shall be made good by the contractor at his risk and cost. In case of any dispute in this issue, the decision of the Employer, Cochin Port Trust shall be final and binding

SECTION 2- TECHNICAL SPECIFICATION:

1. Basis of Design:

The proposed fire fighting system at jetty shall be sea water intake type. Fire fighting system to be designed, procured, and installed in accordance with the requirements of the following codes, standards, and rules:

OISD – 117	Fire protection facilities for petroleum depots, terminal, pipeline installations and lube oil installations.
OISD – 156	Fire protection system for Liquid handling jetty.
IS: 903:1993	Specification for branch pipe, nozzles, nozzle spanner and hose delivery coupling.
IS: 1239:2004	Specification for Steel tubes, tubular having diameter 150mm Part 1 & 2
IS: 3589:2001	Specification for Steel tubes, tubular having diameter above 150mm.
API: 600	Specifications for C S Gate valve
IS:5290: 1993	Specification for landing Hydrant valves
IS: 5: 2007	Colours for ready mixed paints and enamels
IS:13039:1991	Code of practice for external hydrant system

2. MATERIAL OF CONSTRUCTION & SPECIFICATIONS:-

(i) VERTICAL TURBINE FIRE PUMP – 1 No.

The pump manufacturer shall supply the pump furnished for fire protection service with specific drives, controls and pump accessory items. It is the contractor's responsibility to obtain necessary approval for the pump and control. The pumping equipment shall be installed as per OISD 156 norms – 2017 i.e., Vertical Turbine Fire Pumps. Vertical turbine pump set with suction from open back waters capable of adopting different Sea water level is to be supplied with diesel engine driven installation. Also, the Pump and strainers inside shall be coated with corrosion protection coatings like Ceramic coating so as to avoid marine growth. Selected pump shall be capable of meeting the specification.

NPSH (Net Positive Suction Head): Designed for maximum efficiency (The fire pump will draw water from the back waters under suction lifts condition).

Pump characteristic shall meet the requirement as per OISD 156 and pump should be capable of discharging 150% of its rated discharge at a minimum of 65% of rated head. Pump shall witness hydrostatic pressure test to 1.5 times the maximum design working pressure of pump. Pump casing must withstand the hydrostatic test pressure for a period of 5 minutes without evidence of rupture. Inside of pump shall be coated with suitable protection coatings viz. ceramic coating to avoid marine growth. The shutoff head shall not exceed 140% for vertical turbine pumps.

(a) SPECIFICATION OF FIRE WATER PUMP:-

Type	Vertical Turbine Pump with Self-Priming Arrangement.
Quantity	1 No.
Delivery Pressure	14 Kg/cm ²
Capacity	500 m ³ / hr

Medium	Sea Water from back waters
Efficiency	Designed for maximum Efficiency
Stage	Multistage
Rating	Continuous / Marine Duty.
Material of construction	Pump casing, Impeller, Shaft, Shaft sleeve – All the above are Super Duplex.
Operating speed	1500 rpm
Total Head	160 m
Pump outlet	250 mm

Suitable type of Pressure Relief Valve for the Fire Pump is to be provided.

(b) DIESEL ENGINE SPECIFICATION – 1 No.

The engine should be turbo-charged, horizontal inline, water cooled four stroke, cold start, heavy duty compression ignition engine. The engine should be compatible with gearbox and pump.

The Diesel Engine shall be complete with battery charger panel complete with boost and trickle charging facility, auto-manual selector switch, two sets of maintenance free Lead Acid Batteries, (Batteries to be of sufficient Ampere Hour to be adequate for 10 consecutive starts without recharging with a cold engine under compression) & battery with stand.

The engine shall be provided with self-starting arrangement comprising of battery, cable & self-starter and manual cold starting kit. The engine shall have protection against low lube oil pressure, high lube oil temp and high-water temp. The Engine shall be capable of remote operations also. Lube oil gauge, water temperature gauge and lube oil pressure gauge are to be provided and mounted on a separate panel away from the engine with necessary piping etc. and fitted to the same base plate with anti-vibration mounting. Silencer/muffler and other standard accessories are to be provided as necessary. Silencer pipe has to be insulated against radiant heat.

(ii) Jockey Pump with motor: 1 No.

The Vertical Turbine Jockey pump shall be designed for sea water services and material of construction shall be as follows:

Suction bowl/ bell mouth	: SS ASTM A 743 CF 3 M
Impeller	: SS ASTM A 743 CF 3 M
Shaft/ shaft sleeves	: SS 316 L
Shaft Couplings	: SS 316 L
Discharge elbow	: SS 316 L
Couplings for pump	: Forged/ cast steel
Bowl Bearings	: Cutlass Neoprene Rubber in SS 316 L retainers
Thrust bearings	: Antifriction
Line bearings	: Self lubricated type
Foundation nuts/bolts/fasteners	: SS 316
Motor Stool	: SS 316
Sole/ Base plate	: SS 316

The Vertical Turbine Jockey Pump shall be capable of delivering min.43M³/ Hr and total head shall be 85 Mtrs. Suitable strainer of SS 316L with cleaning arrangement shall be

provided at the bottom.

The motor for the Jockey Pump shall be of sufficient rating to couple with the Pump.

(iii) JUMBO / MAYURA CURTAIN NOZZLES:-6 Nos.

Jumbo / Mayura Water curtain nozzles in SS 316 construction, capacity 3000 lpm flanged connection as per ANSI B16.5 300# Complete with all required accessories as per OISD 156-2017. The MOC of Body, flange shall be SS316. Coverage of nozzle shall be 33 m horizontally and 14 m vertical.

Flow Pressure	: 3000 lpm Flow at 12 kg/cm ² inlet pressure
End connection	: Flange to IS 6392, ANSI B 16.5 Class 300
Material and Construction	: Nozzles: SS - 316.

(iv) MVWS Spray Nozzles K64 15 mm dia - 12 nos

End Connection:	1/2 inch NPT(M)
Min Effective working Pressure	1.4 bar – 7 bar
Material of Construction of Housing	A351-CF8M
Approval:	UL Listed
Spray Angle:	Max. Spray Angle 120 degree

(v) Valves

General

- i) All the valves shall be designed manufactured and tested as per the Indian Standards/ British Standards given in the relevant paragraphs.
- ii) All the flanged valves, irrespective of their pressure rating, shall have flanges to be drilled as per IS: 6392 - 1971 (RA 1993) (Table 17)
- iii) All valves shall be so designed that the effort/ Torque required to operate the valve is minimum.
- iv) All valves shall be designed for 100% tight shut off condition.
- v) All the valves shall be provided with hand wheel. The face of the wheel shall be clearly marked with the words "Open" and "Close" and an arrow to indicate the direction for opening/closing.
- vi) All flanged valves shall be as per ASME B 16.20 and all gaskets shall be of metallic with SS316 spiral wounded CAF filler. All studs and nuts shall be as per ASTM A 193 Gr. B7/194 Gr.2H
All the flanged valves shall be supplied with companion flanges of MS plates conforming to IS: 2062 and drilled to IS: 6392. – 1971 (RA 1993) Table 17, CAF gaskets conforming to IS: 2712 -1979 (RA 1994) and Black bolts and nuts conforming to IS: 1363-199.
- vii) For all the Ni-cast iron valves body shall be so designed that at point, wall thickness is greater than the minimum specified in the various standards. Particular attention should be given to the distribution of material to limit the stresses within permissible range and to prevent stress concentration anywhere in the valve design.

- a) **Deluge valve**-4 Nos. (2 Nos. 150 NB at NTB and 2 Nos. 200 NB at STB) replacement with actuator valves in Tower monitor line and 4 nos for jumbo curtain line.

Deluge valve with 200 NB , flanged UL Listed (SEAT BRONZE)ANSI B 16.5 # 300 RF, horizontal mounting with test and alarm, drip and drain valve& water

Deluge valve with 150 NB , flanged UL Listed (SEAT BRONZE)ANSI B 16.5 # 300 RF, horizontal mounting with test and alarm, drip and drain valve& water

b) Gate Valves

- (i) 10"- 1 No.
- (ii) 6"- 6 Nos.
- (iii) 4" -1 No.

Rating : ANSI 300 class
 Ends : Flanged * drilled to ANSI B 16.5
 Tag No. : Item No. shall be attached with each valve
 Radiography : As per manufacturer's quality control
 Size Range : 2" to 12"

Valve Description	Construction required	Materials
Body	Cast	ASTM A 216 Gr. WCB
Bonnet	Bolted	ASTM A 216 Gr. WCB
Stem	Rising	Al-Bronze B148 Copper Alloy No. 955
Wedge Disc	Solid	Al-Bronze B148 Copper Alloy No. 955
Body Seat Rings	Renewable	Al-Bronze B148 Copper Alloy No. 955
Hand wheel	Non Rising	Malleable iron/ Ductile Iron/ steel
Bonnet Bolt		ASTM A 193 Cr B7
Bonnet Nut		ASTM A 194 Cr 2H
Bonnet Gasket		Spiral wound SS 304 with Compressed asbestos filler

Hydrostatic test pressure: Body 1100 lb/in², Seat 800 lb/in²

Test pressure with air seat immersed 100 lb/in²

- Notes**
1. Body of wedge shall be lined internally with 3mm Epoxy.
 2. Flanges shall have serrated face finish as per ANSI B 16
 3. Spot facing as per ANSI B 16.5 shall be done
- *Flanges shall be RF for 2" to 2 ½" NB
 FF for 3" to 12" NB

Max test pressure	:	30 Kg /cm ²
Range	:	0- 25 Kg/cm ² each switch.
Differential range	:	0.3 to 2 Kg/cm ²
Max process temp	:	170 deg. C
Max amp Temp	:	70 deg. C
Material	:	316
Connection	:	Threaded 1/4" BSP (M)
Cable connection	:	1/2"NPT (F)
Accessory	:	Snubber SS316
Accuracy	:	+ or – 1% FSD (Full scale deflection)

(vii) Pressure Gauges

Design and Construction Requirement

a) Service	:	Saltwater / foam
b) Dial size	:	150 mm diameter
c) Mounting	:	Direct
d) Accuracy	:	1%
e) Over range protection	:	25% above maximum line pressure
f) Sensing filament	:	Bourdon
g) Scale Range	:	0-25 kg/cm ²
h) Connection	:	Bottom connection with 1/2" NPT(M)

Threads.

i) Weather Protection	:	IP-54 as per IS 2147 or higher
j) Material of Construction Housing	:	Die cast Aluminum
k) Pressure element and shank movement	:	SS - 316
l) Gauges should be shock resistance type.		
m) Manufacturer's test certificate shall be furnished for the following:		
1) Calibration in ascending and descending order at 0, 25, 75 and 100% of the range of the pressure gauge.		
2) Over range protection test.		

(viii) UV/ IR FLAME DETECTOR

Features:

- Rugged Explosion-Proof enclosure for Hazardous Environment
- FM / ATEX / PESO Approved Enclosure
- Confirm to EN-54
- Easy to install and operate
- High speed response
- Free from False Alarms
- Visual Indication for Normal & Fire condition
- Low Maintenance.
- Low Standby Current

- Detectors shall not require any special type Control Panel.
- Swivel Mounting Base shall be provided for easy mounting at site.
- Triple sensor UV / IR flame detector for hazardous area application.
- The detector shall detect 1 Sq.ft fire at 25-35 metres distance.

TECHNICAL SPECIFICATION	
QUIES CENT CURRENT	< 80 mA
ALARM CURRENT	<150 Ma
RELAY CONTACT RATING	1A at 24VDC,0.5 at 12 0V A C
CABLE ENTRY	M25 X 1.5 -2Nos.
SENSING ELEMENT	UV & IR
RANGE	UV : 185-260 nm IR : 3000-5000 nm
INDICATION	NORMAL-FLICKERING GREEN LED FIRE – RED LED
OPERATING TEMPERATURE	-40 Deg. C to +60 Deg. C
SUPPLY	24VDC +/- 20 % (RESETTABLE)
SENSITIVITY SELECTION	RANGE OF SELECTIONS (a) LOW SENSITIVITY -1 (b) NORMAL SENSITIVITY -2 (c) HIGH SENSITIVITY (FACTORY SET) -3 (d) VERY HIGE SENSITIVITY -4
OUTPUT	1. ONE SET OF ‘NO-COM-NC’ CONTACT FOR FIRE PLUS ONESET OF DUPLICATE ‘NO-COM-NC’CONTACT. 2. ONE SET OF ‘NO-COM-NC’ CONTACT FOR FAUL TPLUS ONE SET OF DUPLICATE ‘NO- COM-NC’ CONTACT. 3. ONE SET OF ‘NO’ CONTACT FOR ALERT(NO HOLDING) PLUS ONE SET OF DUPLICATE ‘NO’ CONTACT. 4. 4. ZONE DETECTOR LINE TO CONNECT DIRECTLY STANDARD CONVENTIONAL FIRE ALARM PANEL.
MATERIAL	CAST ALUMINIUM L M6
FASTENERS	SS 304
EQUIPMENT RATING	EXPLOSION PROOF FOR CALSS I, DIVISION 1, GROUPS A, B, C AND D; AND DUST -IGNITION PROOF FOR CLASS II/III, DIVISION 1, GROUPS E, F & G; HAZARDOUS (CLASSIFIED) LOCATIONS, INDOOR/ OUTDOOR (NEMA TYPE 4X)

		1026 II 2G Ex d IIC Gb 1026 II 2D Ex tb I IIC Db, IP 66
	Certificate for Enclosure	FM APPROVAL FOR ENCLOSURE
	APPROVAL/ CONFIRMATION CERTIFICATION /	1. CONFIRMING REQUIREMENT OF NFPA 72E 2. CONFIRMING REQUIREMENT OF FM STAND ARDS

(ix) INFRARED HYDROCARBON GAS DETECTOR

The detector specially designed to detect the different gases and oils. Gas detector is a diffusion-based, infrared combustible gas detector that provides continuous, fixed monitoring of flammable hydrocarbon gases from 0 to 100% Lower Flammable Limit (LFL). Standard device outputs include an electrically isolated 4-20 mA signal and RS-485 serial communication. Serial communication protocols supported include MODBUS and ASCII. An optional relay output board with two programmable alarm relay outputs and one fault relay output is available.

Ideally suited for protection of challenging on/offshore oil and gas facilities and other downstream hydrocarbon applications, the detector shall be certified for use in Class I, Divisions 1 and 2, and Zones 1 and 2 hazardous areas. In addition, the stainless steel construction, sapphire optics, and modular design all combine to deliver industrial grade hardness along with easy installation.

The Gas Detector shall be capable of detecting hundreds of flammable hydrocarbon gases and vapours. The gas detector shall have performance certified to methane, propane, ethylene, and butane, and is shipped from the factory set and calibrated to one of these gases.

The gas detector shall have below mentioned specifications:

- No undisclosed failure modes.
- Explosion-proof, stainless steel housing with tethered weather protection baffle.
- Integral wiring compartment eliminates need for external junction boxes.
- Built-in tri-colour LED eliminates need for external display module.
- Built-in optional relay package eliminates need for external relay output module.
- Heated sapphire optics deliver long-lasting, high performance detection capability.
- Immune to damage from exposure to constant background gases or to high gas concentrations.
- Factory set and calibrated to methane, propane, ethylene, or butane.
- Alarm Setpoint Range Low Alarm: 5 to 60% LFL / High Alarm: 5 to 60% LFL.
- Accuracy: $\pm 3\%$ from 0 to 50% LFL, $\pm 5\%$ from 51 to 100% LFL.
- Self-Diagnostic Test: All critical tests performed once per second.
- Detector Housing Material: Stainless Steel (316/CF8M Cast)
- Conduit Entry Options: Two entries, 3/4 inch NPT or 25 mm.
- Wiring Terminals: Field wiring screw terminals up to 14 AWG wire, and are DIN/VDE rated for 2.5 mm² wire.

- Temperature Range Operating: -40°C to +75°C (-40°F to +167°F). IP 67 & IP 66
- Storage Temperature :-55°C to +85°C (-67°F to +185°F).
- Humidity: 5 to 95% R.H.
- Detection Range: 0 to 100% LFL standard. Other ranges are configurable.
- Detectable Gases: Most flammable hydrocarbon vapors are detectable. i.e. methane, propane, ethylene, and butane.
- Device Configuration: Configuration parameters include tag number, measurement range, signal processing algorithm, alarm levels, and other selectable parameters.
- FM and CE (including ATEX 94/9/EC) certifications.
- Gas performance verification by FM.
- This product must be suitable for marine applications.
- Any software to program / configure the detector shall be considered.
- The enclosures, junction boxes, glands etc..must be flame proof.

(x) HOOTERS

Explosion proof cum Intrinsically safe hooter. In the main chamber Intrinsically, safe circuit is housed, and it is duly wired up to terminal chamber through sealed bushes. The horn unit is placed on the main chamber cover and the output signals are taken through sealed coils. Neoprene 'O' rings are provided for the weather proof protection.

Mechanical Data

Material : Cast Aluminium LM6
 Weight : 5 Kg (approx.)
 IP Protection : IP65 as per IS 13947/93 (IEC 60529/1989)
 Finish : Anticorrosive Epoxy-Powder Coated
 Cable Entry : 2 x 3/4" ET
 Gasket : Neoprene
 Hardware : Stainless Steel
 Terminals : 4 x 2.5 sq. mm (standard)
 : 6 x 2.5 sq. Mm (for looping)

Electrical Data

Voltage : 24 V DC or 110 V / 230 V AC - 50Hz
 Output Current : 600 mA Peak. Galvanically Isolated
 Power rating : 18 Watts
 Sound Output : 106 db 900 Hz On & OFF alternatively at 1C/S
 Earthing : External: 2 Nos. - M6 Internal : 1 No. - M5
 Type of protection : Flame Proof - Exd T6 IP 65
 Area Classification : Zone 1 & 2
 Gas groups : Group I, II A, II B, IIC
 Apparatus Standard : IS - 2148/2004 (IEC 60079-1/2001)
 CMRI Certificate No. : CMRI / TC / S / H388
 Approvals : CCE, BIS
 Salient Features : Output shall be galvanically isolated.

(xi) **SMOKE DETECTOR**

The testing shall be carried out for each loop / zone, initially one detector in a zone and subsequently 2 or more are disassociated detectors in each zone with time lapse between the detectors to test for Alarm Priority, Alarm Queuing and Call Logging.

An identified detector will be subjected to smoke aspiration from smoke spray cans which give smoke shall be held at 0.3 M distance from the detector.

The FACP should indicate increased analogue output for that address and after the programmed delay time, a fire alarm signal shall be indicated. This delay shall be utilized for alarm verification.

The same test shall be carried out for two detectors in the same Loop but in different rooms. The FACP shall indicate Pre-Alarm higher analogue levels for both detectors in its display with separate identification for both fires. One of the detectors in question be subjected to higher and longer levels of smoke aspiration. The FACP should give priority alarm for this address. The print out shall indicate individual addresses of the detectors with achieved analogue values and the time of event. This test shall be carried out for different

Loops as well as for 2 Loops simultaneously. One detector of each type will be disconnected and subjected to slow dust build - up by means as desired by the Bidder and again connected in the circuit. The FACP shall indicate the changed ambient levels and automatically adjust the analogue values for the same. These Detectors shall then be replaced by new Detectors of identical type and the FACP shall then be programmed accordingly and checked. The Bidder will take custody of the removed detectors without additional cost to the Owner.

(xii) **CONTROL PANELS**

- a) It shall be flame proof, dust and vermin proof, wall mounting type with equipment mounted on a base plate inside, behind a hinged lockable front door.
- b) All components to be complete wired unto terminal block with at least 20% spare terminals and also provided with earthing terminals.
- c) The degree of Protection for enclosure shall be IP - 55 for indoor type and IPW - 56 for outdoor duty. Two control panels shall be provided with canopy to avoid damage during rain.
- d) START Push Button shall be shrouded type in green colour with 1 NO + 1 NC contacts (minimum) or as per final circuit diagram
- e) STOP – Push Button shall be red color and Press to lock and turn to release type.
- f) Name plates with drive description, mechanism number and functional requirement shall be provided.
- g) For non-reversible drive, 2 pin Push Button switch (START & STOP) in control panel shall be provided.
- h) For reversible drive, 3-pin Push Button switch (FOR-REV-STOP) in control panel shall be provided.

(xiii) **JUNCTION BOXES**

The junction boxes shall be dust and vermin proof and made of pressed sheet steel having minimum thickness of 3mm with rubber gasket at all joints and openings. The JB will contain suitable type and number of terminals including 20% spare terminals for terminating cables. Junction box shall be flame proof and weatherproof.

(xiv) **Painting scheme**

Surface preparation: The entire surface of the new pipelines and fittings have to be sand/ shot blasted thoroughly with SA 2 ½ specification to the original surface condition and then be painted as per the following pattern.

No.	Coating	No. of coats	Total DFT
1	Zinc ethyl silicate primer	1 coat	60 - 70µm
2	Epoxy – MIO under coat	1 coat	100 – 110 µm
3	Polysiloxanefinish coat	2 coats	100 – 120 µm
4	Total thickness	4 coats	260 - 300 µm

Specification of coatings:

Zinc ethyl silicate primer

Colour	:	Grey
Finish	:	Matt
Type	:	Two pack
Application	:	By spray (Air or Airless)
Dry film thickness/coat	:	60 – 70 µm
Volume solids	:	60 ± 3%
Surface dry	:	2 hrs.
Hard dry	:	24 hrs.
Recoat ability	:	24 hour
Full cure	:	1 week.
Shelf life	:	9 months

Epoxy – MIO High Build

Colour	:	Dark brown
Finish	:	Matt
Type	:	Two pack
Application	:	Brush or Spray
Pigment (main)	:	Micaceous iron oxide (MIO) 55% w/w of the total pigment.
Type of epoxy	:	condensation products of bisphenol – A and Epichlorohydrin with terminal epoxide group
Epoxide equivalent	:	450-525
Curing agent	:	Polyamide (Amine value 210-230)
Dry film thickness per coat	:	100 – 110 µm
Pot life	:	4 hours
Drying time	:	Surface dry 2 hours
Recoat ability	:	24 hours
Shelf life	:	24 months

Poly Siloxane Finish coat

Colour	:	Post Office Red for fire water lines Yellow for Foam lines
Finish	:	Glossy
Type	:	Two packs
Application	:	By brush or Air/Airless spray

Dry film thickness/coat : 50– 60 µm
 Pot life : 1.5 hour
 Surface dry : 2 hrs.
 Hard dry : 24 hrs.

Sl. No.	Pipe size	Name	Final shade
1	16"	Fire water line	Post Office red background with Crimson red band 100 mm width on every 50 m length
2	8"	Fire water line	Post Office red background with Crimson red band 60 mm width on every 50 m length
3	4"	Fire water line	Post Office red background with Crimson red band 50 mm width on every 50 m length

(xv) Pipe Supports

- a) Pipe supports shall be designed and located to effectively sustain the weight and thermal effects of the piping system and to prevent its vibrations. Location and design of pipe supports shall be shown on the drawings. However, any extra supports desired by the Engineer-in-Charge shall also be provided.
- b) Fabrication shall be done in accordance with IS- 800 Section V & IS: 7275 , erection 12843.
- c) Extra care shall be taken in the correct installation of supports for pumps, etc., according to the specific detailed drawings and supplier's erection instruction/drawings.
- d) No pipe shall be off set unless specifically shown on the drawings.
- e) No direct welding of pipe to the support to be carried out. Rubber or Teflon pad in between pipe and support shall be provided to avoid damage and friction in pipes surface.

(xvi) Specification for Cement Lining

- a) **General:** - This section covers specification and details of materials, operation, tools, plants and labour necessary for the cement mortar lining of fire water pipe lines of 10", 8" and 6" diameters mentioned in the schedule.

b) **Mortar:** - The density of mortar shall be sufficient not to leave any voids so as to achieve water tightness. The thickness of lining shall be uniform 3/8” unless stated otherwise for all fire water pipes.

c) **Materials:**

- i. **Sand:** Sand shall be superior. It shall be clear from salt and other particles and shall conform to IS: 383.
- ii. **Cement:** Cement shall be Portland and Pozzolona (Natural) conforming to IS:1489. Hardened, partially hardened cement, dirty cement etc. shall not be used.
- iii. **Water:** Water for mixing shall be fresh, clear and free from injurious amount of oil, acid, alkali, salt, organic materials etc.
- iv. **Equipments:** Suitable mechanical equipments capable of mixing mortar and doing the lining work to a reasonable degree of uniformity with respect to thickness, density and strength shall be deployed.
- v. **Mortar mix:** Trial mix shall be made to arrive at a mix of cement and sand with strength similar to a minimum of 28 days strength in compression of 200Kg/cm². Testing and sampling shall be done as per IS 6441.
- vi. **Cleaning:** The inner surface of the pipe shall be thoroughly cleaned of rust, dirt, oil, welding splatters etc. using sand / shot blasting.
- vii. **Lining:** Mortar mix shall be placed within 30 minutes after water is added to the mix. Placing of mortar inside the steel pipe shall always be done with care at manufacture’s work site with complete facility for carrying out such work. The concrete shall be consolidating by spinning, vibrating, spinning combined with vibration or other appropriate mechanical means. Mortar lining of any length of pipe shall be continuous and no unfinished surface shall remain exposed for more than 20 minutes. Finished lining shall be free from any honeycombing, cracks and irregularities.
- viii. **Joints, bends** etc. shall be properly lined with cement concrete line by manual applications, toweling etc.

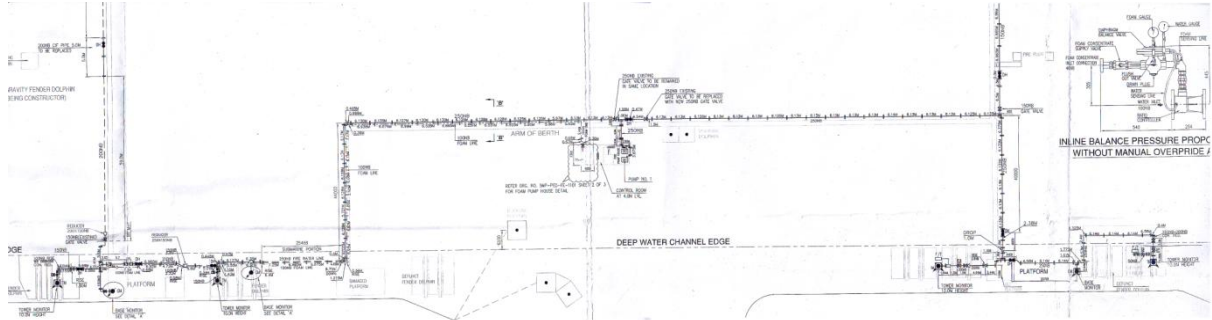
d) **Curing:** Water curing of mortar lining shall be commenced after lining has set. Curing shall be done for 14 days. The mortar shall not be allowed to dehydrate.

SECTION 3. IMPORTANT TERMS AND CONDITIONS:

- (1) **Completion Period:** The entire work as per the Scope of Work shall be satisfactorily completed within 6 months from the date of receipt of CoPT's work order.
- (2) **Guarantee:** All the Works carried out by the Contractor as per the Scope of Work shall be guaranteed for a period of one year from the date of satisfactory completion/ acceptance of work by the Employer.
- (3) **Payment Terms:**
 - (a) **Supply Portion :** 60 % of invoice value of items shall be paid on receipt of materials at CoPT premises in good condition duly certified by TPIA subject to a maximum of three instalments, against submission of bank guarantee for equivalent amount. Maximum amount payable against supply of materials will be limited to 40% of total contract price.
 - (b) **Installation -**40% of the total contract price shall be paid on completion of erection of all the items at site duly certified by TPIA .
 - (c) **Balance Payment** will be made after satisfactory commissioning of the entire fire fighting system duly certified by TPIA.

SECTION-4- LAY OUT

LAY OUT OF THE EXISTING FIRE FIGHTING FACILITIES AT NTB-STB



NTB BERTH

STB BERTH