

**SCOPE OF WORK  
&  
JOB SPECIFICATIONS  
(INSTRUMENTATION)**

**TENDER FOR  
UPGRADATION OF FIRE FIGHTING FACILITIES  
OF NTB & STB TERMINAL AT COCHIN PORT**

**PROJECT : CONSULTANCY SERVICES FOR THE WORK OF  
UPGRADATION OF FIRE FIGHTING FACILITIES OF  
TANKER TERMINALS AT COCHIN PORT**

**OWNER : COCHIN PORT AUTHORITY (CoPA)**

**JOB NO. : C044**

**TENDER NO : C044-111-83-44-FP-T-9501**

B	12.01.2026	ISSUED WITH TENDER	BB	SA	SA
A	13.05.2025	ISSUED WITH TENDER	BB	SA	SA
Rev. No	Date	Purpose	Prepared by	Checked by	Approved by

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## 1.0 SCOPE

S.No.	DESCRIPTION	Contractor	Purchaser
1.0	<b>Scope</b>		
1.1	<b>Scope of Design &amp; Engineering</b>		
	Design and detailed engineering of instrumentation & controls for firefighting system in NTB terminal based on P&ID's and other technical requirements described in various documents attached with Tender. (Note-H)  This shall include detailed engineering including preparation of engineering drawings/ documents, specification data sheets, sizing, selection of materials, review of vendor drawings / documents for all supply items.		
1.1.1	All type of field instruments including Level transmitters, level gauges, flame arresters, pressure transmitters, differential pressure transmitters, orifice plates, pressure gauge, gas detectors, and flame detectors etc. for firefighting system in NTB as per approved P&IDs and any other instruments required to complete the job in all respect.	Yes	
1.1.2	Local Panels for Fire Water Pumps	Yes	
1.1.3	Programmable Logic Controller		
	Dedicated Fire water PLC system located at Control room for both NTB and STB. All engineering and engineering documents required for implementation of control of Fire Fighting System (for fire water pumps and fire water header & associated facilities) at NTB in contractor supplied PLC shall be in contractor scope (e.g. IO List, IO Point Data base, Interlocks & Logic Diagrams, cable schedule, functional schematic etc.). For STB all the necessary hardware shall be provided by contractor for the required I/Os, as per the P&IDs, further engineering shall be done by Purchaser later.	Yes	
1.1.4	Statutory Approvals and Certificates e.g. PESO, CCOE wherever applicable	Yes	
1.2	<b>Scope of procurement/ supply</b>		
1.2.1	Supply of all items related to instrumentation for firefighting system in NTB as indicated in final approved P&IDs and other documents attached elsewhere in Tender. The scope of supply shall include but not limited to following:	Yes	
1.2.2	All type of field instruments including Level transmitters, DP transmitters, level gauges, orifice plates, flame arresters, pressure transmitters, pressure gauge, gas detectors,	Yes	

	flame detectors, etc. for firefighting system in NTB and all instruments indicated in the attached P&ID and any other instruments required to complete the job in all respects.		
1.2.3	All instruments as per final approved P&IDs, Local control panels for Fire Water Pumps with all indicating lamps, loop powered indicators and accessories duly wired and mounted in the panel. Local Panel mounted signals/instruments for existing pumps and other facilities as shown in final approved P&ID, shall be considered in the above mentioned panel. For scope detail related to dismantling of existing item / instrument of existing pump, refer details as mentioned in P&ID and elsewhere in Tender documents.	Yes	
1.2.4	Programmable Logic Controller (PLC) System For Fire Fighting System in NTB and STB located in Control room Factory Acceptance Test for PLC.	Yes	
1.2.6	Junction boxes along with all glands (Alarms, signals & power) for interconnection between field and control room <b>(Note-C)</b> .	Yes	
1.2.7	<b>Cables (signal, alarm, control / shutdown, power supply) (Note-B)</b>		
1.2.7.1	Single pair cables for interconnecting all instruments supplied by Contractor to Junction Boxes and Local control panels.	Yes	
1.2.7.2	Multi pair cables from interconnecting Junction Boxes and Local control panels in field to contractor supplied PLC in Control room. <b>(Note-A)</b> .	Yes	
1.2.7.3	Power cables from UPS ACDB to PDB in control room.	Yes	
1.2.7.4	Any special cables(as applicable) between contractor supplied items/instruments/local panel/JBs to control room.	Yes	
1.2.7.5	Power cables for further distribution from PDB in control room to contractor supplied equipments/instruments/local panels <b>(Note-C)</b>	Yes	
1.2.8	<b>Installation Material</b>		
1.2.8.1	All installation material required for installation of Contractor supplied instruments like Level transmitters, level gauges, flame arresters, pressure transmitters, DP transmitters, pressure gauge, orifice plates, gas detectors, fire detectors etc. as per approved P&IDs, local panel, and junction boxes.	Yes	
1.2.8.1a	All installation and erection materials such as impulse tubes, pipes, valves, manifolds and fittings, all types of consumables for all contractor supplied items	Yes	
1.2.8.1b	Instrument stanchions, supports and all types	Yes	

	of consumables and accessories & installation material for mounting all contractor supplied instruments and accessories, junction boxes, local panel		
1.2.8.2	Cable glands and PVC sleeves (cable shrouds), plugs for different types of cables (single pair and Multi-pair) in Junction Boxes.	Yes	
1.2.8.3	Cable glands / plugs and PVC sleeves (cable shrouds), duly installed with contractor supplied instruments.	Yes	
1.2.8.4	Cable trays, perforated tray, angle tray, structural supports, consumables from instruments to junction box	Yes	
1.2.8.4	Cable trays, perforated tray, angle tray, structural supports, PVC sleeves, other consumables from junction boxes/LCP to control room	Yes	
1.2.8.5	Cable trays structural supports, consumables within control room	Yes	
1.2.8.6	All materials for Fireproofing of cable trays carrying multi-cables	Yes	
1.2.8.7	GI/ copper earthing strip, earthing lugs, cables for earthing of all instrumentation items including junction boxes, field instruments, local panels	Yes	
1.2.8.8a	Copper earthing wire, earthing lugs in Contractors supplied panels / cabinets/ console in control room to earth pit system.	Yes	
1.2.8.8b	Earth pit for panel earth (e.g. for contractor supplied panels/consolas) and Earth pit for system earth (<1 ohm) for contractor supplied PLC. General earthing for instruments, equipments, purchaser supplied panels, Contractor supplied panels, other systems etc.	Yes	
1.2.8.9	FRP Canopies(covered from all sides) for field mounted electronic / electrical instruments, junction box, local panel	Yes	
1.2.8.10	All piping and pipe fittings, tubes and tube fittings for instrument air supply distribution (wherever applicable) for instruments supplied by Contractor.	Yes	
1.2.8.11	Insulation and painting of instruments and impulse lines, as applicable, in line with insulation and painting specifications attached elsewhere in tender	Yes	
1.2.8.12	Any other installation material required for installation and commissioning of various instruments and systems supplied by Contractor	Yes	
1.2.9	Mandatory Spares	Yes	
1.2.10	Commissioning spares	Yes	
1.2.11	Two year operation and maintenance spares	Yes	

	<b>(to be quoted separately)</b>		
1.2.12	Any special tools or tackles required for instrumentation supplied by Contractor.	Yes	
1.2.13	Drawings and documents as listed in Vendor Data Requirement	Yes	
1.2.14	Any additional instrument required in the opinion of contractor for meeting functional requirements, safe and efficient operation, which is not listed specifically in this document.	Yes	
1.3	<b>Installation, field calibration/ testing and commissioning</b>		
1.3.1	Installation of all contractor supplied instruments & accessories, junction boxes and cable trays.	Yes	
1.3.2	Installation of Panels (Note-G)		
1.3.2a	Local Panels supplied by contractors	Yes	
1.3.2b	PLC panels and consoles supplied by contractor in control room.	Yes	
1.3.3	Laying & Termination of Cables		
1.3.3a	Laying & termination of all contractor supplied single pair cables (from instruments to junction boxes/Local control panels) at NTB.	Yes	
1.3.3b	Laying & termination of multi-cables from contractor supplied junction boxes & Local panels in field to Control room (for NTB).	Yes	
1.3.3c	Laying & termination of signal cables and other special cables within control room.	Yes	
1.3.3d	Preparation of cable layout as per the site conditions.	Yes	
1.3.4	Instrument cable trays, perforated tray, angle tray, at field and inside control room for all field instruments /cabinets/consoles	Yes	
1.3.5	Installation of instrument impulse piping/tubing for contractor supplied instruments.	Yes	
1.3.6	Preparation of Fire & Gas detector layout	Yes	
1.3.7	Painting of all supports, impulse lines, tag no painting for instrument/JB in line with painting specifications attached elsewhere in tender documents.	Yes	
1.3.8	SS Identification tag with JB No for multipair/trunk cable at every 10 meters interval even in tray/duct.	Yes	
1.3.9	Carrying out/ witnessing shop testing and calibration of all instruments, junction boxes and local panels as per approved Inspection Test Plan.	Yes	
1.3.10	Loop Checking from all Field Instruments to Control System-	Yes	
1.3.11	Graphics Check, Control Loop Schematics Check, Logic Check during Pre-Commissioning, Commissioning and Site Acceptance Test (SAT).	Yes	

1.3.12	Pre-Commissioning & Commissioning of all Field Instruments, LCP, Control System	Yes(Note-F)	
1.3.13	Site Acceptance Testing (SAT) for complete instrumentation fully integrated as per tender requirements	Yes	
1.3.14	Coordination with <ul style="list-style-type: none"> <li>• Owner/ purchaser,</li> <li>• PLC vendor,</li> </ul>	Yes	
1.3.15	All instruments, junction boxes & Local Panels shall be inspected by Third party inspection agency (TPIA) as per attached Inspection Test Plan for instruments/items. Items/Instruments for which ITP is not attached with tender, contractor shall develop Inspection and Test Plan (with minimum testing requirements as per attached standard specifications) and shall submit the same for purchaser's approval.	Yes	
1.4	<b>Training</b> Training for contractor supplied PLC system	Yes	
1.5	<b>Warranty</b> Warranty for instrumentation items, shall be as per commercial section attached elsewhere	Yes	
1.6	<b>Comprehensive Post warranty annual maintenance contract(CPWAMC): (proposal)</b> Proposal for 3 years comprehensive post warranty annual maintenance contract for PLC system shall be furnished. Price for each year shall be given separately. CPWAMC shall be awarded separately by owner before expiry of warranty/guarantee period. However, Contractor to note that the price for CPWAMC shall be considered for evaluation	Yes	
1.7	Storage and loading/ unloading/ transport at site of Instruments/Equipments for Contractor supplied items.	Yes	

	<p><b>Notes:</b></p> <p><b>A.</b> Glanding and termination of the multi-cables at contractor supplied junction boxes/local panel / PLC Panels shall be in contractor's scope. Approx. distance to be considered between junction boxes and Control room for multi-cables shall be approximately 400m (however contractor to also verify the same).</p> <p><b>B.</b> Contractor to note that for all multi-cables 12/6 pair or 8 Triad cables, contractor shall prepare cable/JB schedule and select cable entries accordingly.</p> <p><b>C.</b> For 230V AC UPS power supply (in contractor's scope), Electrical section of the tender to be referred. However, power distribution to contractor supplied PLC, local panel/instruments and derivation to any other voltage (if required) shall be in contractor's scope.</p> <p><b>D.</b> Power Cable required from UPS ACDB to all bidder supplied items like Local Panels and PLC shall be in Contractor scope of supply including laying, glanding and termination.</p> <p><b>E.</b> For Power distribution, flameproof isolation switches for each feeder shall be provided in the distribution JB/panel.</p> <p><b>F.</b> All field related activities involved during pre-commissioning and commissioning including instrument re-calibration, valve stroke checking during logic checks, complex loop checks etc. per the instruction of CoPA/EIL shall be in the scope of Contractor.</p> <p><b>G.</b> It shall be Contractor's responsibility to conduct a site survey (both before and after job award). Contractor shall verify the space availability in the control room for the required no. of panels &amp; consoles of the PLC system and space allocation shall be done as per Purchaser's approval. Also, any modifications required inside the control room for the installation of the Panels/consoles of the PLC system shall be done by Contractor. Also dismantling of any existing panels/consoles/any other item within control room as required by owner shall be in contractor's scope.</p> <p><b>H.</b> "CoPA shall not execute the works associated with STB at present time. Works related to NTB only to be considered in this present tender. All details documents in this scope of work &amp; all other documents/ drawing forming part of tender document shall be read accordingly."</p>	
2.0	<b>JOB SPECIFICATION</b>	
2.1	<b>GENERAL</b>	
2.1.1	Location of field equipments/ instruments	Hazardous area
2.1.2	Area classification	Refer Electrical section. All instruments supplied shall be suitable for Zone-1, Gas Group IIC, T3.
2.1.3	Operational requirements	Local panel and PLC in Control Room
2.1.4	Type of interlock & shutdown system	Programmable Logic Controller
2.1.5	Type of instrumentation	Electronic
2.1.6	Logic representation	ISA
2.1.7	Order of priority in case of any conflict between Tender documents	<p>In the event of any conflict between this specification, data sheets(as applicable), standard specifications, related standards, codes etc: the following order of priority shall govern:</p> <ol style="list-style-type: none"> <li>Statutory Regulations</li> <li>Job Specifications</li> <li>Codes &amp; Standards</li> <li>Standard specifications</li> </ol> <p>However, Contractor shall inform EIL/owner for any discrepancy for</p>

		resolution before proceeding.
2.2	<b>TYPE &amp; LOCATION OF CONTROLS &amp; INSTRUMENTS</b>	
2.2.1	Type of control system (For monitoring and control)	<b>Programmable logic Controller (PLC) (Contractor Scope of Supply) to be installed in control room.</b>
2.2.2	Type of control system (For Interlock & shutdown)	
2.2.3	Process instrument type for alarm / shutdown	Transmitter (Switch action soft generated through control system. Process switches shall not be used).
2.2.4	Start/ Stop, Auto/ Manual, Local/ Remote commands for all electrical drives from local control stations in field	Shall be directly wired to MCC.
2.2.5	Status signals of drives from MCC	Shall be wired to marshalling cabinet/interface cabinet in Control room
2.2.6	Ingress protection for instruments and enclosures in field.	Weatherproof to IP67 as a minimum. (However, if for any instruments/other items IP67 is not available as manufacturing standard/design than bidder can propose IP65/66 protection for Purchaser's approval on case to case basis during detailed engineering.)
2.2.7	<b>Transmitters</b>	
2.2.7.1	Monitoring and Control loops	Smart type with HART protocol
2.2.7.2	Interlock and shutdown system loops	Smart type with HART protocol
2.2.7.3	Integral LCD type output meter	Required (Display output in user configurable engineering units) with each transmitter.
2.2.7.4	Transmitter accuracy (PT, DP LT)	As given below (Accuracy is defined below as combined effect of repeatability, linearity and hysteresis).
a)	For ranges of $\geq 760$ mm WC	$\pm 0.065\%$ within a turndown of 1:10 of the offered span
b)	For ranges $< 760$ mm WC	$\pm 0.15\%$ within a turndown of 1:10 of the offered span
c)	Diaphragm seal type with ranges $\geq 500$ mm WC	$\pm 0.25\%$ within a turndown of 1:10 of the offered span
d)	Diaphragm seal type with ranges $< 500$ mm WC	$\pm 0.5\%$ within a turndown of 1:10 of the offered span
2.2.7.5	The over-range/static pressure protection of the transmitter shall be 130% of maximum operating range.	
2.2.8	Level transmitters	<b>As per P&amp;ID/ process datasheet.</b> If not specified, selection of Level transmitters shall be based on guidelines given below:
2.2.8.1	Level up to 1500 mm except for services requiring purge or where liquid might boil	Generally Guided Wave Radar type
2.2.8.2	Interface applications	Guided Wave Radar type
2.2.8.3	Level above 1500 mm and for services requiring purge, or where liquid might boil	Differential pressure type

2.2.8.4	<p>Specification for Level Transmitters :</p> <p>A) Guided Wave Radar Type Level Transmitter :</p> <p>(i) The transmitter shall be 24V DC two-wire SMART type with HART protocol as specified in Job Specification. The Guided Wave Radar Type Level instruments shall be used for level measurement up-to 1500mm as specified above. The Guided Wave Radar level transmitter shall work on the principle of Time Domain Reflectometry and shall be capable of measuring level of process fluid of dielectric constant as low as 1.8.</p> <p>(ii) The type of wave guide i.e, coaxial/twin rod/single rod shall be selected by the Contractor based on the specified application.</p> <p>(iii) The instrument probe length shall be selected based on the minimum and maximum levels to be measured.</p> <p>(iv) Unless otherwise specified, external mounted probe type of instrument shall be supplied complete with chamber with 2" flanged end connection. The chamber shall have 3/4" NPT vent and drain connection for pressure rating upto 600# and 3/4" flanged vent and drain connection for pressure rating greater than 600#.</p> <p>(v) The instrument shall meet the following performance requirement:</p> <p>a) The accuracy including linearity, repeatability and hysteresis shall be better than +/- 3 mm.</p> <p>b) The repeatability of level instrument shall be better than +/-3 mm.</p> <p>c) The response time (i.e., 63.2% response) shall be better than 1 second.</p> <p>B) Radar (Antenna) Level Transmitter:</p> <p>i. Transmitter output shall be 4-20 mA. Process flange connection shall be as per EIL standard 7-52-0001 and installation shall be on top of tank along with still well. Ball valve shall be considered for isolation purpose. Radar level gauges with built-in full bore ball valve, duly pressure tested assembly along with antenna flange is also acceptable.</p> <p>ii. Accuracy: +-3 mm.</p> <p>iii. Power supply shall be 230V AC, ±10%, 50Hz ±3% UPS. Enclosure shall be IP-65 and flame proof type (Ex'd').</p> <p>C) Differential Pressure Transmitter:</p> <p>i) The transmitter shall be 24V DC two-wire SMART type with HART protocol as specified in Job Specification. Differential Pressure transmitters shall be used for level measurement above 1500mm or as specified above. Transmitter shall be intrinsically safe.</p>
2.2.8.5	<p>Specification for Level Gauges:</p> <p>(i) Unless specified in P&amp;ID and Process datasheet, Gauge glasses shall be steel armoured reflex or transparent type with body and cover material of forged carbon steel as a minimum and shall have tempered borosilicate glass with asbestos or other suitable gasket. Transparent type of gauges shall be provided with integral illuminators operating at 230 V 50 Hz supply. All gauge glasses must have a rating equal to or more than the vessel design pressure and temperature.</p> <p>(ii) Reflex type will be used for clean and colourless liquids, except liquids level interface. For low temperature, low boiling point service, large chamber type will be used. Transparent type will be used for acid, caustic, dirty or viscous, coloured liquids and liquid interface. Transparent type with Mica or Kel-F shields shall be used for treated water, boiler, and condensate services and for corrosive liquids which can attack glass. Tubular gauge glasses shall not be used, in general.</p>

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	<p>(iii) Large chamber gauges with frost shields shall be provided for cold services below 0 degC. Heating jacket shall be provided for viscous liquids.</p> <p>(iv) All gauges shall have top and bottom chamber connections, unless otherwise specified. In addition each gauge shall be provided with ball check valves and spherical union.</p> <p>(v) The visible range of level gauge shall be selected to cover the complete operating level as well as measuring range of the other level instruments provided for the same purpose. In general, the visible length of the level gauges shall be selected from the following standard lengths:</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Visible length (mm)</th> <th>Centre to Centre Length (mm)</th> </tr> </thead> <tbody> <tr> <td>220</td> <td>470</td> </tr> <tr> <td>470</td> <td>720</td> </tr> <tr> <td>720</td> <td>970</td> </tr> <tr> <td>980</td> <td>1230</td> </tr> </tbody> </table> <p>In any case, the maximum visibility length shall not exceed 1500 mm for a single gauge.</p> <p>(vi) Gauge glass cocks shall be forged off-set type with an integral ball check and back seating stem. Primary isolation valves are normally required in addition to the gauge glass cocks, except on vented tanks containing harmless liquids. Where the process fluid tends to foul the cocks internals and create plugging or where leakage is a problem, gauge valve may be eliminated. On low temperature service with liquids having very high vapour pressure at ambient temperature safety valve shall be provided at the vent connection of the gauge glass.</p> <p>(vii) For level gauging in very viscous liquids and liquids with crystals, float operated magnetic gauges with 2" (50 mm) flanged end connections, shall be provided.</p>	Visible length (mm)	Centre to Centre Length (mm)	220	470	470	720	720	970	980	1230
Visible length (mm)	Centre to Centre Length (mm)										
220	470										
470	720										
720	970										
980	1230										
2.2.9	<p><b>Pressure Gauge</b></p> <p>a) Pressure gauges shall be weatherproof with dial size of 150 mm and shall have features like screwed bezels, externally adjustable zero, over range protection (at least 130% of max. operating pressure), blowout discs and Shatter proof glass window. Pressure gauge sensing element shall be of SS 316 and movement &amp; Case of SS 304, as a minimum.</p> <p>b) Pressure gauge dial shall be white, non-rusting plastic with black figures. The dial face shall be marked with pressure element material. Pointers shall have micrometer adjustment.</p> <p>c) Pressure gauge shall have 1/2" NPT (M) bottom connection.</p> <p>d) Pressure gauge shall have an accuracy of <math>\pm 1\%</math> of URV (Upper Range Value).</p> <p>e) Ranges shall be so specified that the gauge normally operates in the middle third of the scale and shall conform to IS-3624 standard dials, wherever possible. Pressure gauge with design pressure more than 130% of range shall be provided with Gauge saver.</p> <p>f) Diaphragm seals, filled type or mechanical type shall be provided where plugging of the element may occur or where suitable material is not available in highly corrosive services. When chemical seals are required, they shall be of the clean out type with flushing connection.</p> <p>g) Pressure gauges shall be weather proof to IP-65 as per IEC-60529/IS-2147 as a <u>minimum</u>.</p>										

2.2.10	<p>Pressure Transmitter</p> <p>a) Pressure transmitter shall have electronic state-of-art capacitance or any other type of sensor meeting all functional specifications. Body &amp; Element material for transmitters shall be SS316, as a minimum, and shall be able to withstand over pressure of at least 130% of range or maximum working pressure whichever is higher.</p> <p>b) All transmitters shall have an integral output meter. Remote mounted meters may be provided if required in addition.</p> <p>c) Threaded end connections shall be NPT as per ANSI B 1.20.1. Flanged end connections shall be as per ANSI B 16.5.</p> <p>d) Transmitters shall also meet the requirements specified in clause no. 2.2.7 as applicable</p>
2.2.11	<p>Solenoid Valve</p> <p>Solenoid Valve shall be intrinsically safe (24V DC operated) with class "H" coil Insulation. SOV body &amp; trim material shall be SS 316. Cable entry shall be ½"NPT.</p>
2.2.12	<p>Orifice Flow meter</p> <p>As per attached standard specification 6-52-0052</p>
2.2.13	<p>Flame arrestors</p> <p>As per attached standard specification 6-52-0025</p>
2.2.14	<p>Gas Detector</p> <p>HC detector shall be point IR type. Open path type shall be considered if there is requirement for the same from process. H2 Detectors shall be Catalytic diffusion type. H2S detectors shall be electrochemical type. All detector shall be 3 wire having 4-20mA output with HART signal. Transmitter shall be with integral LCD display. Also refer standard specification 6-52-0080.</p> <p>(Note:-Contractor shall prepare Gas and Fire detector layout for Owner's review and only after obtaining owner's approval on the same contractor shall proceed further.)</p>
2.2.15	<p>Fire Detector</p> <p>Fire detectors shall be Triple IR (Multispectrum) type. All detector shall be 3 wire having 4-20mA output with HART signal. Transmitter shall be with integral LCD display. Detectors shall incorporate smart microprocessor calibration and fault diagnostic features. Calibration shall be non-intrusive, i.e., may be performed without opening the sensor/transmitter enclosure. The device shall not be sensitive to arc welding, X - Rays and hot surfaces. Also refer standard specification 6-52-0081.</p> <p>(Note:-Contractor shall prepare Gas and Fire detector layout for Owner's review and only after obtaining owner's approval on the same contractor shall proceed further.)</p>
2.2.16	<p>All the make/ model nos. of Smart transmitters offered by Contractor shall be suitable for calibration with Universal type Hand held Configurator( 1 no. to be supplied by Contractor). In case the offered instruments cannot be calibrated with Universal type Hand held Configurator, contractor shall supply suitable configurator (Intrinsically safe with battery charger) of each type for configuration of the instrument.</p>
2.2.17	<p>Terminal blocks</p> <p>Internal terminal block for all instruments, anti-vibration type, suitable for terminating a minimum of 1.5 mm<sup>2</sup> size cable conductors. Flying leads are not acceptable.</p>

2.2.18	Terminals	Screw less clamp type
2.2.19	IBR, H2 service testing requirements and any other special testing	Required, wherever applicable as per PMS attached elsewhere in Tender.
2.2.20	SS Tag plate	Required for all instruments, gauge boards, and local panel.
2.2.21	Threaded end connections for instruments shall be to NPT as per ANSI B 1.20.1. Flanged end connections shall be as per ANSI B 16.5. All flanges and flanged valves shall have smooth surface finish (125 – 250 AARH) as per ASME B46.1.	
2.3	<b>LOCAL PANEL REQUIREMENT :</b>	
A)	1) The Local control panel for Fire water system to be located in pump house shall have following hardware as minimum.  i) Lamps for Pump Motor Running indication: For all Jockey and main pumps of fire water system  ii) Lamps for Process alarm indication: For Diesel day tank level, fire water tank level, fire water network pressure.  iii) Loop powered indicator: For fire water tank level, fire water network flow.  Actual nos of hardware and tag nos. of the same shall be as per final approved P&ID attached with tender.	
B)	The panel shall be completely pre-wired tested & ready for commissioning Loop powered indicators shall be weatherproof to IP 65. Purchaser shall provide potential free contact (Same shall be rated for 24V DC supply).	
C)	Construction details	Free standing structure
D)	Enclosure	Weatherproof to IP55
E)	Material for all hinges, screws and other non painted metallic parts	Stainless steel
F)	Cable entry	Bottom
G)	Incoming switch & fuse	Required
H)	Power indication on panel front	Required
I)	Lamp test facility	Required
J)	Installed spare	Contractor shall provide 20% spare lamps, terminals in local control panels.

	<ol style="list-style-type: none"> <li>1. Vendor shall fabricate the panel preferably from 3 mm thick cold rolled steel sheet. If the same is not available, 4 mm thick hot rolled steel sheet shall be used. Angle iron frame work shall use a minimum section of 50 x 50 x 4 mm angle.</li> <li>2. Vendor shall follow following color scheme             <ol style="list-style-type: none"> <li>a) Status Lamps for Motor Run Indication : Green</li> <li>b) Status Lamps for Process Alarms : Red</li> <li>c) Push buttons Test: Blue Acknowledge: Yellow Reset: Green</li> </ol> </li> <li>3. Panel layout shall be designed considering ease of operation. No push button / switch shall be located below 600 mm. No instrument, terminals, power distribution box etc shall be mounted on the panel side plates inside the panel. Instrument Mounting heights, in general, shall be as follows:             <ol style="list-style-type: none"> <li>a) Miniature instruments: 1350mm</li> <li>b) Annunciator: 1950 mm</li> <li>c) Electric push buttons/ Switches, lamps etc.: 700 mm</li> </ol> </li> <li>4. Local control panel/panels shall be totally enclosed cubicles with open back type. Panel sizing shall be carried out based on equipment being installed keeping in view the maintenance clearances and easiness. Although the panel dimensions shall be guided by the actual requirements, typical dimensions of 2100 mm operational (height) x 1200 mm (width) x 1000 mm (depth) shall be kept in mind while finalizing the panel size. In any case, vendor shall not proceed with panel manufacturing before getting prior approval from the purchaser.</li> <li>5. All cable entries to the local panel shall be from panel bottom only using cable glands of adequate size. Cable gland plate thickness shall be a minimum of 3 mm cold rolled cold annealed (CRCA) as a minimum. All unused cable entries must be plugged. All hinges, screws and other non-painted metallic parts shall be of stainless steel material. Cable glands for all incoming/outgoing cables shall be provided by vendor.</li> <li>6. The finish shall include sand blasting, grinding, chemical cleaning, surface finishing by suitable filler and two coats of high grade lacquer with wet sanding between coats. Two coats of paint in panel colour shall be given for non-glossy high stain finish. Panel colour inside and outside shall be decided during detail engineering.</li> <li>7. <u>Panel Wiring</u> Terminal strips shall preferably be mounted in an enclosure. Fused terminal shall be used wherever necessary. A minimum of 1 mm multi stranded PVC insulated copper conductor shall be used in general. All wiring shall be laid in the PVC troughs and separate trough shall be used for power signal etc. No trough shall be more than 70% full. Power wiring and control wiring shall be separated by not less than 150 mm. Intrinsically safe wiring and terminals shall be light blue in colour and shall be separated from non-intrinsically safe terminals at least by 50 mm.</li> </ol>
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	<p>All incoming power feeders shall be terminated on separate terminals suitable for the incoming feeder size. These shall be located at the bottom of the panel and shall be suitably covered for protection against accidental shorting and for human safety</p> <p>Following design philosophy shall be followed while deciding the internal layout of panels, as a minimum:-</p> <p>a) Distance between terminal strip &amp; side of the panel upto 50 terminals width: 100mm (min.)+ trough b) Distance between two adjacent terminal strips width: 100 mm (min.)+trough c) Distance between gland plate and bottom of the strip: 300 mm (min.) d) Distance of terminal strip from instrument/trough/panel top: 100 mm (min.)</p> <p>8. 230 VAC UPS and 240 VAC (Non-UPS) power supply within the panel and derivation to any other power level required shall be carried out by vendor.</p> <p>9. The design of control panel shall incorporate provision for expansion by installing adequate spare capacity. Each panel shall be designed to accommodate the following additional equipment, as a minimum;</p> <p>a) 20% of panel front/inside mounted instruments including lamps, push buttons, switches, relays etc. b) 20% additional power feeders each provided with switch fuse assembly. c) 20% spare cable entry points.</p>
2.4	<p>Certification for use in hazardous area shall be as follows:</p> <p>i. For all electrical items manufactured in India, the testing shall be carried out &amp; test report issued by Indian test laboratory recognized by the Chief Controller of Explosives and valid copy of BIS license (only for Ex Electric Apparatus having flameproof type protection) or IECEx Certificate of Conformity, valid copy of IECEx Quality Assessment Report (summary) and IECEx Test Report.</p> <p>ii. For all electrical items manufactured outside India, Test report issued by Indian test laboratory recognized by the Chief Controller of Explosives and valid copy of BIS license or IECEx Certificate of Conformity, valid copy of IECEx Quality Assessment Report (summary) and IECEx Test Report or EU Type Examination Certificate (Applicable for manufacturers having manufacturing locations in countries covered under the European Union), valid copy of Production Quality Assessment / Assurance Notification.</p> <p>iii. For installations in India, additionally a copy of approval for intrinsically safe/flameproof enclosure from local statutory authority i.e 'Petroleum and Explosives Safety Organization (PESO), Nagpur in India' shall also be provided based on above.</p>
2.5	<b>PROGRAMMABLE LOGIC CONTROLLER SYSTEM(Control room)</b>

2.5.1	Vendor to provide a PLC based control system for control, monitoring, permissive sequence and controls, interlocks and shutdown. Vendor shall supply DMR (dual modular redundant) PLC for monitoring and control and of the Fire Water Pump Package. All I/O cards, processor modules of the PLC shall have conformal coating (G3 or equivalent) to suit the environmental conditions. In general PLC specifications shall be as per standard specification 6-52-0040. PLC shall be common for both NTB & STB.	
2.5.2	PLC Make	As per EIL vendor list.
2.5.3	Location	Control room
2.5.4	PLC functional requirements	Interlock logics, control algorithms (if any), sequence of events (SOE), and dynamic graphics.
2.5.5	PLC configuration	Dual redundant type with following components, as a minimum, being dual redundant: 1. Processors, 2. Communication processors / modules, 3. Power supplies, 4. All input and output electronic cards and modules, 5. Serial interface modules 6. SIL-3 certified
2.5.6	Diagnostic Facility	System diagnostics shall be provided which shall include sensor out of range, open or shorted loops, checking the compatibility and availability of I/O hardware and software, memory diagnostics, availability and fault of power supplies etc.
2.5.7	PLC panels / cabinets	Marshalling cabinets, system cabinets, barrier, power supply distribution, cabinets for the signals connected with the vendor supplied PLC system shall be supplied by the Vendor of (All cabinets shall be with dimensions of 800mm x 800mm x 2100mm) for installing in Control room.
2.5.8	Consoles	Two (2) nos. operator cum engineering console along with the necessary software required for configuration, monitoring the system shall be supplied by the contractor. The interconnecting cables between consoles and PLC shall be supplied by contractor.

2.5.9	Console specifications	The PLC consoles shall have the latest hardware, software and operating system specifications (LED screen size of 21", password protected DVD reader and writer, keyboard, optical mouse, all software driver discs, Ethernet card with ports, serial and parallel ports, sound card, graphics card, PCI slots, etc as a minimum)
2.5.10	Printer	One no color laser A3 printer connected to the package's operator cum engineering console shall be provided by contractor.
2.5.11	Isolated Output	Shall be provided wherever repeat signals are required.
2.5.12	Interposing Relays	Shall be provided for all MCC interface and field switches (if applicable).
2.5.13	PLC wiring	All inputs and output wiring shall be double ended upto the I/O card, i.e. there shall be two wires for each input and output and there shall not be any common return / looping for multiple inputs / outputs.
2.5.16	Scan time	250 msec as a minimum. In case faster scan time is required for any equipment in vendor's scope; vendor shall provide faster scan time.
2.5.17	Loading philosophy	Processor: Not exceeding 50% Communication processor and bus: Not exceeding 30% Bulk power supply: Loading not exceeding 50% in worst case.
2.5.18	Interlock & shutdown scheme	Vendor shall provide the interlock and shutdown scheme complete for package as will be incorporated in the PLC in the form of: a) Logic diagram as per ISA S 5.2 b) Logic write-ups including Sequence of start-up, shutdown & normal operation for purchaser's information.
2.5.19	Factory Acceptance Test by Vendor's authorized representatives, Purchaser, unless specified otherwise in PLC Vendor Premises	
2.5.20	Site Acceptance Test at site by Vendor's authorized representatives, PLC Vendor, Purchaser, unless specified otherwise.	
3.0	<b>POWER SUPPLY REQUIREMENT</b>	
3.1	Control system	230 V AC 50 Hz UPS
3.2	Interlock & shutdown system	230 V AC 50 Hz UPS
3.3	Transmitters (loop powered)	24 V DC
3.4	Level Gauge	240 V AC 50 Hz (Non- UPS)

	<p>Note-2 (i) Power (UPS and Non-UPS) distribution to contractor supplied PLC, local panel/instruments and derivation to any other voltage (if required) shall be in contractor's scope. Power Cable required for all bidder's supplied equipments like Local Panels and PLC shall be in Contractor scope of supply including laying, glanding and termination. For Power distribution flameproof isolation switches for each feeder shall be provided in the distribution JB/panel. (ii) Contractor shall provide power feeder(s) for 240 V AC Non UPS for Local control Panel. Further distribution of same to various Contractor supplied cabinets in field and any other equipment supplied by Contractor shall also be carried out by Contractor. (iii) Contractor shall indicate estimated power consumption for 230 V AC (UPS) &amp; 240 V AC (Non-UPS) along with bid. iv) Suitable cable terminals shall be provided by contractor for termination of purchaser's power cables.</p>	
4.0	<b>CABLES &amp; CABLE GLANDS</b>	
4.1	Type (single pair as well as multipair)	1.5 mm <sup>2</sup> twisted in pair individually and overall shielded with aluminium Mylar tape with drain wire and armoured. Triad cables shall be used for RTDs and Gas detectors.
4.2	Power supply cable to field instruments	Minimum 2.5 mm <sup>2</sup> armoured.
4.3	Flame retardant and Low Smoke	Required, flame retardant as per IEC 60332 Cat. A.
4.4	Cable glands	Nickle Plated Brass, double compression type suitable for armoured cables. All cable glands shall be Exd (both JB and Instrument side) irrespective of the area classification. All plug shall be of SS (min SS304), EXd type at spare cable entry to instruments/JBs.
4.5	Slipper type PVC sleeves (cable shrouds)	Required (over cable glands for all cable entries in instruments and junction boxes). Slip-on type PVC sleeves (cable shrouds) shall be heat shrinkable type
4.6	Cable entries	Generally 1/2" NPTF for signal, 3/4" NPTF for power, temperature elements (duplex), 1" NPTF for 6 pair cable, 1.5" NPTF for 12 pair.
4.7	Cable Insulation	All Cables shall have XLPE as primary insulation.

4.8	Cable trays	Cable trays shall be made of FRP with standard sizes of 60mm, 150mm and 300mm width. All cable trays in field shall be with cover. Tray thickness shall be minimum 4 mm. Each individual cable routed through trays must be clamped or tied using SS wires. The overall clamping shall be with aluminium clamp instead of tying with cable armour. Nuts/Bolts for cable tray fixing shall be SS.
4.9	Fire proofing of cable duct, trays	Cable trays carrying multi-cables shall be fire-proofed on all sides.
5.0	<b>INSTALLATION REQUIREMENT</b>	
5.1	Instrument connection sizes on Vessel, standpipes & tanks. Instrument connection sizes on Pipe	As per 7-52-0001 & 7-52-0002 attached with Job Specification.
Note: - Typical installation standards shall be provided to the successful bidder. Based on these typical installation standards and the final approved P&IDs, contractor shall develop and submit Installation standards (hook-up) for all instruments supplied and installed by the contractor, for owner's review.		
6.0	<b>MISCELLANEOUS</b>	
6.1	Proven track record	The instruments as being offered / supplied should have been operating satisfactorily under similar process conditions for at least 6 months. PLC being offered / supplied should have been operating satisfactorily under similar process conditions for at least 6 months.
6.2	Vendor list	All instrumentation items shall be supplied from EIL approved vendors. For items not appearing in EIL approved vendor list, Contractor shall furnish proposed sub-vendor list for purchaser's approval during detailed engineering.
6.3	Logistic support	Contractor shall furnish the logistics support certificate form duly filled in confirming the contractor's logistics support for the supplied PLC system.
6.4	Painting requirements	Painting of installation material, instrument supports, structural supports and tag no painting shall be as per painting specification attached elsewhere in tender.
7.0	<b>SPARES</b>	
7.1	Installed spares for contractor's PLC and LCP  (Installed spare requirements specified here is minimum and shall override spare requirements mentioned elsewhere in tender)	The installed spares shall be provided as per the below philosophy, over and above the mandatory spares: I/O Level- 20% Marshalling Level- 20%

		<p>Additional power feeder with switch fuse assembly- 20%</p> <p>Additional spare windows in alarm annunciators- 20%</p> <p>Spare cable entry points (JBs, panels)- 20%</p> <p>All type of marshalling hardware, i.e. terminals or equivalent- min. 20%</p> <p>Free space for hardware with installed DIN rail/base plate/back plane- min. 20%</p> <p>Spare MCB- min. 10%</p> <p>In each card at least two channels and overall 20% spare channels maintained.</p>
7.2	<p><b>Mandatory Spares</b> 5% or min. one of each type of module including processor module Fuses – 100% of each type Lamps – 50% of total installed quantity Loop powered indicators- 10% subject to minimum 1 No. of each type. DP Transmitter – 10% of each type Pressure Transmitter – 10% of each type Pressure Gauge: - 10% of each type</p> <p>Prices for mandatory spares shall be included in the base price. 1. The word 'TYPE' means the Make, Model no., Type, Range, Size/ Length, Rating, Material as applicable. 2. Wherever % age is identified, Contractor shall supply next rounded figure.</p>	
7.3	<p><b>Commissioning spares:</b></p> <p>Contractor shall provide instrument commissioning spares and commissioning spares for PLCs and Local Panels as required for successful commissioning of Fire fighting system for NTB area. The commissioning spares shall include following items as minimum.</p> <p>Set of each type &amp; size of Gaskets for level gauges : 10% subject to minimum 1 set</p> <p>Set of each type of Gaskets for level transmitter : 10% subject to minimum 1 set 1 No. of each type and size of glass used in Level gauge</p> <p>Indicating Lamps: 20% of total installed quantity. Fuses: 20% of total installed quantity (each type)</p> <p>Price for commissioning spares shall be included in the base price. Contractor shall procure these spares as per recommendation of sub vendors/Suppliers and these shall be available at the time of commissioning. Contractor shall note that in case any additional spare is required during erection and commissioning over and above the quoted erection and commissioning spares, the same shall be supplied by contractor without any time and cost implications.</p>	
7.4	<p>2 years operation and maintenance spares Contractor shall furnish separate list of recommended spares for instruments / Local panel / PLC for 2 years operation along with unit price.</p>	
8.0	<b>INSPECTION &amp; TESTING</b>	

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	<p>Factory testing &amp; inspection of all instrument items, Local Panels and PLC</p>	<p>All instruments and accessories, system oriented items like PLC shall undergo factory testing and inspection. Factory Acceptance Testing of critical items like PLC shall be witnessed by Purchaser at their discretion.</p>
<p>9.0</p>	<p><b>PWCAMC (POST WARRANTY COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT) FOR PLC</b></p>	<p>Post Warranty Comprehensive Annual Maintenance Contract (PWCAMC) for 3 years duration shall be provided for below listed items to be executed after expiry of the defect liability period with supply of consumables.</p> <p>List of Items for PWCAMC</p> <p>a) PLC</p> <p><b>TERMS AND CONDITIONS FOR POST WARRANTY COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (PWCAMC)</b></p> <p>The Contractor shall indicate a separate price for the 3 (three) years Post Warranty Comprehensive Annual Maintenance Contract (PWCAMC) in his bid in the format as per commercial section for the listed Item.</p> <p>After detail engineering, at the time of finalization of the supplier for the listed items, CONTRACTOR will enter into a 3 (three) years Comprehensive Annual Maintenance Contract (PWCAMC) (with the spares) with the Supplier/Original equipment manufacturer and thereafter transfer this contract to Owner. The PWCAMC shall be valid for a period of three years from the date of expiry of the defect liability period. The contract shall clearly indicate the scope of work/terms/conditions of PWCAMC as indicated below along with the rates as quoted by contractor.</p> <p>Owner does not have any liability, whatsoever, over and above the prices of PWCAMC quoted in the format as per commercial section of the tender. Owner shall place a</p>

		<p>separate order for this PWCAMC directly to the Supplier/Original equipment manufacturer after the expiry of defect liability period. It will be the obligation of the CONTRACTOR to ensure that at the time of transfer of Contract to OWNER, the Supplier/Original equipment manufacturer shall accept the terms &amp; conditions and Price of the PWCAMC contract as per tender conditions and as quoted in the format respectively. Any increase in contract price for execution of PWCAMC by the Supplier/Original equipment manufacturer beyond the quoted rates in FORMAT shall be adjusted from amount payables to the contractor/any other means/securities available with OWNER.</p> <p><b>SCOPE OF WORK FOR PWCAMC</b></p> <p>The following are the minimum terms and conditions for each of the listed item under PWCAMC which the Contractor shall include in its price bid.</p> <p>The PWCAMC includes complete servicing, regular &amp; preventive maintenance and breakdown / Emergency / shutdown maintenance as per the service frequency outlined below for above listed item. This also includes supply of spares and Consumables required for repair or replacement of the above listed item.</p> <p><b>A. Preventive Maintenance</b></p> <p>Once in a year the Owner shall inform the PWCAMC Supplier/Agency, one month in advance, the planned shutdown dates. The PWCAMC Supplier/Agency shall mobilize during this period to carry out the preventive maintenance. This Includes cleaning, inspection of all hardware and software, Checking of all ground connections, ground voltages etc., Checking &amp; recording of all settings &amp; parameters, fault prediction, inspection of power supply quality,</p>
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		<p>checks on environmental operating conditions, calibration checks, major repairs and replacements, replacement of electronics modules or any other parts likely to fail due to aging, cleaning of each component like electronic modules connectors, etc. flushing of sampling lines, cleaning of all filters, valves, Overall checking of the system performance, Checking of breakdown logbooks to analyze problems and suggesting long-term solutions for reliability improvements and preparing detailed reports. This visit shall be in addition to those required for periodic maintenance and shall be part of PWCAMC.</p> <p><b>B. Periodic Maintenance</b> Site visits, minimum 4 times a year (total days expected 9-12 per year). Schedule of visits shall be discussed and finalized with Owner. Preventive maintenance shall include inspection of general healthiness of the systems, study and advice on daily maintenance, inspection of all hardware and software, running of test programs, on-line servicing and solving reported problems. Checks shall be conducted on running systems / sub-systems like:</p> <ol style="list-style-type: none"> <li>a. Checks on power supplies</li> <li>b. Cleaning of cabinet filters</li> <li>c. Cleaning / replacing all filters, checking and rectifying leaks, etc.</li> <li>d. Diagnose alarms history.</li> <li>e. Running diagnostic routines, software debugging,</li> <li>f. Checking &amp; recording of all settings &amp; parameters.</li> <li>g. Taking back-up copies of last updated software as applicable</li> <li>h. Trouble shooting of minor problems and general performance check-up</li> <li>i. Prepare site visit report.</li> </ol> <p><b>C. Software Maintenance and Support</b> This shall include maintenance of operating and application software to improve upon system performance.</p>
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		<p>This includes application and operating software modification &amp; debugging, supply and fixing of patches released by manufacturers to remove bugs or upgrading the running version, etc.</p> <p><b>D. Emergency Services</b></p> <p>a. In the event of any malfunction of any of the systems/ items for which the PWCAMC is in force, the PWCAMC Supplier/Agency shall depute the concerned experts to Site so as to trouble shoot the problem &amp; rectify the failed system items within 24 hours after receipt of a written intimation or Telephone call from OWNER.</p> <p>b. The PWCAMC Supplier/Agency shall maintain at his premises or of the other agencies / vendor charged with the maintenance, a stock of necessary spares required. In an event of breakdown, repairing or replacement should be possible with In 24 hours maximum without any lead time for procurement of spares. The PWCAMC shall include not only the supply of spares for maintenance but shall also include Labour and materials at no additional cost to repair the system and any devices applicable. In the event of any malfunction of the hardware / software, the experienced service engineer shall be made available at Site to rectify and put back in service the defective system / item within 24 hours.</p> <p>c. The PWCAMC Supplier/Agency's liability to provide maintenance spares shall not, however, be confined in any manner to be requirement of maintenance spares estimated by the PWCAMC Supplier/Agency. The PWCAMC Supplier/Agency, shall, within the scope of the Maintenance Contract, be required to fulfill or replenish any shortfall in the maintenance spares without additional cost to OWNER.</p>
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		<p>d. Owner's personnel shall work on the system on a day to day basis and wherever possible, inform the PWCAMC Supplier/Agency about the type of failure of hardware/software, based on diagnostics or other information available. However, PWCAMC Supplier/Agency shall be fully responsible to attend, Identify the root cause and rectify the failure in the shortest possible time.</p> <p><b>Other Terms &amp; Conditions of PWCAMC</b></p> <ol style="list-style-type: none"> <li>1. The PWCAMC shall be valid for a period of five years from the date of expiry of the defect liability period.</li> <li>2. PWCAMC Charges are inclusive of all the charges for Transportation, Lodging, Boarding, all insurances including third party insurance and all other incidental charges.</li> <li>3. The prices also include cost of spares and damaged parts (in case of comprehensive maintenance contract).</li> <li>4. The PWCAMC charges also include arranging hand tools &amp; tackles, special tools etc. required to carry out the work.</li> <li>5. Maintenance engineer shall Report to OWNER's site engineer for necessary job clearances before start of the job.</li> <li>6. Maintenance engineer shall Observe / abide by site working conditions prevailing in the existing refinery, safety codes and Indian laws.</li> <li>7. Maintenance engineer shall ensure compliance to guidelines on PPE(Personal Protective Equipment) &amp; Other Safety Norms.</li> <li>8. Maintenance engineer shall carry proper tools and tackles wherever required for the job execution and completion as advised by Engineer - in- Charge/Site Engineer.</li> <li>9. Job report to be prepared and</li> </ol>
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		submitted to engineer-in-charge after every schedule/emergency visit/service as indicated above.
10.	<b>TRAINING</b>	
10.1	Programmable Logic Controller (PLC)	
	At site	
	Operation and Maintenance training:	Two persons for three days.

### 11.0 LIST OF ATTACHMENTS

S. No.	Description	Document No.	No. of sheets
1.	Vendor Data requirement	C044-000-16-51-VD-9501	4
2.	Technical Compliance	C044-000-16-51-CF-9501	2
3.	Instrumentation vendor list	C044-000-16-51-VL-9501	25
4.	Inst. Connection on vessels, standpipes and tanks	7-52-0001	5
5.	Inst. Connection on pipes	7-52-0002	3
6.	Perforated tray supports and cables clamping details	7-52-0107	1
7.	Standard specification for Tank level instruments	6-52-0014	15
8.	Standard specification for flame arrestor	6-52-0025	7
9.	Standard Specification for PLC	6-52-0040	40
10.	Standard specifications for Packages	6-52-0052	58
11.	Standard specification for special level instruments	6-52-0071	12
12.	Standard Specification for Gas detection system	6-52-0080	25
13.	Standard Specification for Fire detection system	6-52-0081	14
14.	Inspection and test plan for electronic equipments	6-81-2032	6
15.	Inspection and test plan for orifice plates and flanges	6-81-2004	5
16.	Inspection and test plan for gas detection system (LEL / H2S)	6-81-2080	7
17.	Inspection and test plan for fire detection system (UV / IR)	6-81-2080	6
18.	Inspection and test plan for receiver and pressure gauges	6-81-2016	4
19.	Inspection and test plan for gauge glasses and cocks	6-81-2012	5
20.	Inspection and test plan for tank level instruments	6-81-2014	6
21.	Inspection and test plan for special level instruments	6-81-2071	3
22.	Fire proofing details for cable trays	C044-111-16-51-SK10	1

**FORMATS FOR LOGISTIC SUPPORT CERTIFICATE**

**Certificate for logistic support (by Principal)**

*(To be signed by Principal's corporate level signatory on company's letterhead)*

I, on behalf of M/s \_\_\_\_\_ confirm that the \_\_\_\_\_\*  
quoted by M/s \_\_\_\_\_ for UPGRADATION OF FIRE FIGHTING FACILITIES  
IN NTB & STB AT COCHIN PORT Project of Cochin Port Authority shall continue to be supported  
by us. The quoted item shall not be withdrawn from Indian market in next three (3) years from the  
date of placement of order as a matter of our corporate policy.  
I further confirm that in case of placement of order by M/s \_\_\_\_\_ on M/s \_\_\_\_\_  
\_\_\_\_\_ we shall continue to support M/s \_\_\_\_\_ in providing back-up  
engineering, maintenance support and spare part to Cochin Port Authority (CoPA) for a period of  
10 years from the date of expiry of warranty.

Signature with Seal

Authorized, Senior Management Level Signatory

\* PLC, Analysers, any other system oriented item provided by Contractor.

**Certificate for logistics support (by Vendor)**

*(To be signed by Vendor's corporate level signatory on company's letterhead)*

I, on behalf of M/s \_\_\_\_\_ confirm that the \_\_\_\_\_\*  
quoted by M/s \_\_\_\_\_ for UPGRADATION OF FIRE FIGHTING FACILITIES  
IN NTB & STB AT COCHIN PORT Project of Cochin Port Authority shall continue to be supported  
by us and our principal(s). The quoted item shall not be withdrawn from Indian market in next three  
(3) years from the date of placement of order as a matter of our corporate policy as supported by  
attached certificate from our principal(s) M/s \_\_\_\_\_.  
I further confirm that in case of placement of order by  
M/s \_\_\_\_\_ on us, we shall continue to support Cochin Port  
Authority (CoPA) in providing back-up engineering, maintenance support and spare part to Cochin  
Port Authority (CoPA) for a period of 10 years from the date of expiry of warranty.

Signature with

Seal

Authorized, Senior Management Level Signatory

\* PLC, Analysers, any other system oriented item provided by Contractor.