

## **ANNEXURE “A”**

### **BACKGROUND & GENERAL INFORMATION**

OGDCL intends to hire the services of an experienced and well reputed contractor for construction of Condensate storage tank having Capacity 24,000 BBLs in KPD facilities along with allied services as described at different sections of this tender documents. The scope of work includes civil, mechanical, cathodic protection and all allied works i.e. Procurement of material, Construction, testing /inspection, CP system design and installation, Calibration and Commissioning of the crude storage Tanks. Successful contractor shall have to offer at least 10-year maintenance free guarantee of the installed systems.

The said tank (Future Tank) to be constructed besides the available/active 24,000 BBLs condensate storage tank as described in Plot plan 165-4-GPP-006. The both Tanks (available and proposed) shall be within same dyke wall (already constructed) area as mentioned in Plot Plan. The new /proposed tank shall be a mirror image of existing tank, therefore all construction drawings of existing tank are available with Tender and shall be applicable for construction of new tank.

Being an operational Plant and active condensate storage tank nearby, the construction of new/proposed tank to be considered in brown field development /construction. All necessary precautions & arrangements by contractor to be done for safety of personals and plant/assets during.

### **2. CONTRACTORS' SCOPE (GENERAL).**

The contractor shall be responsible for minimum but not limited to the following.

Civil construction, Mechanical tank erection. Procurement of material, earthing system, cathodic protection system, coating, painting, calibration, commissioning and testing etc. are in the scope of contractor. The tank is to be completed and tested as per applicable API 650 standard & CP System as per API 651 standard.

All the required material regarding pipe, fittings and other allied equipment etc. is included in this scope of supply of contractor; Contractor would provide flame arrestors, vacuum breathers for installation.

### **3. DESIGN**

OGDCL has provided the design and drawings in this document for Civil, Mechanical & CP System Works. All relevant reports are available with OGDCL.

4. **CODES AND STANDARDS.**

All the design, erection, testing & inspection must be as per following standards of oil & gas industry.

- API Standard 650
- API-653
- RP-651
- ASME Section IX
- ANSI B31.3 – Petroleum Refinery Piping
- PS 1020 or 1025 specification for carbon steel plate and profiles should be as per ASTM 283-C ASTM-A 106, Sch. 40 (For Seamless pipe.)

5. **Scope of TPI/OGDCL Inspection:**

TPI/OGDCL shall carry out the inspection according to API 650 and API 653 latest editions. Any issues during construction shall be evaluated according to these standard even not mentioned in the below scope. In any case, API standards shall be followed.

1. Material Identification through mill test certificates or through laboratory testing or other means.
2. Review / Witnessing of Procedure's qualification record and welder's qualification tests.
3. Inspection regarding construction of ring wall foundation as per drawing and other related civil works.
4. Inspection of roof, shell and bottom plates materials as per specification given in agreement
5. Inspection of welding consumables and to check the quality and suitability.
6. Inspection of Steel Structure assembly and welding.
7. Inspection of Shell Peaking, Bending, Roundness & Plumpness.
8. Inspection of Nozzle Orientation.
9. Witnessing of DPT and Pneumatic Leak Test where necessary.
10. Inspection of quality of welding of bottom, shell and roof plates.
11. Witnessing of vacuum box testing of bottom weld joints
12. Review results of radiography of horizontal, vertical and T-Joints of tank.
13. Stage inspections/hold points to be decided according to the Quality
14. Inspection plan to be submitted by TPI.
15. Witnessing of Hydrostatic Testing.
16. Witnessing of Calibration of Tank.
17. Inspection of CP System installation.
18. Report of findings
19. Overall responsibility for the excellent workmanship guaranteed through the above inspections and continuous site supervision shall be carried out by third party inspection firm /OGDCL at site at OGDCL's cost.

**Note:**

All Inspection must be carried out by API-653 Certified Inspector. The contractor would facilitate and support the TPI/OGDCL engineers / inspectors during all the phases of the project.

**6. MATERIAL PROCUREMENT / HANDLING / STORAGE.**

- 6.1 In this regard bidder's responsibilities include procurement of material, transportation from manufacturer's site to the site store already established by the contractor.
- 6.2 The loading / un-loading of the material and shifting from site store to the site location shall be the responsibility of the contractor. OGDCL will not provide any sort of transportation / loading / un-loading facilities. If in case OGDCL provide such facility on contractor's request, that will be charges as per actual.
- 6.3 To determine the originality & authenticity of the material being used for this project, all material shall be 100% traceable and suitably marked for easy identification of manufacturer or supplier, grade, source, size and rating.
- 6.4 Material Identification shall be carried out through mill test certificates or through laboratory Testing or other means up to satisfaction level of OGDCL/TPI.
- 6.5 All foreign and local procured material shall be inspected by OGDCL engineer(s). OGDCL inspection engineer(s) shall have full right to accept / reject any material / equipment.
- 6.6 The defected / sub-standard / rejected material not conforming to the OGDCL requirement will be replaced with the new one at bidder's account including transportation, handling demurrage etc.
- 6.7 The replaced material will be inspected once again and then be used by contractor after clearance from OGCL professional.
- 6.8 Hauling of plates and pipe shall not be allowed.
- 6.9 All material shall be kept / stored on wooden skids / platform. No. material shall be kept on ground.
- 6.10 Spreader bar shall be used for lifting plates
- 6.11 Contractor shall submit detailed procedure of material handling storage for approval to OGDCL before commencement of any work.

**7. CONSTRUCTION AND INSTALLATION.**

- 7.1 The bidder should be thoroughly familiar with the specifications of all the civil & mechanical works and shall ensure that all works are being

completed in accordance with good industrial practice, relevant specifications and API standards. The approved bidder must submit the detailed scope of work of each task during erection.

- 7.2 Contractor shall be responsible for all Civil, Fabrication, Inspection, Testing and Calibration jobs required for completing the project as per approved design.

7.3 **CIVIL WORKS.**

The civil jobs to be done according to drawings 165-4-C-237 and 165-4-C—256 and include:

**Tank Ring Wall Foundation:**

- Excavation for tank ring and dyke wall foundations.
- Construction of Tank Ring Type foundation.
- Sand filling and its compactness inside the tank foundation ring.
- Installation of anodes during sand compactness inside the ring wall as per API-Standard and as advised by CP consultant / OGDCL Corrosion Engineer and as per relevant section of this document.
- During construction of ring wall conduit pipe installation for CP system be done as per instruction of CP consultant/OGDCL corrosion engineer.

**Dyke Wall and Dyke Area:**

- The Proposed Tank is inside dyke wall as mentioned in the Layout Plan. The half of the area is covered with PCC around the already constructed Tank. Rest of area is only earth filled. Contractor to construct PCC flooring for rest of half area around new/proposed tank keeping the levels maintained as per details mentioned in Drawings 165-4-C-256.
- Dyke wall already exists, therefore no need of dyke wall construction.
- Construction of drain channels.
- Concreted pit for removal / recovery of water / oil in the area in case of rain and oil spillage.
- Repair work of civil structure, if damaged by contractor during transportation/construction to be done by Contractor without any charge.
- All required material for the construction is the responsibility of contractor.

7.4 **MECHANICAL WORKS.**

The mechanical construction works scope is as mentioned below but not limited to:

- Fabrication works according to mechanical construction drawings 165-4-MST-001 to 015 available in tender.
- Fabrication & welding of steel plates for tanks bottom, walls and roof.
- Fabrication and welding of tank structure (Internal / external stairs, top fence etc.)
- Fabrication and welding of all tank internals.
- Fabrication and welding of pipe and fitting for all required nozzles along with valves, gaskets stud / nuts, companion flanges and mono block insulation joints wherever required.

- Vent gas to the vent flare line or to utilities.
- Placement of wind socks on each tank with six spares numbers for subsequent operations.
- Installation of earthing system of tank.
- Installation of lightning arrester and system for tank.
- Top roof railings and fencing with support stairs/steps till the center of top tank.
- Installation of gate valves of ANSI Class 150 as per nozzle size. These valves and companion flanges to be provided by contractor and included in his scope of work. These valves to be of good quality and contractor is responsible to take prior approval of OGDCL before purchase of valves and supply.

Note: Contractor has to provide all the relative data of welding material & procedures to be used during project.

- 7.5 The **CP System works scope** is as mentioned in the relevant portion of the document.
- 7.6 The contractor shall conduct welder's qualification test by any reputable 3<sup>rd</sup> party for this project according to ASME Section IX and API-650. Only the qualified welders will be allowed for welding jobs for this contract. Contractor Site Engineer must have the copies of the certificates of the welders all the time till completion of the project.
- 7.7 All the necessary test should be conducted regularly during the construction phase to maintain the quality of construction works (civil & mechanical) like soil compactness, cement/concrete strength, welding radiography physical inspection, hardness and other related tests.
- 7.8 All the tanks and pipes should be painted according to good industrial practice and specifications. After sand blasting a layer of primer coat must be done on the tank followed by other coats of good quality Epoxy Industrial paint as per relevant clause of this document.
- 7.9 The bottom and internal walls of tanks should be painted to protect the internals against the corrosive effects of water.
- 7.10 The contractor is responsible to take care of all the necessary safety measures for doing the fabrication, installation and electrical jobs in the potential hazardous area as construction to be done in active oil & gas handling facilities both for the workers and machinery as per safety rules.
- 7.11 Contractor should take all safety measures before starting of each day job, including safety meeting, emergency response plan meeting necessary HC detection test before and during the process of any hot job or electrical works where the possibility of spark generation. All the necessary safety documents must be available at site / office of the contractors.

- 7.12 Fitness certificates of all the machinery required at site area must be available on site office of the contractor.
- 7.13 Company shall have right to inspect all equipment that shall be brought for work. Company has the right to reject any equipment it deems not fit for work. In that case contractor shall immediately remove and replace the equipment with no cost to the company.
- 7.14 If any damage occurred to any equipment due to miss handling, improper storage, wrong installation procedure etc. during the project, that damage shall have to be rectified by the contractor without any cost to OGDCL.
- 7.15 The contractor is responsible for living arrangement of its manpower at his own account. Further he is also responsible for ensuring and using all necessary machinery at site required for construction, fabrication, installation and material handling during the entire project schedule at his own account.
- 7.16 A Project Site Incharge must be deputed by the contractor as the Incharge of all fabrication and construction activities for communication / correspondence with OGDCL site / project Incharge. The said incharge must be supported by qualified supervisors for each job.
- 7.17 Bidder is required to provide the project team details and organization to OGDCL with its technical and financial proposal. Any change in organization and person of project team must be intimated to OGDCL for information / approval as required.

## **8.0 COATING & PAINTING**

Before the final handover of the tanks, the contractor would ensure the application of internal coating and external painting as per guidelines mentioned below. The vendor and brand to be approved from OGDCL before supply/ application.

### **8.1 External Protective Coating.**

For Shell and Fixed Roof

- |   |                 |
|---|-----------------|
| 1. 1 coat of zinc rich epoxy primer at        | 50 microns dft  |
| 2. 2 coat of iron oxide paint at per coat     | 100 microns dft |
| 3. 1 coat of acrylic modified polyurethane at | 50 microns dft  |

Total dft 300 micron

### **8.2 Internal Protective Coating**

Floor and first shell strake upto 2 meters height must be coated with FRP coating @ 3mm thickness while all the above roof & shell must be coated as per following

- i. One coat of zinc-phosphate primer
- ii. Two coats of high built epoxy liner to achieve a total thickness of 250 micron dft.

Total dft: 250 micron

## **9.0 INSPECTION, TESTING & COMMISSIONING.**

- 9.1 The contractor is responsible for tank calibration after successful completion of all tests by himself or through a reputed contractor. The calibration should be as per API 650, API 2555 and PI 2250 using physical measurement, strapping and optical reference methods. The calibration charts prepared by the calibration firm must be witnessed / attested by government authorities for authentication as per law. Calibration charts must be submitted to OGDCL after approval.
- 9.2 Bidder is responsible to carry out all test during construction and post construction phase ensuring the integrity and performance of each Crude Oil Storage Tanks. This should include:
  - i. Material inspection jointly with representatives of Contractor and TPI/OGDCL prior to commencement of construction work.
  - ii. Compactness test for soil & sand filling (inside and outside of foundation ring).
  - iii. Concrete compressive strength test (cube tests of different ageing) field density reports of fill materials.
  - iv. Welder qualification test.
  - v. Radiography of weld joints of tank as per API-650
  - vi. Radiography of weld joints of piping spools.
  - vii. Hydraulic and vacuum test of tank.
- 9.3 Prior to testing and commissioning. The Contractor Shall Submit Detailed Testing & Commissioning Procedures as per codes of the area to be tested.
- 9.4 Purchaser / Engineering Contractor shall receive from Contractor all information regarding various phases of fabrication work so that Engineer's inspection can establish the quality of workmanship at the required fabrication stages.
- 9.5 Inspection by OGDCL or his representative shall not relieve the Contractor of the responsibility to replace any inadequate material and to repair any poor workmanship found on site.

- 9.6 Any material or workmanship that does not meet the requirements of this engineering specification may be rejected.
- 9.7 Material Certificates of all material etc. proposed to use for the tank shall be witnessed.
- 9.8 Any defective material or works found after acceptance at the time of rolling, machining or during erection and testing of tank shall be replaced without charge even if it has been accepted previously.
- 9.9 Welding procedure specification shall be submitted for approval, prior to welding procedure qualification.
- 9.10 Welding procedure qualification and welder qualification tests shall be carried out in the test facility to be approved.
- 9.11 Butt welds shall be full penetration and fusion. Quality of shell welded joints shall be evidenced by radiographic inspection, as specified in API-650.
- 9.12 Extent of Radiography shall be as specified in API-650. OGDCL/TPI at any time reserve the right to have any joint radiograph. All welds which are unacceptable shall be repaired and retested through radiograph at contractors expenses.
- 9.13 All radiographic reports along with the films shall be submitted for approval.
- 9.14 Fillet welds inspection shall be visual. In case that visual inspection of Purchaser's / Engineering Contractor's inspector reveals poor welds, acceptance or rejection shall depends on sectioning of these welds as per API-650
- 9.15 All tests be witnessed and approved by Engineer.
- 9.16 Surface preparation for painting shall have to be approved prior to the application of paint.
- 9.17 Inspection of fabrication and erection work shall not relieve the manufacturer of the responsibility to replace any inadequate material and to repair any poor workmanship found on site.
- 9.18 All material required (Like water pneumatic air etc.) for the testing would be arranged by the contractor at its own cost. It is not OGDCL responsibility.
- 9.19 **Inspection / Quality Plan**

**Activity**

**Purchaser Inspection**

Pre-production Meeting

H



Submission of work schedule	R
Installation of anode bed	H
Material Procurement	R
Mill Test Report	R
Material Inspection	H
Welding Procedure & Welder Qualification	H
Fabrication	M
Radiographic Testing	M
Welding Repairs	M
Hydrostatic Testing	H
Installation of Anode JB (CP Sys)	H
Commissioning of CP Sys	H
Painting and Coating	H
Calibration of Tank	H

**Note:**

- H - Hold point, inspection or testing shall not proceed without the presence of the purchaser's representative.
- M - Monitor point, notification to the purchaser's representative of impending inspection or test activity is required.
- R - Review documents, presentation of the specified.

**9.20 Tank Bottom Testing.**

After welding the tank bottom, the welded joints shall be tested by means of vacuum chamber. Welding seams shall be brushed with soap suds, flax oil or other materials suitable to detect leakage.

**9.21 Tank Shell Testing**

- After erection of the whole tank, all attachments and fixtures used for erection shall be removed and prior to connection to eternal piping the shell shall be tested by water filling.
- The tank shall be filled upto 2" (50 mm) above the top angle.
- All connections shall be blanked off.
- Filling rate shall not exceed 45m<sup>3</sup> / hour upto top shell lower edge. From top shell lower edge upwards filling rate shall not exceed to 30m<sup>3</sup> / hours.
- The telltale holes shall be used to pneumatically test attachment welds on reinforcing pads. The telltale holes shall be plugged after hydro test with non-hardening sealant or grease.

**9.22 Tank Roof Testing**

After the tank is finished, the welds of the roof shall be tested by an inner pressure which shall not exceed roof plate weight or by vacuum chamber applied on weld outer surface. Welding seams shall be lubricated with soap solution flax oil or other liquid suitable to tested leakage.

## **10. MARKING.**

- 10.1 All plates, reinforcements, access steel structures, etc. shall be marked as specification in the detailed engineering design.
- 10.2 Marking shall be stamped in an easily visible place, using a striking dye, after protective coating application (if specified).
- 10.3 Tank identification tag with capacity, service, dimension, treatment, and year of manufacturing with Contractor complete address to be affixed permanently.

## **11. WORK SCHEDULE & REPORTS.**

After the award of contractor, a detailed kick-off meeting to discuss the reporting channels and work schedule for timely completion of the project would be held in the OGDCL head office. OGDCL engineers would perform material inspection at the contractor's site; before mobilization for the material of construction, and contractor would intimate its schedule accordingly.

## **12. PROGRESS REPORTS.**

The contractor shall prepare and submit to the company a monthly progress report detailing all actions that have occurred in the preceding month and actions anticipated in the coming month, the detail should be included but not limited to;

- i. Work in progress in shape executive summary.
- ii. Work completed during the month.
- iii. Problem areas.
- iv. Proposal remedial actions associated with shortfalls/problems areas.
- v. Out standing matters
- vi. All monthly reports will be submitted on or before 5<sup>th</sup> of every month with API Inspector signature as well.

## **13. FINAL INSPECTION.**

OGDCL would under take its routine site monitoring for the progress. However it is the responsibility of Contractor to present the completed Tank in all respect for OGDCL Inspection. Only after acceptance of OGDCL regarding the completion of tank, tank will be handed over to OGDCL as per OGDCL handing/taking over procedure.

## **14. EXPERIENCE**

The contractor who intends for participate in this project must have 7 years of fabrication and installation experience. Further the contractor should submit a list of recent projects of similar nature carried out by him with brief scope of work, cost and completion duration along the technical portion of the bid, otherwise his bid shall not be considered for further evaluation.

#### **15. HIRING OF SERVICES**

In case Contractor hires the services of any activity for the project like designing, installation, fabrication, inspection etc. from other company. He must propose at least 03 Nos. of reputed companies at the time of submission of bids having at least 07 years relative experience. After approval of the bid no change regarding replacement of the sub contractor can be made OGDCL would finally nominate one of the proposed sub contractor.

#### **16. ADDITIONAL / EXTRA WORK (S)**

Company shall have the right to ask contractor for any work(s), which was not previously included in contractor's scope of work. However the company shall be liable to pay for the extra work provided that the proposed approval has been taken prior to the commencement of work. BOQ of extra work shall be applied.

#### **17. REPAIRS.**

All welding defects shall be brought to the Purchaser's / Engineering Contractor's knowledge and approval shall be obtained before repairing them.

All remedies must get approval of the Purchaser / Engineering Contractor.

#### **18. PEAKING.**

Using a horizontal mould to radius of 1m long peaking in any area of inside shell surface shall not exceed 12.7mm.

#### **19. BANDING.**

With a vertical sweep board 1m long, banding shall not exceed 12.7m. Measurements for tank shall be performed before hydraulic test.

#### **20. BOX-UP**

After testing and calibration, all tanks shall be emptied and water disposed of as per instruction of Purchaser / Engineering Contractor. Tanks shall be thoroughly cleaned internally and boxed-up, including mounting, fitting, fixing and bolting of all tank fittings and accessories provided by Purchaser such as valves, level gauge, etc. The cost of this work shall be considered included in the Contractor's rates for fabrication of tanks.

#### **21. DELIVERY OF TANKS.**

Contractor is responsible to complete the tank in all aspects and handover to OGDCL in 180 days' time from that date of issuance of purchase order.

**22. PAYMENT SCHEDULE.**

Following is the payment schedule against tank:

- 10% Mobilization Advance against bank guarantee.
- 10% payment upon satisfactory completion of Ring Wall Foundation, installation of Anode Bed of CP System and sand filling as per drawings.
- 30% payment after procurement of material (tanks plates and structure, nozzles etc.) and its successful inspection at site by OGDCL.
- 25% payment after completion of fabrication works (i.e bottom, roof, shell, stairs, completion of nozzle works etc.) and successful inspection at site by OGDCL engineer.
- 25% payment after handing over the tank upon completion of job.

**Scope of work for above-ground storage tank bottom's CP Systems.**

As already discussed in the document, one tank of 24,000 BBLs is already constructed besides the proposed tank. CP system is also installed on the constructed tank. Contractor scope is to install the impressed current CP system of proposed tank bottom and connect the system with available TR unit which is installed for existing tank. The capacity of this TR unit is up to 50 Amp and can easily handle the proposed tank CP system.

Following is minimum but not limited requirement for installing Cathodic Protection Systems to protect above-ground storage tanks.

***(Note deviation of any of the requirement will lead the contractor for technically non-responsiveness).***

**1. CP Contractor's Eligibility Criteria.**

- i. The contractor must have minimum proven experience not less than 15 years of CP System's design, installation and commissioning for tank bottoms.
- ii. Should have an established team consisting of local, experienced, certified and qualified man-power for storage tank CP System's design, installation and commissioning.
- iii. The installation and commissioning supervisor must have hands-on experience not less than 10 years of relevant job. NACE (CP Level-III) / I-Corr certification will be mandatory requirement.
- iv. Contractor must be well aware of relevant national and international codes and standards for CP Systems design and installation of storage tanks.
- v. CP system installation contractor shall be finalized after approval of OGDCL. In this regard preference will be given to those contractors who have worked or are working with OGDCL other CP system Projects.
- vi. In case CP contractor intends to hire foreign experts, obtaining security clearance from concerned authorities will be sole responsibility of contractor. OGDCL may assist in filling the case. Minimum 7-9 weeks are required in obtaining security clearance.

**2. Material procurement.**

As per above tests / surveys, data and history collection, the detailed engineering design was conducted for already built tank. The same design will be applicable. Accordingly the BOQ, Design and as built drawing (already installed Tank CP system) is attached with this document.

After finalization of the OGDCL approval for contractor and BOQ, contractor will proceed for material procurement with the minimum requirement of relevant portion of this document.

Following are the specifications of main equipment to be installed:

**a. Junction Box, Test Post Box, Current Distribution Box**

- i. All sort of junction boxes such as Anode Cable Junction boxes (AJBs), Positive Junction Boxes (PJBs), Current Control Boxes, test post boxes etc, shall be made of robust 16 gauge stainless steel plate, or cast aluminum alloy or equivalent, and provided for termination of +ve and -ve main cable.
- ii. The anode junction box / current control box must have capacity to cater / accommodate all the individual connections of all the anodes / structures of the system plus half of the installed anodes as spare for future connections.
- iii. Test boxes / Test posts made of SS / aluminum alloy or equivalent shall be used for potential measurement.
- iv. Aluminum lids shall be detachable and fixed to the test boxes / test posts by 4 stainless steel bolts heads shall be flush with lid surface or lower bolt-tightened state.
- v. Better if brass terminal bolts be provided on both the sides of box so that potential measurement could be carried out without opening the terminal. These terminals shall be fully isolated from the box.
- vi. all above boxes shall be compliant of Hazardous area Zone-II requirement.

**b. Anodes**

- i. The anode shall be designed to provide adequate CP current to 100 % of the tank bottom's protective current density specified for a minimum of 25 years period + 50% extra.
- ii. The impressed current anodes shall be preferably polymeric anodes configuration (Anode Flex or equivalent).
- iii. The anodes shall be designed to provide uniform current distribution. The number of anodes shall be determined by the total current requirement of the CP system(s) and the criteria of over-under protection.

**c. Monitoring Facilities / Test Stations.**

- i. Monitoring facilities shall be designed to ensure effective indication of the level of the Cathodic Protection at different locations of the CP systems showing impressed current of all tank bottoms. For this purpose following standard monitoring methodology, test post shall be installed at selected critical points with atleast four pins (min) and three wire connections. The critical points shall be identified during pre-design survey and made part of final design.
- ii. The test posts shall be made from MS steel pipe 4" painted and complete with terminal plate. Test posts shall be installed with cement grouting.

**d. Cabling**

- i. The cable connections shall be made preferably by mechanical means, thermite welding could be permitted keeping in view the safety matters at site premises.

- ii. Mechanical connection shall be made above ground only using cable lugs, nuts and serrated washers.
- iii. All ground electrical connections to the protected structure shall be fully encapsulated.
- iv. All cables shall be sized such that no excessive voltage drops occur which reduce the capacity of the system. All cables shall be insulated and sheathed to withstand the prevailing site condition. Drains cables and anode feeder cables shall be armored.
- v. All cables shall be buried in soft sand at a depth of at least 0.5 meters, provided with cable protection tiles and warning tape as considered suitable for the area.
- vi. Cables tags shall identify all the cables where they come above ground.
- vii. The CP cables shall be HMWPE or XLPE type with the minimum cross-section as below:
  - a. Test lead and bonding : 10-16 mm<sup>2</sup>
  - b. Positive circuit anode-rectifier : 35-50 mm<sup>2</sup>

The supply and laying of all cables (including A/C power cable) to & from T/R unit, anodes, anode junction boxes, current control boxes etc shall be the responsibility of contractor.

- viii. Standard cable color code shall be used for various purposes of cable connections.

**e. Installation of Monolithic Blocks.**

- i. For electrical isolation of tanks from other structures, procurement and installation of monolithic blocks on all in-let and outlet flanges will also be responsibility of CP contractor.
- ii. Isolation kits instead of monolithic blocks will not be acceptable.

**f. CP Monitoring Equipments / Tools etc.**

The contractor has to provide a complete tool kit and CP spares for proper monitoring and maintenance of CP System. The tool kit & spares will include but not limited to following;

- i. Portable Copper-Copper Ref. electrodes = 01 Nos.
- ii. High impedance rough-tough type multi-meters digital = 01 each.
- iii. Additional Shunts / Rheostats = 20 each.
- iv. Lugs (various sizes) = 50 Nos.
- v. Splice kits with filling material = 20 Nos.

**3. INSTALLATION / TESTING / COMMISSIONING.**

- i. After procurement of the material as per Design provided and approved BOQ, the CP contractor will carry out installation and commissioning of the material and system without delay.
- ii. The bidder shall ensure that all works should be completed according to NACE and other relevant codes & standards. It will be mandatory that installation of main equipments and final commissioning of the system

- shall be carried out under supervision of NACE (CP Level-III) / I-Corr certified engineer/technologist.
- ii. Contractor shall be responsible for all CP installation works including installation of junction boxes, current control boxes, complete cabling net-work, and test posts etc as per standard practices.
  - iii. All Anode Junction boxes / current control boxes shall be based on suitably designed solid concrete blocks.
  - iv. A standard type shed shall be made to protect control boxes, anode junction boxes.
  - v. When installation and commissioning of the CP system are completed in all respects, it will only be handed over to company after successful completion of trouble-free operation with complete polarization as per NACE standards.
  - vi. Final commissioning report and as built drawings will be prepared and submitted by the contractor.

**4. Applicable Codes & Standards.**

- i. The contractor shall have to follow all applicable international codes / standards (*especially following listed NACE, API or equivalent BSI codes*) and local regulations and practice in vogue to complete the job.
  - a. NACE RP - 01 – 0169 / 2002.
  - b. NACE RP – 01 – 99.
  - c. NACE RP – 05 – 72.
  - d. NACE RP – 02 – 86.
  - e. API RP – 651.
  - f. BS – 7361.
- ii. It will be contractor's responsibility to be fully aware of the requirement of the applicable codes and standards.



**Data Sheet to be filled by Bidder**

Sr. #	DESCRIPTION	PARAMETER	CONTRACTOR to Comply
1	SCOPE	Bidder to comply all sections of This SOW in totality.	
2	TPI/OGDCL Scope of Inspection	Section 5	
3	Compliance to the Sections 2 to Section 22	As per guidelines mentioned.	
4	Experience certificates of the Company (at least three references required, for the technical suitability). Clients guaranteed certificates in the company's name.	Client's certificates required with dates, tank capacity and clients letters for completion of projects.	
5	Above Ground API 650 tanks constructed by the contractor in its name and at least six (6) tanks on the contractor's credit in last 10 years in Pakistan for qualification.	Mandatory experience required.	
6	Organogram of Company and Organogram of proposed team for site execution.		
7	Delivery period, any bidder/contractor offering additional time that exceeds from given delivery period, would be asked to match this timeline for further evaluation.	180 days	
8	Any deviation to this specification, each deviation to be marked by section wise description (if any) from 1 to 22.		
9	Provision of PEC registration certificate as proof of work experience in mechanical construction for min C4 category.	Valid PEC certificate to be attached for applicable category	
10	Provision of necessary experience showing competency for projects above PKR 70 Million.	Experience with client references, email, and telephone numbers to be provided	
11	<b>CP System</b> <ol style="list-style-type: none"> <li>The contractor must have minimum proven experience not less than 15 years of CP System's installation and commissioning for tank bottoms.</li> <li>Should have an established team consisting of local, experienced, certified and qualified man-power for CP System's installation and commissioning.</li> <li>The installation and commissioning team supervisor must have hands-on experience not less than 10 years of relevant job. NACE / I-Corr certification will be mandatory requirement.</li> </ol>	Bidder to provide the name of company with enough documentary proof of experience in the form of purchaser order, service order , LOI ,etc.	
12	An authority letter / JV letter in case of Joint bid submission clearly indicating the lead and supportive partner.	Bidder to provide authenticated letter of agreement clearly mentioning the portion of work to be carried out by each JV partner.	

13	Installation supervising and commissioning engr(s) for CP System must be NACE / I-Corr certified as per SOW.	<p>The bidder to provide;</p> <ul style="list-style-type: none"> <li>• Name(s) / Alternate of the design, installation &amp; commissioning engr(s).</li> <li>• Proof of affiliation with bidder.</li> </ul>	
14	CP Sysytem engr(s) must be affiliated with the bidder.	Evidence to be provided	
15	The proposed NACE / I-Corr certified engr(s) shall remain at field during installation / commissioning.	Name(s) / Alternates with assurance to be provided	
16	1 year trouble free performance guarantee after commissioning of Tnak and allied systems	Bidder to confirm. (In case of JV bid the guarantee shall be submitted individually & jointly).	

TO BE FILLED IN COMPLETELY BY THE BIDDER / CONTRACTOR.