

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

**HINDUSTAN BHAWAN, 3RD FLOOR
8, SHOORJI VALLABHDAS MARG
BALLARD ESTATE
MUMBAI – 400 001**

TENDER DOCUMENT

FOR

3 X 650 MT CAPACITY
MOUNDED LPG STORAGE VESSELS

AT

HUBLI LPG PLANT

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

Carrying out Detailed Engineering, Design, Supply, Fabrication, Erection, Testing & Commissioning of 3 x 650 MT Capacity Mounded LPG Storage Pressure Vessels at Dharwad LPG Plant

Tenders as per attached tender document are invited for Carrying out Detailed Engineering, Design, Transportation & Supply of all material required, Fabrication (at Vendor Works / at site), Inspection, Statutory Approvals, Erection , Testing & Commissioning of 3 x 650 MT Capacity Mounded LPG Storage Pressure Vessel for our LPG Bottling Plant at **Belur Industrial Area, Dharwad, Karnataka**

The works are required to be carried out in working LPG Plant having time restrictions, access restrictions, space restrictions, entry / exit restrictions etc. The entry of men, machinery & material into the Plant is governed by regulations / permissions stipulated by Plant Authorities which shall be adhered to in toto. Vendors are advised to visit the site and get acquainted with the site / Plant conditions before quoting. Lack of adequate data on site conditions on this cannot be a reason for any future claims and such claims are not arbitrable.

ADDRESS OF LOCATION:

HINDUSTAN PETROLEUM CORPORATION LTD.
LPG Bottling Plant
165 / 166, KIADB Industrial Area
Belur
District – Dharwad
Karnataka State

CONTACT AT HQO: Shri. V. Venumadhav / Biju K Nair (022-22637161 / 22637081),

venumadhav@hpcl.co.in, bnair@hpcl.co.in,

For any Techno-commercial Clarifications please contact Sh Prabakar sant (022-22637013)

prabakarsant@hpcl.co.in

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NIT FOR e procurement:

This is an e- tender and bids are to be submitted on-line only at <http://eproc.hpcl.co.in>. Response in any other form shall not be accepted. While on-line bidding, bidders would be required to upload the scanned copy in pdf format of EMD instrument.(or exemption proof if applicable). For bidding it is suggested that bidders should not wait for last date/ tender due date for their bid preparation as several documents are to be uploaded in the offer and prices are to be entered on screen for all items. There is a facility to keep the bid ready in the system for final submission, however bidders are requested to keep sufficient time margin with them for modifications, connectivity issues etc.

All the items of the tender are mandatory. For evaluation all the items would be considered and job would not be split. For details please refer tender document. The taxes mentioned in techno-commercial sheet on-line (Service tax, works contract tax etc.) will be added to the amount(Sum of (item quantity x item rate quoted by bidder) for arriving at total offer value. The education cess would be calculated on service tax. In case bidder quoted some/all taxes as 0%, it would be concluded that bidders quote is inclusive of all taxes applicable of all taxes applicable on tender due date/time or extended due date/time.

Please note that queries related to scope of job, tender specifications, terms & conditions etc should be only at <http://eproc.hpcl.co.in> before the mentioned date in calendar.

Clarifications sought/ queries received from bidders /vendors/parties on tender, within mentioned calendar date will be entertained by HPCL.

The process of e registration in HPCL e portal <http://eproc.hpcl.co.in> involves following steps:

- a) Clicking on enrolment option available at above referred site and selecting desired user id, password, email id, company name & submitting.
- b) After submitting the details, a challenge phase from HPCL server will be send to vendor's email id. Then again vendor has to go to above referred site & choose login option by using his user name, password and challenge phrase and complete two pages having company name, company short name, incorporation type, address, email, contact person, contact number, numbers of years of company incorporation, Indian or foreign bidder, PAN number in case of Indian bidder (foreign bidder has to provide his tax number at this place which is used for filing income tax returns in their respective countries), phone number and fax number.

These two steps can be completed by the bidders. After completion of registration bidders shall contact any of the following officers for approval of registration:

1. Shir J B Khadgi(Manager Operations)-LPG, Tel No:022-22637020
E-mail: khadgi@hpcl.co.in
2. Prabhakar Sant (Manager EP&P)-LPG Tel No:022-22637013
Email : prabakarsant@hpcl.co.in

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3. Pradeep Chauhan (Manager EP&P)-LPG Tel No.022-22637011
E-mail : pchauhan@hpcl.co.in

After approving the registration, bidder will be in a position to participate e tender inquiry.

Please note, for vendors to respond to the tenders which will be published through our website has to take digital certificate (which is must for online bidding), meant for tendering purpose, having the facility of data encryption and decryption so that bidders may be in a position to submit their online bids, encrypt it, sign it and it can be decrypted and opened at due date and time by HPCL authorized representative.

The Minimum requirement of Hardware required in your computer are:

- : Pentium III or Later Processor
- : Minimum of 128 MB RAM
- : An available USB Port (if Certificate is in USB-Token)
- : You have to install USB-Token drivers into computer system before usage of application.
- : If USB-token driver is not installed before usage of application, you cannot use your certificate for application.
- : Reliable internet connectivity.
- : Certificate with full chain.
- : Certificate should not be expired and it should be a valid certificate.

Operating System:

- : Windows 2000 professional
- : Windows XP

Browser Version:

- : Internet Explorer Versions 5.5 or 6.0

JAVA Component:

- : Routine Environment Version 1.5

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PRE-QUALIFICATION CRITERIA

The tenderer shall meet **all** the following conditions for qualifying for the job of construction of 3 x 650 MT Mounded LPG Storage Vessel at our **DHARWAD LPG PLANT**

1. The tenderer should be CCOE approved fabricator of Pressure vessels under SMPV rules 1981(unfired). **Copy of license should be enclosed along with the technical bid.**
2. The tenderer should have designed, fabricated, supplied, erected, tested and commissioned spherical / cylindrical pressure vessels of total volume 1500 cum. with minimum individual vessel capacity not less than 500 cum and design pressures above 14 kg/sq. cm in the **last 7 years**.

OR

Parties who have completed, in the **last 5 years**, before the date of this tender, at least one Mounded LPG Storage Vessel Project as per OISD 150 Guidelines (including design engineering, fabrication, erection, hydro testing of vessels) in India with minimum individual vessel LPG Storage capacity not less than 300 MT qualify for this job. Tenderer shall submit Certificate from Third Party Inspection (TPI) agency showing at least the Mechanical Completion (including Hydro Testing) of the vessel for the job executed.

3. The tenderer should have successfully completed job of fabricating pressure vessels in the **last SEVEN financial years** any one of the following:
 - a. Three similar fabrication jobs each costing not less than ₹..720 Lakhs.

OR

- b. Two similar fabrication jobs each costing not less than ₹..900 Lakhs.

OR

- c. One similar fabrication job costing not less than ₹.. 1500 Lakhs.

Similar work shall mean "Designing, fabricating, supplying, erecting, testing & commissioning Pressure Vessels under SMPV Rules including cost of steel plates and related civil works". The Value shall be taken as the value of Purchase Orders including cost of steel plates & civil works.

4. **Annual financial turnover** criteria, on annualized basis, in each of the **last 3 years** ending 31st March 2011 shall be a **minimum of ₹. 1000 Lakhs**. Bidders are required to submit the audited balance sheets, profit & loss statements for the last 3 financial years.
5. Bidder shall furnish documentary evidence i.e. copies of work orders / relevant pages of contract, completion certificate or certified final bill from their clients, annual reports containing audited balance sheets and profit & loss accounts statement, in the first instance itself, in support of their fulfilling the qualification criteria. HPCL reserve the right to complete the evaluation based on the details furnished without seeking any additional information.

Parties who are affiliates of one another can decide which Affiliate will make a bid. Only one affiliate may submit a bid. Two or more affiliates are not permitted to make separate bids directly

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or indirectly. If 2 or more affiliates submit a bid, then any one or all of them are liable for disqualification. However up to 3 affiliates may make a joint bid as a consortium, and in which case the conditions applicable to a consortium shall apply to them. "Affiliate" of a Party shall mean any company or legal entity which: (a) controls either directly or indirectly a Party, or (b) which is controlled directly or indirectly by a Party; or (c) is directly or indirectly controlled by a company, legal entity or partnership which directly or indirectly controls a Party. "Control" means actual control or ownership of at least a 50% voting or other controlling interest that gives the power to direct, or cause the direction of, the management and material, business decisions of the controlled entity.

Bids may be submitted by the following subject to conditions given under item 7 among others:

- a) A single person/ entity (called sole bidder);
 - b) A newly formed incorporated joint venture (JV) which has not completed 3 financial years from the date of commencement of business.
 - c) A consortium (including an unincorporated JV) having a maximum of 3 (three) members
 - d) An Indian arm of a foreign company.
6. Fulfilment of Eligibility criteria and certain additional conditions in respect of each of the above 4 types of bidders are stated below, respectively:
- a) The sole bidder (including an incorporated JV which has completed 3 financial years after date of commencement of business) shall fulfill each eligibility criteria.
 - b) In case the bidder is a newly formed and incorporated joint venture and which has not completed three financial years from the date of commencement of business, then either the said JV shall fulfill each eligibility criteria or any one constituent member/ promoter of such a JV shall fulfill each eligibility criteria. If the bid is received with the proposal that one constituent member/ promoter fulfils each eligibility criteria, then this member/promoter shall be clearly identified and he/it shall assume all obligations under the contract and provide such comfort letter/guarantees as may be required by Owner. The guarantees shall cover inter alia the commitment of the member/ promoter to complete the entire work in all respects and in a timely fashion, being bound by all the obligations under the contract, an undertaking to provide all necessary technical and financial support to the JV to ensure completion of the contract when awarded, an undertaking not to withdraw from the JV till completion of the work, etc.
 - c) In case the bidder(s) is/are a consortium (including an unincorporated JV), then the following conditions shall apply:
 - 1) Each member in a consortium may only be a legal entity and not an individual person.
 - 2) The Bid shall specifically identify and describe each member of the consortium;
 - 3) The consortium member descriptions shall indicate what type of legal entity the member is and its jurisdiction of incorporation (or of establishment as a legal entity other than as a corporation) and provide evidence by a copy of the articles of incorporation (or equivalent documents);
 - 4) One participant member of the consortium shall be identified as the "Prime member" and contracting entity for the consortium;
 - 5) This prime member shall be solely responsible for all aspects of the Bid/ Proposal including the execution of all tasks and performance of all consortium obligations;

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- 6) The prime member shall fulfill each eligibility criteria;
 - 7) A commitment shall be given from each of the consortium members in the form of a letter signed by a duly authorized officer clearly identifying the role of the member in the Bid and the member's commitment to perform all relevant tasks and obligations in support of the Prime/lead member of the Consortium and a commitment not to withdraw from the consortium;
 - 8) No change shall be permitted in the number, nature or share holding pattern of the Consortium members after pre-qualification, without the prior written permission of the Owner.
 - 9) No change in project plans, timetables or pricing will be permitted as a consequence of any withdrawal or failure to perform by a consortium member;
 - 10) No consortium member shall hold less than 25% stake in a consortium;
 - 11) Entities which are affiliates of one another are allowed to bid either as a sole bidder or as a consortium only;
 - 12) Any person or entity can bid either singly or as a member of only one consortium.
- d) In case the bidder is an Indian arm (subsidiary, authorized agent, branch office or affiliate) of a foreign bidder, then the foreign bidder shall have to fulfill each eligibility criteria. If such foreign company desires that the contract be entered into with the Indian arm, then a proper back to back continuing (parent company) guarantee shall be provided by the foreign company clearly stating that in case of any failure of any supply or performance of the equipment, machinery, material or plant or completion of the work in all respects and as per the warranties / guarantees that may have been given, then the foreign company shall assume all obligations under the contract. Towards this purpose, it shall provide such comfort letter/guarantees as may be required by Owner. The guarantees shall cover inter alia the commitment of the foreign company to complete the entire work in all respects and in a timely fashion, being bound by all the obligations under the contract, an undertaking to provide all necessary technical and financial support to the Indian arm or to render the same themselves so as to ensure completion of the contract when awarded, an undertaking not to withdraw from the contract till completion of the work, etc.
7. **EMD of ₹. 28,00,000 (Rupees Twenty Eight Lakhs Only) shall be submitted. Tenders without EMD shall be rejected.**

Bidders shall submit an **Earnest Money Deposit of ₹. 28.0 lakh (Rupees Twenty Eight Lakhs only) by crossed account payee Demand Draft** drawn on any **Indian Nationalised / Scheduled banks other than Co-operative banks** and drawn in favour of **HINDUSTAN PETROLEUM CORPORATION LIMITED** payable at **Mumbai. Copy of EMD should be uploaded along with the Unpriced Bid. Bids received without EMD shall be rejected.** Bank Guarantee towards EMD is also acceptable but it should be issued by an Indian Nationalised / Scheduled Bank, other than Co-operative banks. Format of BG is enclosed. The Bank Guarantee shall be valid for a period of 180 days from the date of opening of the Unpriced Bid.

A) Cheques, cash, Money Orders, Fixed deposit Receipts, towards EMD are not acceptable.

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B) Similarly, request for adjustment against any previously deposited EMD / Pending Dues / Bills /security Deposits of other contracts etc. will not be accepted towards EMD.

C) Exemption from EMD: Central Public Sector Enterprises are exempted from payment of EMD. The proof that the tenderer is PSE must be submitted along with Technical-Bid or else their offer is liable to be rejected.

Units registered under NSIC are entitled to exemption from payment of earnest money and security deposit for performance upto **monetary limits specified in the NSIC certificate**. subject to: Registration certificate being valid as on date of quotation. Technical Bid is accompanied by a notarized copy of valid NSIC Registration Certificate. Photocopy of application for registration as NSIC or for renewal of NSIC will not be acceptable. Such offers will be treated as offers received without EMD. Registration with DGS&D will not entitle the Tenderer to claim exemption from payment of EMD. The EMD is liable to be forfeited or parties who have opted for exemption from submitting the EMD, shall be barred for a period of one year from taking part in any tender floated by HPCL in future , in the event of :

- i. Withdrawal of offers during the validity period of the offer.
- ii. Non-acceptance of Orders, if and when placed.
- iii. Any unilateral revision in the offer made by the tenderer during the validity of the offer.
- iv. Non payment of Security Deposit, against LOIs / POs within the stipulated period of 15 days from date of placement of LOIs / POs, whichever is earlier. EMD shall be refunded to all the unsuccessful tenderers after finalisation of the Tender. For successful tenderers, refund shall be made only on payment of Security Deposit against LOI / PO, as placed by them. EMD shall not bear any interest and shall be refunded by Cheque/e-payment. While claiming refund, the original Cash Receipt issued by HPCL must be surrendered.

The earnest money deposit (Original DD/Pay order or bank Guarantee) will be submitted before due date and time to Ch.Manager EP&P-LPG, Hindustan Petroleum Corporation Ltd., LPG Department, HB-3, 8 Shoorji Vallabhdas Marg, P.B.No.155, Mumbai-400 001. Please write the Tender No. and due date on envelope. HPCL is not responsible for delay due to any reason including postal delays in receipt of EMD.

Late/delayed EMD should not be considered.

8. **Integrity Pact: Duly Signed and Witnessed Copy of the Integrity Pact (as per the format enclosed) shall be submitted on line along with the above documents. Failure to sign the Integrity Pact shall lead to outright rejection of bid.**

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INTEGRITY PACT:

Integrity Pact (refer Annexure B) is a Pact between HPCL (as a purchaser) on one hand and the prospective bidder / contractor (vendor) on the other hand stating that the two parties shall make certain commitments to each other in regard to ensuring transparency and fair dealings in the purchasing activities of the Corporation.

The Integrity Pact (Annexure B) duly signed by the authorized official of HPCL and the Contractor, will form part of this contract / supply order. Proforma of Integrity Pact (which is issued along with the bidding document as Annexures A & B) shall be returned by the bidder along with technical bid, duly signed by the same signatory who signs the bid, i.e., who is duly authorized to sign the bid. All the pages of the Integrity Pact shall be duly signed by the same signatory. **Bidder's failure to return the Integrity Pact along with the bid, duly signed, shall lead to outright rejection of such bid.**

If the Bidder has been disqualified from the tender process prior to the award of contract according to the provisions under Integrity Pact, HPCL shall be entitled to demand and recover from bidder Liquidated damages amount by forfeiting the EMD / Bid security (Bid Bond) as per provisions of Integrity Pact.

If the contract has been terminated according to provisions of the Integrity Pact, or if HPCL is entitled to terminate the contract according to provisions of Integrity Pact, HPCL shall be entitled to demand and recover from the Contractor liquidated damages amount by forfeiting the Performance Bank Guarantee / Security Deposit as per Integrity Pact.

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INSTRUCTIONS TO TENDERERS

DOCUMENTS TO BE UPLOADED ALONG WITH TECHNICAL BID

1. Documents to be uploaded along with the tender shall be as follows:

Sr.No. Document

1. Technical Bid
2. EMD
3. Details of Job currently in hand with HPCL
4. Documents supporting all the requirements of Pre-qualification criteria
5. Copy of CCOE License as "Approved manufacturer of pressure vessels under SMPV Rules 1981"
6. Confirmation of "Supply of steel plates from M/s. SAIL only" on letter head.
7. Integrity Pact duly signed and witnessed

IN CASE VENDOR FAILS TO UPLOAD THE ABOVE DOCUMENTS ALONG WITH THEIR TECHNICAL BID, THEIR BID SHALL BE LIABLE TO BE REJECTED WITHOUT ANY FURTHER REFERENCE TO THE VENDOR.

2. **Validity**

Quoted prices shall be valid for a period of **120 days** from the due date / extended due date for placement of order.

3. **The works are required to be carried out in working LPG Plant having time restrictions, access restrictions, space restrictions, entry / exit restrictions etc. The entry of men, machinery & material into the Plant is governed by regulations / permissions stipulated by Plant Authorities which shall be adhered to in toto.** The tenderers are advised to visit the site and get acquainted with the site conditions. HPCL will not provide any infrastructure such as water, power, internal roads for construction works of the mounded storage.
4. The tenderers should note the site conditions before quoting. The site will be offered on **AS IS WHERE IS** condition for the execution of this job. It will be the sole responsibility of the Vendor to ensure that they abide by the various rules, regulations, bye-laws and other statutory requirements, etc. imposed by the Government / Semi-Government and / or other local authorities governing execution of this job.
5. The tenderers should study all the documents / conditions etc. in this tender document carefully before submitting their offers. If there are any doubts, they should get clarifications from HPCL, Mumbai through e-procurement but this shall not be a justification for late submission of tenders or extension of due date of the tender.
6. **Origin of steel plates & Fabrication: Steel plates manufactured by M/s. SAIL are ONLY acceptable under the scope of this tender. Vendors are advised not to quote for the tender with any other brand of steel plates other than M/s. SAIL. The tenders with any other origin of steel plates will be rejected without assigning further reasons.** All plates shall be delivered at site of work.

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7. As far as possible, the tenderers should endeavor not to stipulate any counter terms / conditions or modifications of tender clauses and should quote strictly as per tender conditions. This will assist in proper evaluation of each offer. However, should there be any specific comments in respect of any of the Clauses, the same may be highlighted in a separate deviation schedule in the Technical bid.
8. HPCL reserves the right to reject offers not meeting its Technical requirements and commercial conditions.
9. HPCL shall not be bound to accept the lowest tender and reserves right to accept any or more tenders. Decision of HPCL in this connection shall be final.
10. HPCL reserves the right to accept any tender in whole or in part or reject any or all tenders without assigning any reason.
11. The third party inspection agency (TPIA) for the entire work will be arranged by HPCL. Vendor shall arrange for the Third Party Inspection services for BQ Plates, at BQ Plate manufacturer's works at their own cost.

The Approved TPI Agencies for inspection of BQ Plates at Plate manufacturer's work are - Lloyds Register , Bureau Veritas and IRS.

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GENERAL REQUIREMENTS

1. Execution of Work:

- a) The Vendor shall carry out the Job strictly in accordance with approved Drawings, Specifications and other Tender documents and as per directions in the Purchase Order / Tender. Vendor shall submit a detailed QA Plan to HPCL / HPCL approved TPIA for approval for each job, i.e., Ground Improvement Methods, Civil Works, BQ Plate procurement, fabrication, instrumentation works, CP system, PU coating, Radiography, Hydrotesting, SR etc. Inspection shall be carried out as per approved QA Plan. The Vendor shall not undertake on their own any changes in the Specifications mentioned in the Tender documents and Purchase Order.
- b) It shall be Vendor's responsibility to procure all required Materials / Equipment etc. No delay due to non-availability of any Material / Equipment will be entertained by HPCL as per attached makes, brands, models etc.
- c) The Vendor shall, submit before starting work, a detailed Construction program / BAR chart adhering to the completion time as accepted under Delivery Schedule Clause of this Order to our LPG Projects Dept. at Hindustan Bhawan, Mumbai. Programme thus submitted shall form part of the contract and shall be binding on the Vendor. However, HPCL reserves the right to alter the program, if necessary, from time to time for which no claim from Vendor shall be entertained.
- d) Vendor shall be required to submit regular fortnightly progress reports and Inspection reports of their work to our LPG Projects Dept. at Hindustan Bhawan, Mumbai.
- e) The responsibility of Safety and Security of the Materials and Equipment brought or installed by the Vendor at our Site (till they are handed over to HPCL) will remain in custody of the Vendor and any claim of whatsoever nature due to any loss or otherwise will not be entertained.

2. Approval from CCOE:

Vendor should be CCOE approved Pressure Vessel Manufacturer under SMPV Rules 1981 and will be **required to furnish a copy of such approval from CCOE along with the Technical Bid.**

Before taking up construction of Mound and fabrication of Pressure Vessel, the Vendor will be required to obtain approval of Chief Controller of Explosives, Nagpur on the Design calculations for Civil works and Fabrication drawings of the Pressure Vessel and the total storage installation including mounding, CP installation etc. Vendor shall furnish a copy of such approval to HPCL for their records. **FEM Analysis report required for obtaining CCOE approval shall be got done by the vendor at their own cost by the HPCL approved structural consultants.** The approved structural designers for carrying out FEM Analysis are **M/s. Systech Consultancy Services, Mumbai & M/s. ProSim R&D Centre, Bangalore.** For any change in the agencies other than the approved above, vendor shall obtain prior written permission from HPCL and HPCL is not bound to approve the change. The report shall be submitted to HPCL / TPIA for approval before submitting to CCOE. All Instruments etc. installed on the Pressure Vessels shall be approved by CCOE.

3. Inspection By HPCL:

HPCL & their representatives (TPIA) reserve the right to inspect the entire work of the Pressure Vessels at any time. Vendor shall extend all facilities & co-operation to HPCL & their authorised representatives (TPIA).

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4. Deviation in Design / Specifications / Approved makes / Brands:

For deviations, if any, proposed by the Vendor in Specifications / Drawings, the Vendor should get them approved in writing from the appointed Third Party Inspection Agency and HPCL prior to the execution. The deviations should be approved by CCOE also.

Any financial benefit accruing to the Vendor due to such deviations shall be passed on to HPCL and the decision of HPCL on the deviation acceptance shall be final.

5. Delivery Schedule:

The required Delivery Period is **11 (Eleven) Months** from the date of issue of LOI or advise to start the work by Site / Sr. Manager-LPG Projects HQO, whichever is later. It may be noted that the contractor may **NOT** be allowed to carry out the works round the clock on all days including holidays subject to meeting applicable statutory norms. The works have to be carried out within the premises of working plant, all necessary safety related issues, working hours etc shall be adhered to as per guidelines by the Plant Authorities.

The **Date of Delivery** shall be the Date of Handing over the **completed mounded storage vessel works** along with **Certificate of Control & Safety Certificate under Rule 33 of SMPV** from Third Party Inspection Agency and submission of As-Built Drawings after Erection & Hydro testing and **obtaining CCOE approval**.

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SCOPE OF WORK & DESIGN PARAMETERS

1.0 SCOPE OF THE WORK IN GENERAL:

The scope of work of this tender includes the following;

- a) Carrying out Detailed Engineering, Design, preparation of drawings, applying to CCOE for approval, etc complete. The drawings & designs shall be for – ground improvement, civil foundations, retaining wall, tunnels etc., and mechanical drawings including Vessel, cutting schedule, BOM, etc., complete. Vendor shall submit all detailed design calculations after approval by Back up consultants, to HPCL / TPIA, appointed by HPCL for approval. **Vendor shall arrange for carrying out FEM Analysis of vessels to assess the stresses in the vessel & stiffener for various loading conditions & report shall be submitted to TPIA / HPCL for approval.** The approved structural designers for carrying out FEM Analysis are **M/s. Systech Consultancy Services, Mumbai & M/s. ProSim R&D Centre, Bangalore**. For Civil works, approved design engineer is **M/s. GP Engineering Services**. For any change in the agencies other than the approved above, vendor shall obtain prior written permission from HPCL and HPCL is not bound to approve the change. Civil design to be prepared as per Soil Investigation Report / Foundation study provided by HPCL.

Procurement of “SA 537 Class-1 Boiler Quality” steel plates, Supply, Transportation, Fabrication, Erection, Testing & Commissioning of Mounded Storage Vessels, preparation of Civil & Fabrication Drawings & submitting the Detailed Design calculations etc., after approval by Back up consultants, to HPCL / TPIA, appointed by HPCL for approval. The Comments etc. of HPCL / TPIA shall be incorporated in the drawings at **NO EXTRA COST**. The construction shall be in accordance with PD 5500 latest edition and OISD Standard 150. Though EEMUA code is not a statutory code, certain provisions as listed in EEMUA (latest edition) have to be incorporated. These have been listed in the detailed specs. The Drawings shall then be submitted by contractor to Chief Controller of Explosives, Nagpur for approval which has to be obtained by contractor, prior to start of civil work, fabrication, etc. Necessary changes / Comments as suggested by CCOE shall be incorporated by the Vendor, under information to HPCL at **NO EXTRA COST**. Mound Construction and Fabrication shall not start till the approval of CCOE for drawings and design is obtained. Back-Up Consultant shall be involved at all stages of drawing preparation and approval.

- a) Designing & Execution of Ground Improvement work for Mounded Storage Vessels. Ground improvement is envisaged with excavated earth itself along with soling stones. However, the detailed design / requirement to be ascertained.
- b) Procurement and Supply of all materials like Steel Plates from SAIL, Various fittings like Nozzles, Flanges, Safety valves, Level gauges, instrumentation, high level alarm etc., as required for the fabrication of Pressure Vessel in accordance with the approved specifications as per BS 5500 Class I and approved drawings. All Instruments / Fittings to be provided should be as per specs given in the tender and shall have the approval of CCOE Nagpur.
- c) Construction of Domes for nozzles.
- d) Preparing & submitting the Quality Assurance (QA) Plan to HPCL / TPIA for approval, for executing the entire job. Comments of HPCL / TPIA shall be incorporated and executed at NO EXTRA COST. Stage Wise Inspection shall be carried out by HPCL / TPIA (to be appointed by HPCL). Since the TPIA shall be engaged by HPCL, contractor has to give their Schedule well in advance (**min. 7 working days**) for Third Party Inspection. Liaisoning with Third Party Inspection

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Agency has to be done by the contractor. Delay in TPI will not be considered as a reason for delay in the completion of the job. Decision of HPCL / TPIA shall be binding on the Contractor.

- e) Execution of entire Civil Works, Fabrication, welding, stress relieving, NDT etc. of entire storage Pressure Vessel with stage wise Inspection from HPCL & TPIA as per approved Quality Assurance Plan.
- f) 100% Radiography before and after Stress Relieving, 100% Stress Relieving, Wet Fluorescent Magnetic Particle Inspection / Testing (WMPI) after Stress Relieving, Hydro-testing of the Vessel at appropriate stages as per BS code. **WMPI shall be carried out for both Internal & external surface of the weld joints. Hardness test shall be carried out for heat affected zone (HAZ).**
- g) Design, approval by Third Party Inspection agency, supply, installation, testing and commissioning of Impressed Current cathodic protection system for the mounded storage facility including anode beds, transformer rectifier units, UPS, cables etc. complete as per the design & TPIA requirements.

2. DETAILED SCOPE OF CIVIL WORKS RELATED TO MOUNDED STORAGE:

Below stated jobs give a broad scope of work & include all related Civil Works like Excavation, Backfilling, disposal of excess unusable earth, Supply of various materials etc. PCC, RCC, reinforcement, Shuttering as per design, standard engineering practices, etc. including all materials, tools, tackles, equipment & machinery required to execute the work. NO EXTRA PAYMENT WILL BE MADE & RATES QUOTED SHALL BE INCLUSIVE OF ALL RELATED JOBS. Vendor to include any other item required, in their quoted rates. Further the Comments incorporated by HPCL / TPIA during approval of Drawings etc. shall also be executed at NO EXTRA COST.

- i) Carrying out Ground improvement by excavation, sand / murrum filling / excavated earth filling (as specified in the BOQ) & compaction including all the tests as required and as specified by our consultant and as per the standard engineering practice, with stage wise inspection by TPIA.
- ii) Sand filling includes Compaction to achieve 98 % Maximum Dry Density (MDD), up to the required level in various stages of construction and compaction & other related jobs.
- iii) **Construction of RCC Retaining Walls (Min. M 30 grade) on the front side at about a distance of 2 M from the dish end of the vessel and Retaining walls on all other sides up to centre line of the vessels to retain sand filling / stone pitching. Access tunnels for bottom nozzle with clear inside dimensions of 1.8 Wide x 1.5 M height shall be provided.**
- iv) Sand filling above & by sides of vessels including Compaction to achieve 93% MDD, to the required level and slope on the balance 3 sides of the bullets for forming the mound.
- v) Stone pitching and grouting in CM (Min) 1:4 to make the mound impervious. Stone filling , pea gravel etc as required as per design and drawings.
- vi) Laying of Geotextile sheet of make-Terram 1000 or approved equivalent, UPVC sheet 1000 microns etc. at the required levels. Payment of Geotextile / UPVC sheets shall be made on Plan Area Basis & no Laps etc. shall be paid for extra. Vendor to provide Laps as per manufacturer's specification or 500 mm whichever is greater, in all directions for both geotextile and UPVC sheet.
- vii) Staircases for the mound made of RCC structure, suitable tiling on steps / landings, handrails etc.

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- viii) Construction of Inspection Tunnel of opening size 1.8 m wide X 1.5 m high, made of RCC (Min. Grade M-30), for inspection of Bottom Nozzles.
- ix) Construction of Pavements all around the mound. For pavement, PCC M-20 shall be laid in panels. Prior to concreting, excavation of soil to the required depth and filling of sand in layers for specified thickness (preparation of sub grade) to be done for a level and well-compacted surface for concreting.
- x) Stage Wise Inspection shall be carried out by HPCL or HPCL appointed TPIA for the entire Civil Works as per the approved QA Plan.
- xi) All Payments for RA Bills shall be made as per Schedule of Rates (SOR) approved by HPCL in the Purchase Order & as per Payment Terms & Conditions.
- xii) Site Cleaning after completion of the entire work.
- xiii) Any other item needed for completing the entire work is included in the scope of Vendor at no extra cost.

3. MISCELLANEOUS:

- (i) Insurance for all Transportation jobs & erection of Pressure Vessels will be arranged by the vendor at their own cost. HPCL will have no liability till completion & handing over of the vessels. In case of any damage is caused to the Pressure Vessels during the Transportation / Loading / Unloading / fabrication, the same shall be repaired & made good in accordance with relevant Code at their own cost and to be approved by CCOE and TPIA..
- (ii) Construction of Mound and Fabrication of Mounded Storage Vessels as per approved Drawings.
- (iii) Stage wise Inspection / Certification by Third Party Inspection covering approval of Design, Drawings, Material, Fabrication, Testing of Pressure Vessels, Fittings and Complete Vessel, Associated Civil Works, Ground Improvement Methods etc. The inspection of all Instruments shall be done by HPCL approved TPIA.
- (iv) All drawings verified / approved by Backup Consultants should be submitted to HPCL / TPIA for approval before commencement of the required activity.
- (v) Cleaning and painting of the vessel as detailed in the Annexure.
- (vi) Vendor shall furnish **SIX sets** of final Fabrication drawings and Design calculations duly stamped by Third Party Inspection Agency & approved by CCOE, Nagpur and one set in SOFT FORM (CD) of Fabrication drawings (Autocad 2010) and Design calculations to HPCL for their records.
- (vii) Vendor will furnish original copy of **Certificates of Control & Safety Certificate under Rule 33 of SMPV** issued by Third Party Inspection Agency and all other Test certificates to HPCL.
- (viii) Setting up of permanent Bench Marks required to measure the settlement of vessel at the time of hydrotest and recording of settlement readings as per format approved by TPIA.
- (ix) Vendor shall Supply and Install Flame proof, explosion proof & weather proof instruments mentioned below **for each vessel** viz.

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- (a) 1 no. Servo Level gauge cum transmitter type ATG 854 of Enraf or equivalent models of Endress Hauser or Tokyo Kieso and shall be capable of measuring both level and density
- (b) 1 no. Radar Gauge with all accessories
- (c) 1 no. Pressure Transmitter of approved make,
- (d) 1 no. High level Alarm switch of Tokyo Kieso or equivalent approved make,
- (e) 1 no. Averaging type Temperature multi-point sensors type Temperature Transmitter with thermowell

complete with tank farm management system integrating all outputs from the instruments (level, density, Pressure & Temperature) including software for generating real time & historical reports / screens, analysis, quantity measurements, daily out turns and MIS reports.

- (f) 2 Nos. Multi-port Safety Relief Valves of Rego or approved equivalent make on each Pressure Vessel along with one No. lock open type Fire Safe Ball Valve of approved make having API monogram along with each safety valve as per enclosed technical specifications. Vent pipes of min 3 m height with cowl /cap, flanges etc complete for providing the vents is included in the scope.

All the gauges / transmitters should have FLP, ExP, WP local / field indications suitable for LPG application & also in the Tank Farm Automation system and shall include supply of all communication / power / control cables, double compression cable glands & lugs for inter-instrument wiring and wiring with Communication interface unit / PC (approximate distance between Control room and the mounded storage facility is 500 m). The CIU should be able to provide an independent "modbus" output for hard wired connection to the SCADA system (future). The laying of cables is included in the scope of the contract, the termination and commissioning of all instruments in the tank farm management system is included in the scope. Laying of cables shall be through the approved cable routes, with minimum 750 mm depth above cables, 300 mm width of cable trench, two layers of sand of 100 mm and 150 mm, bricks laid on edge for cable protection, excavation, backfilling, roadcrossings if required including making up to original state, cable markers etc. Cables for instrumentation and CP system shall follow separate cable trenches; and rates are inclusive in instrumentation and CP system schedules.

The tank farm management system for all the vessels put together shall also include the supply of one no. personal computer along with accessories and this shall be the latest version of IBM / Dell / Compaq make but having minimum specifications as below: Intel Pentium i7 E5200 (2.5 GHz), 6 GB DDR2 SDRAM, 500 GB Standard, Intel GMA 3100, Microsoft Windows 7 Business Premium 64-bit Edition, Personal computer, 29" colour monitor (LCD screen), keyboard, optical mouse, laser jet printer, Network interface card 10/100 base-T, minimum 3 extra USB ports for future use, hot Standby machine with KVM switch (sharing key board, mouse & monitor) with pre-loaded operating system along with PC cabinet, UPS for entire instrumentation requirements. UPS for CP system is separate and covered under CP schedule.

Offers without Gauging system, level, pressure, temperature Transmitters, tank farm management system and safety relief valves will be treated as incomplete and will be liable for rejection. Vendor to quote the make of equipment he desires to supply at the time of submitting his bid.

- (x) Water for associated civil works & Hydro-testing shall be arranged by the Vendor at their own cost.
- (xi) Power required for Vendor's work & lighting at Site shall be arranged by the Vendor at his own cost.

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- (xii) Preparation and submission of calibration charts using theoretical method and liquid calibration method. The vessels shall be calibrated just before final handing over and shall have the approval of both the local Weights and Measures department and CPWD. Only reputed parties, approved by HPCL, shall be engaged for calibration of the vessel. Contractor shall obtain prior approval of HPCL for the calibration procedure. Rates quoted shall include calibration of the vessels.
- (xiii) The vessels, foundation etc. shall be designed for suitable seismic Zone as per IS 1893 considering Importance Factor as 1.5.

4. Design Parameters / Material Specifications:

4.1 VESSEL

- | | |
|---|--|
| 1. Storage Capacity of LPG | : 650 MT each, 3 nos |
| 2. Volumetric Water Capacity | : Vendor to specify considering 85% highest filling level in the vessel. |
| 3. Density of LPG | : 0.55 gm/cc |
| 4. Design Codes | : PD 5500 Latest edition and OISD 150 |
| 5. Design Pressure (Internal)
(External) | : 14.5 Kg/cm ² Gauge at Top
: 1.856 kg/cm ² Gauge |
| 6. Design Temperature | : - 27° C to + 55° C |
| 7. Hydraulic Test Pressure | : As per code |
| 8. Radiography | : 100% before and after PWHT |
| 9. Corrosion Allowance | : 1.5 mm |
| 10. Post weld Heat Treatment | : Required |
| 11. Wet Fluorescent Magnetic Particle Testing | : Required after PWHT |
| 12. Hardness checking of HAZ | : Required after PWHT |
| 13. Mapping of plate thickness | : Required |
| 14. Joint efficiency | : 1 |
| 15. Length of Pressure Vessel | : As per requirement. |
| 16. Dia of Vessel | : 7000 mm (approx) ID |
| 17. Length of Vessel | : 42000 mm End to End (Approx) |
| 18. Dished Ends | : Hemispherical |

Notes:

1. All Openings will be of 300# weld neck Flanged type with Nozzle Construction.

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2. **FEM Analysis** shall be conducted for the Vessel to assess the stresses in the vessel & stiffener for various loading conditions and various stiffener sizing combinations & report shall be submitted to TPIA / HPCL for approval. The approved structural consultants are **M/s. Systech consultants, Mumbai & M/s. ProSim R&D Center, Bangalore.**
3. Stiffeners shall be provided as per the design requirements. The detailed design for stiffeners shall be submitted to HPCL for prior approval.
4. As the bottom 120 deg. Area is not accessible at hydro test, the weld joints in this region shall be ultrasonically tested followed by DP testing after hydro test.
5. All ASTM Pressure parts shall meet the Design Code Requirements for Impact testing as per app. D & Cl. 2.3.2 of PD 5500 (latest edition) or equivalent. The requirement of OISD 150 shall also be incorporated.
6. The maximum differential settlement allowed is 25 mm. Total settlement allowed is max 60 mm.

4.2 MATERIAL SPECIFICATIONS:

1	Shell, Dished Ends, Stiffener rings, Pad plates, Cleats etc.	SA 537 Cl 1 (detailed Specs enclosed)
2	Nozzles	SA 333 Gr. 6
3	Flanges	SA 350 Gr. LF2-ASA 300 WNRF as per ANSI 16.5.
4	Couplings	SA 350 Gr. LF2 6000 lbs
5	Bolts/Nuts	SA 320 Gr. L7 or SA 194 Gr. 4 / Gr. 7
6	Gaskets	SS 316 Spiral Wound Asbestos filled.

4.3 Nozzles:

Following Nozzles shall be provided by the Vendor on each Pressure Vessel. A sleeve structure made of glass reinforced epoxy or un-plasticised polyvinyl chloride shall be provided around nozzles and manholes in line with EEMUA recommendations. Final orientation of all Nozzles will be given by HPCL at the time of approval of Fabrication drawings. The Liquid Inlet / Outlet Nozzle shall extend upto 3 m from the face of vessels & shall have no flange Joint except at the end. It shall be adequately supported , additional spring support shall be provided (design of spring support to be approved by HPCL / TPI) & shall be stress relieved & Hydro tested.

All Nozzles shall be provided with SA 350 Gr. LF2, 300 lbs. RF blind Flanges and stud/nuts.

- | | | |
|----|---|---------|
| 1. | 750 mm dia Manhole with cover | : 2 no. |
| 2. | 250 mm dia Nozzle for Liquid receipt withdrawal line at bottom | : 1 no. |
| 3. | 100 mm dia Nozzle for Liquid return at Top | : 1 no. |
| 4. | Nozzle of suitable size (6" NB) for Servo Level / Radar Gauge along with stilling well / dip pipe | : 2 no. |
| 5. | 2" Nozzle for Pressure Gauge / Transmitter at Top. | : 1 no. |

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- | | | |
|----|--|----------|
| 6. | 2" Nozzle for Avg. Temperature Gauge / Transmitter at top. | : 1 no. |
| 7. | 100 mm dia Nozzles for Vapour line on Top (1 Nozzle with Dip pipe) | : 2 nos. |
| 8. | Suitable Size Nozzle for Safety Valves on Top.(design to be submitted) | : 2 nos. |
| 9. | Spare nozzle 2" | : 1 no. |

(Party to design Safety Valve & Nozzle & submit calculations for the same)

- | | | |
|-----|---|--|
| 10. | 100 mm dia Nozzles for High Level Alarm with Dip pipe. | : 1 no. |
| 11. | Lifting lugs suitably spaced on the Top | : As Required as per design. |
| 12. | Cleats as required for providing operating platforms wherever required. | : No. of cleats to be provided will be decided later |

4.4 MISC. REQUIREMENTS:

- | | | |
|----|-----------------------------------|---------------------|
| 1. | Earthing Boss and CP Connection | : As required |
| 2. | Name plate with following details | : 1 no. per Vessel. |
| | a) Manufacturer's name | |
| | b) Manufactured for | |
| | c) Designed by | |
| | d) Design code | |
| | e) Design pressure | |
| | f) Design temperature | |
| | g) Date of first hydro testing | |
| | h) Capacity & size of vessel | |
| | i) Water capacity | |
| | j) Empty weight | |
| | k) Corrosion Allowance | |
| | l) Radiography | |
| | m) Stress Relieving | |
| | n) Inspected by | |
| | o) Certificate number | |
| | p) Drawing number | |
| | q) Vessel serial number | |

In addition to providing the name plate, the following details are to be punched on the manhole flange ring.

1. Design code
2. Design pressure
3. Test pressure

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4. Date of first test
5. Inspected by
6. Certificate number
7. Drawing number

5. SCOPE OF THIRD PARTY INSPECTION (TO BE APPOINTED BY HPCL):

- (i) Approval of FEM Analysis, Ground Improvement Methods, QAPs, Civil & Mechanical Fabrication drawings / design calculations.
- (ii) Identification of Raw materials, Instruments, Flanges, welding electrodes etc., with respect to Test Certificates (MTCs) & Checking of forming of plates, edge preparation and mock assemblies.
- (iii) Verification of welding procedures and carrying out welder qualification tests.
- (iv) Stage-wise Inspection of all Civil Works including Ground Improvement Methodology, RCC, PCC, Reinforcement, Geotextile, Aggregates, Sand, quality of civil construction materials, QC checks at site and Laboratory etc.
- (v) Carrying out compaction tests wherever required.
- (vi) Stage-wise Inspection during fabrication of Vessels.
- (vii) Inspection of components at Vendor's works.(including approval of vendors by verification of documents submitted by the fabricator)
- (viii) Approval of all weld set ups and back chipping.(Welding rods /makes to be approved as per submitted documents by the fabricator)
- (ix) Examination of radiographs and supervision of repairs wherever necessary.
- (x) Approval of the design calculations of CP installation and the stage-wise inspection of execution.
- (xi) Approval of stress relieving.
- (xii) Attendance to other non-destructive tests and such hardness measurements, magnetic flux tests and ultrasonic tests where specified.
- (xiii) Inspection of assembly.
- (xiv) Final dimensional checks.
- (xv) Attendance of hydraulic and pneumatic tests.
- (xvi) Inspection of cleaning and painting.
- (xvii) Issue of certificate of control & Safety certificate under Rule 33 of SMPV.
- (xviii) Issue of Inspection reports.
- (xix) Any other items of Inspection not covered above but required as per Inspection Agency / Design Code / Statutory requirements / Safety requirements / Static and Mobile Pressure Vessels (Unfired) Rules, 1981 shall also form part of this Scope of Work.

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TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION FOR BOILER QUALITY **STEEL PLATES FOR MOUNDED VESSELS**

1. Description : Plates shall conform to ASME / ASTM SA 537 Class 1 (detailed specifications as given below)
2. Tolerance : On thickness positive only
3. Inspection : Lloyds / Bureau Veritas IRS (at the works of Supplier of BQ Plates)
4. Impact Testing : As per **PD 5500** or equivalent
5. Ultrasonic Testing : As per SA – 578 Level I
6. Heat Treatment : Normalized
7. Maximum Tensile Stress : 80,000 psi.
8. The Steel shall be made to fine grain particles.
9. **Origin of steel plates & Fabrication:** Steel plates manufactured by M/s. SAIL are **ONLY acceptable under the scope of this tender. Vendors are advised not to quote for the tender with any other brand of steel plates other than M/s. SAIL. The tenders with any other origin of steel plates will be rejected without assigning further reasons.** All plates shall be delivered at site of work.

PO on M/s. SAIL and invoices, gate passes, of SAIL to be submitted to HPCL. PO and invoices shall not be predated from HPCL MSV Purchase order.
10. Supplementary Requirement
 - a) The plates shall be free of scales and rolled in the direction of length specification and shall be supplied in the normalized condition. Accelerated cooling by liquid quenching or other means is not permitted. **Plates shall be ordered with testing of sample for mechanical properties after simulation.**
 - b) The plates shall be supplied with gas / sheared edges with tolerance as per SA 20 latest. Manual gas cutting is not acceptable. Tolerance on thickness shall be positive only.
 - c) All the plates shall be supplied in normalized condition.
 - d) The plates shall be free from injurious defects and shall have work-man like finish, **reconditioning / repair of plates by welding is not permitted.**

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- e) One product analysis of each heat shall be done as per relevant BS code on the entire surface of the plate with a square grid of 200 mm. UST shall be done after heat treatment and results recorded in the test certificates.
- f) Marking as per specification, accordingly Purchase Order No. shall be stenciled and inspector symbol shall be die-stamped.

11. OTHER REQUIREMENTS

- A) All Tests should be carried out in the presence of the Third Party Inspection Agency and shall be certified and stamped on each plate **ON BOTH ENDS at manufacturer's works.**
- B) MARKING: The plates shall be marked with Heat No., Plate No. and Batch No. on each plate.
- C) TEST CERTIFICATE: The material shall be duly certified by **M/s. Lloyds, M/s. IRS, or M/s. Bureau Veritas** at the Steel Plate Supplier's works. & necessary documents, test certificates covering details given below shall be submitted to HPCL:
 - a) Heat and plate number
 - b) Chemical composition cast and product, analysis
 - c) Heat Treatment cycles
 - d) Mechanical properties viz. Tensile, Yield, Elongation, impact.
 - e) Ultrasonic test results
 - f) Results of simulation PWHT of mechanical test coupons in two conditions in addition to the test results in as supplied condition of plates.
 - g) Charpy V- notch Impact Tests.

The Third Party Inspection at the BQ Plate supplier's Work shall be arranged by the tenderer & the rates quoted shall be inclusive of this Inspection. However, the TP Stampings on the Plates & material Test Certificates put at the manufacturer's works shall also be inspected by TPIA arranged by HPCL. Approved TPIA for inspection at Steel Plate supplier's works are M/s. Lloyds, , M/s. IRS, and M/s. Bureau Veritas.

- D) Vendor to **submit original invoices of purchase to HPCL** and same shall be returned to vendor after verification. HPCL shall retain the copies of all invoices of steel plates for future references.
- E) Manufacturer's Test Certificate in 3 sets to be dispatched immediately after TPIA clears the goods from their side.
- F) Production Test Coupon requirement shall be as follows:
 - i. Total Number of PTC required per Vessel: Min 05 (Minimum 5 nos) and the number may be increased as per discretion of HPCL / TPIA, to meet the following requirements

A. For Shell Plates

For Long Seams	:	One No per vessel/ per heat/ per procedure
For Circum-seams	:	One No per vessel /per heat/ per procedure
For Field Joints	:	One No per vessel/ per heat/ per procedure

B. For Dish End Plates

For Dish Plates	:	One No per vessel/ per heat/ per procedure
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For Shell to Dish Joint : One No per vessel/ per heat/ per procedure

ii. PTC Testing Requirement:

- 2 - Transverse Tensile test.
- 1 - All weld tensile test.
- 4 – Bends (2 root & 2 face) test.
- Micro, Macro, Hardness & Impact (weld, HAZ)

Technical Specifications for Steel Plates as per ASME / ASTM SA 537 Class-1

Material Specifications

CHEMICAL COMPOSITION

		Requirements
Element		Percentage
Carbon Max		0.23
Manganese (<40mm thickness)		
Heat Analysis		0.70-1.35
Product Analysis		0.64-1.46
Phosphorous max		0.035
Sulphur max		0.035
Silicon		
Heat Analysis		0.15-0.50
Product Analysis		0.13-0.55
Alloying elements, if present, shall not exceed the following amounts (percentage)		
	Heat analysis	Product Analysis
Copper - max	0.35	0.38
Nickel max	0.25	0.28
Chromium max	0.25	0.29
Molybdenum max	0.08	0.09
Cu+Ni+Cr+Mo max	0.70	
In addition to the above, one of the following requirements for Carbon equivalent based on Heat analysis shall be satisfied-		
$C_{eq} = C + Mn/6 \leq 0.42$ (eqn.-1)	when applicable material specification specifies C and Mn only.	
$C_{eq} = C + \frac{Mn}{6} + \frac{(Cr+Mo+V)}{5} + \frac{(Cu+Ni)}{15} \leq 0.43$ (eqn.-2)	when applicable material specifies the above elements or restricted chemical requirements are specified or supplementary requirements S19 and S21 of SA-20 are specified in material requisition.	

PHYSICAL PROPERTIES

Properties	HPCL Requirement
Tensile Strength	485-620 MPa (70 to 90 KPSI)
Yield Strength	345 MPa (50 KPSI)
Elongation – 50 mm	22% min

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Elongation – 200 mm		18% min
1a	Plate material	To conform to ASME / ASTM SA 537 Class. 1
1b	Make / Manufacturer's name & complete address of Manufacturing Unit	M/s. SAIL, Bhilai – Vendor to confirm the acceptance
2	Tolerance	As per SA 20 latest. No negative tolerance on thickness.
3.1	Inspection	Lloyds / Bureau Veritas / IRS (at the Steel Plate manufacturers works)
3.2	Scope & frequency of Inspection	<p>Witnessing all the tests performed on the plates as per the ASTM / ASTM standard for SA 537 Class 1 plates as specified above. The same shall include (but shall not be limited to) following:</p> <ul style="list-style-type: none"> i) Identification of Heat and plate number – All plates ii) Visual Inspection, dimensional checks – Each plate iii) Chemical / Ladle analysis – 1 / heat iv) Product Analysis – 1 / heat / thickness <p>Heat Treatment cycles –witness</p> <ul style="list-style-type: none"> v) Tensile, Yield, % Elongation: <ul style="list-style-type: none"> a. As supplied: 1/mother plate b. On Simulated heat treated test coupons : 2/heat/thickness vi) Impact Tests: <ul style="list-style-type: none"> a. As supplied : 1/mother plate b. On Simulated heat treated test coupons : 2/heat/thickness vii) Ultrasonic test : All plates ix) Any other test specified in ASME / ASTM standard for SA 537 C11 plates : As required
4	Impact Testing	<p>Charpy V-notch impact test as per S5 of specification SA-20 at (-) 30 deg Celsius shall be conducted. Impact test shall be conducted after the simulation heat treatment for test plates.</p> <p>Energy absorbed : 50 J min (Avg of 3 specimens) and 45 J min (individual)</p>
5	Ultrasonic Testing	As per SA – 578 Level B on the entire surface of the plate with a square grid of 200 mm.
6	Heat Treatment	Normalized. Accelerated cooling by liquid quenching or other means is not permitted.
7	Maximum tensile stress	620 MPa (80,000 psi) (preferably)

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8	Other Requirements	<p>Fine grain practices. The plates shall be free of scales. Final rolling in the direction of length. The plates shall be supplied with gas/sheared edges. Manual gas cutting is not acceptable.</p> <p>Plates shall be free from injurious defects and shall have work-man like finish. Reconditioning / repair of plates by welding is not permitted.</p> <p>Surface conditions shall meet requirements of EN 10163-2 Class A Subclass 3 & no negative tolerance in thickness.</p>
9	Marking on Plates	<p>All the plates shall be inspected and marked at both ends with the following details: Purchase Order No. shall be stenciled / painted Inspector symbol shall be stamped No. of relevant Standard and Appropriate Grade Heat No. & Plate No.</p>
11	Test Certificate	<p>Material test certificates shall conform to EN 10204 Type 3.2 covering the following details:</p> <p>Heat and plate number Chemical composition of cast and product analysis Heat Treatment cycles Mechanical properties viz. Tensile, Yield, Elongation, impact. Ultrasonic test results Results of simulation PWHT of mechanical test coupons Charpy V- notch Impact Tests</p> <p>Manufacturer's Test Certificate in 3 sets to be dispatched immediately after TPIA clears the goods from their side</p>
12	Painting and Coating	<p>No painting / coating of any kind is permitted to the steel plates, except details as manually marked</p>
13	Simulated Heat Treatment of Test Coupons	<p>Test coupons taken from normalized plates shall undergo one cycle of normalizing followed by two cycles of stress relieving before mechanical tests. Acceptance criteria shall be same as those for tested from normalized plates before heat treatment.</p> <p>a. Conditions Of Test Coupons Renormalizing and P.W.H.T. (Twice) b. Renormalizing and P.W.H.T. cycles : Renormalizing cycle: Loading Temp: 200degC and under Rate of Heating: 200degC per hour max. Holding: 930degC (Min.) 960degC (Max.) Soaking Time : 2 hours Cooling Method : In still air PWHT Cycle (Stress relieving):</p>

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		Loading Temp.: 300 deg C Rate of heating: 80 to 100 deg C/hr Holding Temp.: 610+/-10 deg C Soaking Time: 2 hours Rate of cooling (Furnace cooling): upto 300 deg C: 100 to 120 deg C/hr Below 300 deg C : In still air
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ADDITIONAL TECHNICAL SPECIFICATIONS FOR FABRICATION / MATERIALS.

1. All bolt holes of flanges shall straddle the principal center axes.
2. All butt welds shall be full penetration joints. Wherever back chipping is not feasible, root run shall be carried out by GTAW.
3. All nozzle flanges shall be as per ANSI B16.5 standard.
4. Manhole flanges as per as per ANSI B16.47 Series B
5. The gasket seating surfaces of all nozzles and man ways to have 125 RMS finish.
6. The vessel to have a slope of 1:200 between the ends with respect to True horizontal. However man way/ nozzle flange faces except the Liquid receipt nozzle N1 shall be parallel to true horizontal. The flange face of Liquid receipt nozzle shall be perpendicular to the horizontal.
7. All nozzles on the tank shall be provided with 2 nos. stiffeners of 100 x20 thk at 90 deg. Apart.
8. All sharp edges/corners to be rounded off.
9. All welded attachments to the tank to be welded before post weld heat treatment.
10. Prior of hydrotest, all weld spatter ,metal dust etc. shall be removed from the tank. During hydrotest, tank is to be supported on sand bed.
11. Production test coupon shall be provided in line with requirements as mentioned in technical specifications.
12. Radiography shall be carried out before and after post weld post weld heat treatment. And wet fluorescent magnetic particle testing of welds shall be carried out after post weld post weld heat treatment.
13. All forgings and nozzle flanges shall be MP/DP tested after machining. 10 dia. Antisiphon / vent hole shall be provided on all dip pipes near the top inside the vessel except temperature gauge nozzle.
14. Portion of tank covered with sand during hydrotest shall be ultrasonically tested before placement on sand bed.
15. Hardness test shall be carried out for Heat affected Zone and all weld metal after PWHT.
16. Nozzle necks fabricated from plates to be fully radiographed.
17. All weld metal and HAZ for procedure and production test coupons shall be impact tested.
18. Forgings, pipes and fittings to be impact tested at -27 deg.C. and to meet Impact test energy requirements of code.
19. Ovality of the shell shall be as per PD 5500 (Max. 0.5% of the radius).
20. Flange material SA 350 Gr. LF2 shall have 0.25% max. carbon content.
21. Hydrotest of vessel shall be carried out only once after stress relieving.
22. NDT of weld joints after hydrotest is as follows:
 - 100% UT Exam of all the T joints from inside of vessel followed by DP test.
 - M.P. of 1/3 rd length of fillet weld of inner shell to stiffner Web as 0 deg., 90,180, 270 deg.
 - After final inspection, before gassing up and commissioning of LPG Bullets , an ultrasonic shell thickness testing shall be carried out on the internal walls of bullet at the points designated for 5 years.
23. Hardness testing on production test coupons after PWHT to be carried out.
24. Reinforcement pads for nozzles to be tested pneumatically at 1 kg/cm² (G) after test T/t holes to be filled with hard grease.

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METHOD OF MEASUREMENT (FABRICATION, ERECTION, TESTING AND COMMISSIONING OF
MOUNDED LPG STORAGE BULLETS)

The following shall be measured for payment based on the theoretical weight considering a material density of 7.85 Gms / Cubic Centimetres under item fabrication job.

- a. Shells made of SA 537 Cl. I
- b. Dish-ends made of SA 537 Cl. I
- c. Dome made of SA 537Cl. I
- d. Manhole neck made of SA 537 Cl. I
- e. Reinforcement pads made of SA 537 Cl. I

Following SHALL NOT be measured for measurement under this item :

- 1. Unused Plates
- 2. Cut-offs / scraps
- 3. Unrecoverable scrap
- 4. Burning loss
- 5. Weight of Nozzle pipes, WNRF /BLRF Flanges, nut-bolts, washer, Gaskets, flexible bellows etc. Fabrication & erection of these items shall be paid under respective items.
- 6. Structural items made out of structural / tubular material (IS 2062 / IS 1139) such as ladder, staircase, plates, pipes welded as reference marks, lifting lugs etc
- 7. Any temporary structures, cleats etc made for facilitating fabrication, but removed later and hence not featuring in the as built drawing.

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SCOPE OF SUPPLY, INSTALLATION AND COMMISSIONING OF
TANK FARM INVENTORY MANAGEMENT SYSTEM

1. SCOPE OF THE JOB :

To provide the Tank Farm Inventory Management System, the vendor is required to supply, install, test and commission the following minimum equipments / accessories.

- (a) **Servo level gauges** (Electronic level transmitters) on top of LPG Bullets for accurate level and density measurements. The ELTs should be provided with **Bullet top local indication, Tank side indication near bullet area** or at any suitable location as advised by the Site-in-charge and should also have **modbus output** via RS 232C or RS485 for integration with tank farm inventory management software (display in PC) installed with a single SCADA platform.
- (b) FLP Pressure Transmitters of make Yukogawa or its equivalent as approved by HPCL one no., FLP / intrinsically safe local indicator, one no., FLP / intrinsically safe **tank side** indicator in LPG Pump house & **modbus output** via RS 232C or RS485 for integration with software / display in PC.
- (c) Multi point Average temperature measuring instrument cum transmitter on the top of bullet with local gauge, interface units with one no. FLP / intrinsically safe **local** indicator, one no., FLP / intrinsically safe **tank side** indicator in LPG pump house & **modbus output** via RS 232C or RS485 for integration with software / display in PC.
- (d) Radar gauge for level and density

NOTE:

- (i) The Design, Supply & Installation of "Still Well" on bullets will be done by vendor and shall be approved by TPI / HPCL / CCOE.
- (d) The tank farm management system for all the vessels put together shall also include the supply of one no. personal computer along with accessories and this shall be the latest version of IBM / Compaq / HP / Dell make but having minimum specifications as below:
Intel core i7, 6 GB DDR2 SDRAM, 500 GB Standard minimum, Intel GMA 3100, Microsoft Windows 7, Microsoft Windows 7 Business Premium 64-bit Edition Personal computer, 29" colour monitor (LCD screen), keyboard, optical mouse, laser jet printer, Network interface card 10/100 base-T, minimum 3 extra USB ports for future use, hot Standby machine with KVM switch (sharing key board, mouse & monitor) with pre-loaded operating system along with PC cabinet.

The software should be able to operate as an automation and control system with optimized inventory management, complete management information and easy to read operator presentation & control. The software should be menu driven, user friendly that interfaces to the field and to Control, MIS and ERP systems. The software should come with real-time data monitoring capable of assembling and analyzing real time and historical data.

- (e) Supply, installation, testing and commissioning of Parallel - redundant UPS of capacity **5 KVA minimum** with a Battery back-up of 30 minutes at full load, for the uninterrupted power requirements of all the above-mentioned instruments. The UPS shall provide 230V +/- (-) 10%, 50 Hz + (-) 3% AC supply to all field instruments. Scope includes providing the necessary battery bank, Control panel having rectifiers, inverters & all other accessories. The Control panel shall also consist of the outgoing distribution feeders with separate On/Off switch for the following specified instruments:

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- (i) All the field instruments under the scope of this tender at each location
- (ii) ROVs : 9 Nos
- (iii) High-level alarm : 3 Nos
- (iv) Spare feeders : 6 Nos
- (f) Supply, laying in cable trenches / cable trays (including all civil works, supply & laying of bricks / sand, cable trays and all other accessories required for the completing the cable laying works to the required specifications) and commissioning of all power, control, signal & communication cables, including cable lugs and terminations, between the Field instruments, Field instruments to local / remote indicators / Communication Interface unit / Computer display unit located in Administration building etc complete in all respects.
- (g) Supply, installation & commissioning of all required FLP & non FLP junction boxes including double compression cable glands of approved make for FLP junction boxes and single compression cable glands for non-FLP panels / JB's, necessary cable trays for laying the cables from field instruments to LPG pump house where remote indicators are installed.
- (h) All other works which are not specified above but are required to complete the system as a whole shall also be in the scope of bidders.

Tank Farm management system comprising of Servo Gauge FW 9000 of TK- Japan or equivalent and Radar Level Gauge type RTG 3960 of SAAB or equivalent make with associated accessories for local indication as well as remote indication of measured values, calculated values and interface unit with software for continuous monitoring of the tank farm operations, including monitoring of alarm limits. The measured values shall include Level, Volume, Density, Temperature & vapour pressure. All sensors and accessories like Tank side indicator, Local Data Acquisition Units, FCU / CIU Interface, software & PC, junction boxes, isolation switches, cabling (shall include supply and laying / testing of all communication / power / control cables, double compression cable glands & lugs for instrument wiring and wiring with Communication interface unit / PC) upto control room (located approx 500 m away) Pressure transmitter, etc. shall form part of the system. The system shall be capable of monitoring product in minimum 8 tanks. The Servo Level Gauge and also the Radar Level Gauge provided on the mounded vessel shall have Remote Display unit in LPG Pump house and shall be connected with the Tank Farm Management system. The CIU should be able to provide an independent "modbus" output for hard wired connection to the SCADA system.

All the equipments and accessories shall be explosion proof and having CCOE approval. The equipment shall have self-diagnosis and remote calibration facility.

Offers without Gauging system, level, pressure, temperature Transmitters, tank farm management system and safety relief valves will be treated as incomplete and will be liable for rejection. Vendor to quote the make of equipment he desires to supply at the time of submitting his bid.

3. CLIMATIC CONDITIONS

All the field equipment's shall be suitable for mounting and operation in wet tropical climate.

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Max. Temperature	-	50°C
Min. Temperature	-	5°C
Relative Max. Humidity	-	95%

4. OTHER REQUIREMENTS :

- (a) Vendor has to submit the following documents along with Unpriced Bid:
- (i) Schematic drawings showing the details of their connectivity details with respect to power, control & communication cabling, Data Sheets / Technical literature / Brochures / Makes / Catalogue Nos. of field instruments like ELTs, PTs, RTDs, local / remote indicators, CIU, PC with Printers, UPS, Distribution Boards, FLP / Non-FLP Junction boxes, Cable Glands with all other necessary details.
- (ii) Detailed literature on the software being offered and the user friendly menus / reports/data logging facilities / controls etc available in the system.
- (b) All the gauges with their remote displays should be of the same make so that the spares are common and inter-changeable.
- (c) Future Upgrade for TFMS (Tank Farm Management System)
- It should be noted that the Tank Farm Management System offered should have provision for future upgrades. The Make/Models of gauges offered should be latest and top of the line.
- (d) Power for all the instruments will be 230 V +/- 10% and frequency 50 +/- 3 hz and the same will be provided at the Control room in the Admin Building through 5 KVA minimum capacity UPS supplied by the vendor.
- (e) The Design / Installation of "Still Well" on Spheres / bullets will be done by vendor and shall be approved by TPI / HPCL / CCOE.
- (f) All instruments / gauges offered should be suitable for high pressure (40 bar) and low temperature (up to - 42 Deg. C) applications.
- (g) The Servo level gauges should have interface and density measurement capacity.

5. ELECTRICAL CLASSIFICATION

The hazardous areas are generally Zone 1, and all explosion proof and I.S. equipment shall be suitable for Zone I, IIA / IIB and temperature Class T3 as per IEC norms.

All Electrical Equipment to be approved by CCOE.

6. TROPICALIZATION PAINTING

All equipment has to be suitable for mounting, functioning and storage in tropical climate. They shall have weather proof and dust proof enclosures in accordance with IEC 529, IP – 65 or better.

Earth Relays: System should be immune from radio frequency & electromagnetic interference.

7. SYSTEM SOFTWARE & APPLICATION SOFTWARE

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- (a) General Software environment may be Windows latest / Unix based Application.
- (b) The operating system software should be modular in design & shall provide effective utilization of all system resources and facilitate future expansion.
- (c) The application software should have excellent feature in regard to real time data acquisition, data & alarm processing, database downloading, terminal security access etc. The software should also meet our desired operational criterion in regard to stock recording, monitoring & control of product movement. The operator interface module shall provide centralized information to terminal operator to terminal in the fields, like menu driven data entry screen thru structured pull up & pull down menus manipulation of control loops, alarm displays & annunciation bar graphics displays and status indications, logging & trending including historical trend recording, self diagnostic messages etc.

As far as operational displays are concerned following displays shall be possible as minimum: Overview display, Group display, loop / point display, Graphic display, Alarm monitoring & display, database management system display, Trend display etc. The report generation module shall be capable of generating various reports and logs for all measured and competed parameters as per requirement. The system should provide scope for database generation & configuration with multilevel security access into the system.

Scope of instrumentation also includes supply of suitable monitor desk, control room furniture / cabinet /accessories for the supplied system.

8.0 PROCEDURE FOR LAYING CABLES

LAYING OF UNDER GROUND CABLES

All civil works including supply, labour and materials included in vendor's scope of supply.

Cables supplied by the vendor shall be laid in trenches in the route specified by the Plant Manager at a depth of 750 mm with a 100mm thick sand cushion below & 150mm thick sand cushion above & a layer of 230 mm width bricks on top laid widthwise, including excavation, back filling, cable markers @ 100 m c/c, 100 mm dia GI pipes for road crossings, cable entries etc. complete as per technical specifications detailed below and as directed by the Plant Manager.

Where cables rise from trenches / under ground pipes to instruments, they shall be taken through G.I. Pipes and long bend radius elbows of adequate size up to a minimum of 300 mm above the floor level.

Cables shall be pulled carefully through the pipes so that there is no damage to the cables. If required cable lubricant shall be used.

Where the cables pass through foundations, walls or any underground structure, necessary duct and opening shall be provided. However, for cutting holes in the existing foundation or structure prior permission from the Plant Manager has to be taken. All the openings in walls etc. have to be closed & made good after laying the cables.

LAYING OF CABLES ABOVE GROUND

Wherever buried Cable laying is not possible vendor shall adopt overhead cable laying.

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- a) Cables laid above ground shall be run on Perforated G.I. cable trays (supply and erection included in vendor's scope), fixed on walls, ceilings or structures and shall be run on parallel or at right angles to the beams, walls of columns. Cable dressing is important and must be approved by Plant Manager. In case the above conditions for exposed cables are not maintained, the Plant Manager may direct to rectify / modify the same without any extra cost to the owner.
- b) Individual cables, groups of cables which run along a structure may be directly clamped to the structure by means of 16 gauge Al. saddles on 25 * 6 mm saddle bars. Proper nylon locking type straps, aluminum clamps etc. must be used for binding / clamping of temporary fastening etc., steel wires, cables armor etc. shall never be allowed for such purposes. Cables shall be supported adequately to avoid unsightly sagging. Normally the distance between the two supports shall be 300 mm for cables of diameter up to 25 mm. For cables of higher diameter the distance may be up to 450 mm. However, uniform distance shall be maintained from aesthetic consideration. All cables shall be supported near the glanding.

9. JUNCTION BOXES

Vendor shall supply FLP & Non-FLP junction boxes complete with cable glands, plug terminals etc. All the FLP junction boxes shall have CCOE / CMRS approvals and the same have to be submitted to HPCL.

The junction boxes have to be mounted on a suitable structural support made of ISMC 75 channel of required height as advised by the Engineer-in-charge.

10.0 TESTING, INSTALLATION, COMMISSIONING AND ACCEPTANCE

On the basis of the guidelines specified in these specifications, vendor shall submit their own testing installation, commissioning and acceptance procedure. For hardware, the procedures shall include purpose of test, test definition of input, procedure results expected and acceptance criteria. For software's, it shall include details of method list of tests, sequence of execution, results expected and acceptance criteria.

The testing and acceptance of the system shall be carried out on mutually agreed procedure and criteria based on these guidelines and vendor's standard procedures.

11.0 INSTALLATION, TESTING, COMMISSIONING

Vendor shall offer the services of the installation which would install the equipment in the field & control room, lay the interconnecting cabling outside and inside the control room and check out, test and commissioning of the system.

Vendor's responsibility at site shall include all activities necessary to be performed to complete the job including:

- a. Receipt of Hardware and Software and checking of completeness of supplies.
- b. Installation of the system including free supply equipment, if any.
- c. Field cable laying.
- d. Field cable termination and inter cabinet cabling and termination.
- e. Check out equipment installation.

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- f. Checking of interconnections, hardware and software configuration overall system functioning etc.
- g. Loop checking (100%)
- h. Commissioning and debugging of the system.
- i. Involvement during commissioning and performance of final acceptance test.

12.0 EARTHING

- a. Each panel, cabinet, console and other equipments in control room shall be provided with an earthing lug. All these earthing lugs shall be properly secured to the AC main earthing bus.
- b. All circuit grounds of electronic instruments, shields and drain wires of signal cable shall be connected to instrument ground bus which is electrically isolates from the AC mains earthing bus. This bus shall be typically 25 mm wide and 6 mm thick copper. The instrument ground bus is connected to independent instrument system ground bus through insulated wires.
- c. All active barriers, if used, shall be secured grounded. The active barrier ground wire shall be capable of carrying a maximum fault level current.

13.0 LOOP CHECKING

- Loop checking shall be carried out by the vendor including checking the interconnections, configuration and overall system functioning.
- Vendor's scope of work in loop checking shall include termination of field cable in the control room through Multi Cable Transit (MCT), checking of interconnection between instrument / equipment. Ferruling and tagging of interconnecting cables in control room and performing overall loop performance check.
- Vendor shall do the proper loop checking. Any discrepancies found during checking shall be brought to the notice of the Plant Manager.
- The input signals shall be simulated by disconnecting / connecting the field wires for all field switches connected to the system.
- After loop checking is complete, vendor shall connect back any terminals and connections removed for loop checking.
- All the system functions shall be checked thoroughly for proper functioning. The tests shall include:
 - a) visual and mechanical
 - b) Complete system configuration loading
 - c) Demonstration of all system functions
 - d) Checking system configuration loading
 - e) Checking of correct functioning of all keyboards

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- f) Termination of all system diagnostics
- g) Checking of proper functioning of all printers. Hard copy unit and printing of all reports.
- h) Checking of all disc drives
- i) Complete checking of logic blocks

14.0 SPARE PARTS

Vendor shall include special tools, test equipments, initial stock of maintenance spares for a period of two years operations and consumables for six months after system takeover in the proposal as are essential for proper maintenance and operation of the system. In addition, estimated requirements of spares per annum should also be indicated. Full particulars for the above shall be provided separately. The list also include item wise price for each item. Spares and consumables required, if any up to system takeover shall be supplied by vendors as free of cost and shall be part of contract.

The successful vendor shall warrant that the spare parts for the system would be available for a minimum period of five years. After this period, if vendor discontinues the production of spare parts, Vendor shall give at-least 12 months notice prior to such discontinuance so that the owner may order his bulk requirements for future.

15.0 DOCUMENTATION

- (i) The vendor shall submit the following documents along with **Technical BID**. This is in addition to the documents specified elsewhere in the tender document.
 - (a) System description
 - (b) Basis of selection of computer hardware, memory, peripherals
 - (c) Percentage of CPU, main memory and HDD utilization
 - (d) System architecture
 - (e) Power supply requirement of each equipment and total power required
 - (f) Pre-formatted displays and typical graphic formats
 - (g) Application program details
 - (h) Communication type to supervisory computer
 - (i) Parts list
 - (j) Certificate for statutory bodies
 - (k) Assembly details
 - (l) Bill of materials
 - (m) Recommended spares parts for commissioning
 - (n) Recommended spares parts for 2 years operation
- (ii) The following drawings / documents shall be furnished after completion of the job.
 - (a) Functional design specification of Tank Farm Management System and application software.
 - (b) Detail specification for each instrument equipment and accessories.
 - (c) Operating and maintenance manuals
 - (d) Installation manuals
 - (e) Test plans and test reports
 - (f) Part list catalogues with exploded view of each item and recommended spare parts.
 - (g) Software manuals

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- (h) Engineering drawings such as wiring diagrams, loop drawings interconnection details, general assembly drawings for equipments, grounding system drawings, logic diagrams, equipment layout in control room, instrument layout drawings etc.
 - (i) As built documentation covering hardware, software uses, installation and maintenance manuals for all equipments.
 - (j) Inspection and test reports.
 - (k) Quality assurance and quality control documents
 - (l) All report generation printout patterns
- (iii) It shall be obligatory on the part of the vendor to modify and / or replace any hardware and modify the operating, application and diagnostic software free of cost, in case any malfunctioning is revealed even during on line operation after taking over with the warranty period.
- (iv) Vendor shall provide the total maintenance of the system during warranty period if specified. The cost of warranty maintenance, if any shall be included in the proposal.
- (v) No. of Sets
- | | | |
|-------|---|---|
| Final | - | 6 sets hard copy |
| | - | 1 set soft copy in CD in editable format and AutoCad 2010 |
| | - | . |

16.0 DEVIATIONS

Deviations, if any from this standard shall be clearly indicated in the offer with reasons thereof. Deviations from the data indicated in specification sheet shall be shown clearly by encircling it and indicating the revised data in specification sheet.

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LIST OF APPROVED SUB-VENDORS

1. ELECTRONIC D/P PRESSURE TRANSMITTER (SMART VERSION)
CHEMTROLS (FUJI)
FISHER ROSEMOUNT (MODEL 3051 C)
YOKOGAWA BLUESTAR
TATA HONEYWELL
INVENSIS (FOXBORO)
2. ACTIVE BARRIER (GALVANIC ISOLATOR)
MTL
STAHL (Germany)
P&F
3. UPS
TATA LIBERT
GUJARAT HIREL CONTROL LTD.
SIEMENS
NUMERIC
4. MULTICABLE TRANSIT SYSTEM
NEW MERCHANTILE IMPEX
LYCAB
ROXTEC
5. TEMPERATURE ELEMENTS
GENERAL INSTRUMENTS
DETRIV
ELECTRICAL & ELECTRONIC INST. CORPN.
6. COMPUTER
COMPAQ
IBM, HP, DELL
7. EARTHING RELAY
ANDERSON
SCULLY
8. PRINTERS
HP
EPSON
9. CABLES (T/C EXTENSION)
KEI INDUSTRIES
TOSHNIWAL CABLES
UDEY PYRO CABLES
FINOLEX
10. CABLES (INSTRUMENTATION)
KEI INDUSTRIES
TOSHNIWAL CABLES
FORT GLOSTER
FINOLEX

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- 11. COMPRESSION FITTING
 - EXCELSIOR
 - ASTEC INSTS.
 - EXCEL HYDRO PNEUMATIC
- 12. INSTRUMENT FITTINGS
 - TECHNOMATIC
 - MICROPRECISION
 - CHEMTROLS
- 13. JB AND CABLE GLAND
 - BALIGA
 - FLAME PROOF EQUIPMENT
 - EX-PROTECTA
 - CEAG
- 14. SS TUBING
 - CHOKSHI TUBES
 - REMI METAL
 - NIKKA TUBES
- 15. CABLE TRAY
 - HOPES METAL
 - INDIANA
 - GLOBE ELECTRICALS

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SPECIFICATION FOR SERVO LEVEL GAUGE

Servo operated tank level gauge type ATG 854 of ENRAF make or equivalent model of Tokyo Keiso or Endress Hauser with local indication and digital transmitter assembly for remote indication at a distance up to 100 mts. All the equipments & accessories shall be explosion proof and having CCOE Approval. The servo level gauge shall be suitable for measurements of level, volume, temperature and density. All the necessary sensors for measurement of above specified parameters shall be supplied and installed along with the gauge. The equipment shall have self diagnosis and remote calibration facility.

DATA SHEET

Vessel Size	7000 mm dia X 42000 mm long (Approx)
Type	Servo Operated Level Gauge
Make	ENRAF / TOKYO KEISO / ENDRESS HAUSER
Model	854 ATG / FW 9000 / Equivalent approved
Function	Measurement of Level, Volume, Density & Temperature
Mounting	Top of Vessel
Measuring Range	0-8500 (Min)
Accuracy	+/- 1 mm
Sensitivity	+/- 0.1 mm
Repeatability	0.1 mm
Measuring Accuracy (Interface)	+/- 2 mm
Measuring Accuracy (Density)	+/- 5 kg/Cum
Measuring Accuracy (Temperature)	+/- 0.2° C
Operating Pressure	Up to 14.5 Bar
Operating Temperature	-40° C to +55° C
Power Supply	240 V, 50 Hz
Level Alarms	4 & Programmable
Lightning Protection	Required
Area Classification	Class Div.1 Group B, C & D
Certification	CENELEC / FM / / TIIS / CCOE Approved Agency
CCOE Approval	Required
Display	LCD / LED
Automatic Compensation	Yes, for Wire Elongation, Displacer Weight, Tank Deformity & Temperature
Self Diagnosis	Required
Remote Indicator	Required
Remote Programming	Required
Remote Alarm Indication	Required
Integral Key Board for Gauge Operation & Command	Required
Service	LPG

NOTE

- Each servo gauge shall be supplied with a suitable calibration chamber and Each Servo Gauge shall be supplied with a fire safe ball valve type tested as per API-607
- The Servo Gauge shall be inspected by TPIA – M/s.Lloyds or M/s. BVIS in the country of manufacture and the inspection charges shall be borne by the vendor.

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SPECIFICATION FOR RADAR GAUGE

DATA SHEET

Vessel Size	7000 mm dia X 42000 mm long (Approx)
Gauge Type	Radar Operated Level Gauge
Make	SAAB or Equivalent Approved
Model	RTG 3960 of SAAB / EMERSON or Equivalent approved
Function	Measurement of Level, Volume, Vapour Pressure & Temperature
Mounting	Top of Vessel
Measuring Range	0-8500 (Min)
Accuracy	+/- 1 mm
Sensitivity	+/- 0.1 mm
Repeatability	0.1 mm
Measuring Accuracy (Temperature)	+/- 0.2° C
Operating Pressure	Up to 14.5 Bar
Operating Temperature	-40° C to +70° C
Power Supply	240 V, 50 Hz
Level Alarms	4 & Programmable
Lightning Protection	Required
Area Classification	Class Div.1 Group B, C & D
Certification	CENELEC / FM / CCOE Approved Agency
CCOE Approval	Required
Display	LCD /LED
Automatic Compensation	Yes, for Tank Deformity & Temperature
Self Diagnosis	Required
Remote Indicator	Required
Remote Programming	Required
Remote Alarm Indication	Required
Service	LPG

- Each Radar Gauge shall be supplied with a fire safe ball valve type tested as per API-607
- Perforated Still Pipe shall be provided as per requirement for installation of Gauge.
- The Gauge shall be inspected by TPIA – M/s.Lloyds or M/s. BVIS in the country of manufacture and the inspection charges shall be borne by the vendor.
- Tank farm management system shall communicate with HPCL's ERP system as per HPCL's requirements. Necessary software modifications required to provide data to HPCL's ERP system shall be included in the quote for TFMS. If required, Vendor may visit one of HPCL's existing bottling plants to get acquainted with data required / communication protocol required for HPCL ERP system.**

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JDE-TFMS INTERFACE

The JDE machine shall interface with TFMS server to transfer the data files between them using the interface programs provided by the vendor developed using the protocol details given by HPCL. The objective for interfacing the JDE machine with TFMS SERVER shall transfer the necessary data between these two systems to avoid the re-entering of data so as to ensure the consistency of the data in both the systems. The interfacing between TFMS SERVER and JDE machine will be based on the following :

The JDE machine and TFMS SERVER will be connected through Ethernet with TCP/IP suite loaded on both the servers. All the programs required for various pre-defined data requests will be developed by the suppliers of automation software and hardware and all the source programs will be made available on JDE machine and TFM SERVERS

The gateway TFMS server shall be Windows (preferably 2007 server or later) M/c which is on the network of both the Automation system & HPCL network through a pair of network cards. JDE (ERP) communicates with the gateway TFMS server through the set of JDE demon programs. The JDE demon programs are responsible for polling files from Gateway TFMS server to JDE & vice-versa. Once the file is downloaded by the Automation system in designated directory it will be polled & send to JDE server & a copy of the same will be maintained in the backup directory. Each TFMS file generated should have a unique name.

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The following points should be noted for effective implementation of TFMS and interfacing with JDE:

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Automation System software should have the facility to maintain the IP addresses of the Gateway Server in *.ini files. The daemon program should read the IP addresses from the *.ini file and communicate with servers through TCP/IP. It should be possible for HPCL to carry out the changes in the IP addresses of the Gateway TFMS server other machines in the network depending on the business requirements.

- There should be a provision in the TFMS software to add / modify / delete brands by HPCL. This is required since new brands are being introduced in the market. A front end application through which the location personnel can enter the new brands or update / modify the existing brands shall be available. The changes to the brand master shall be reflected in the software including the MIS reports (Color changes, bay changes etc.) The brand master could be maintained in a table or in a product.dat file.
- JDE will communicate with the TFMS system through a Windows Gateway Server (1 primary + 1 backup) through TCP/IP. The Windows Gateway Servers should have Windows 2007 OS or later.
- The vendor shall provide the TFMS Gateway server, proper documentation of all the software. It is the responsibility of the vendor to provide an environment for compiling his demon program if required.

In Automated locations, bulk tank readings like Gross dip, water dip, temperature & density are automated & displayed thru TFMS workstation/ OIC. As part of the JDE Automation interface the readings will be recorded by the automation system & downloaded in the predesigned format as shown, in text file in a designated directory – c:\jde\tfms (configurable) in the Gateway server. The file will be created once a day

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only either at day-end i.e. when the operations at the locations are over or predefined time (configurable).

The format for the data will be

Field Name	Data Type Description	Item Size	Decimal	Remarks	Remarks1
Business Unit	String	5			
Tank ID	String	8			
Date	Date	10		DD/MM/YYYY	
Time	Numeric	6		24hour format HHMMSS	
Description	String	30			
Tank Capacity	Numeric	15			
Unit of Measure	String	2		LT	
Item Number	Numeric	8		JDE Item Number	
Product Level	Numeric	7	2	in CMs	99999.99
Product Gross Quantity	Numeric	15	3	in Litres	
Product Net Quantity	Numeric	15	3	in Litres	
Average Temperature	Numeric	6	2	Degree Centigrade	999.99
Density @ 15	Numeric	6	4		9.9999
Water Level	Numeric	15	2	in CMs	999.99
Water Volume	Numeric	10	3	in Litres	
Tank Alarms	Numeric	3			
Tank Mode Indicator	Character	1		R- Receipt / D - Dispatch / I - Idle	
Tank Status	Character	1		Active / Inactive / Repair	
Vapour Pressure	Numeric	6	2	KG/ cm2	
Vapour Temperature	Numeric	6		Degree Centigrade	

Following points should be noted

1. Fields are delimited by a “|” character
2. Should use ASTM 54B Table Only
3. Density field should be in format 9.9999. Density should be @ 15
4. The Business Unit should have JDE location code (Size 5)

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5. Tank IDs should match the tank IDs of the JDE system. Details of the tank IDs should be taken from Location In-charge & they should correspond to IDs in JDE system.
6. Quantities should be in Litres.
7. Tank Alarm has to be 1/2/3/4 (1 - L, 2 - LL, 3 - H, 4 - HH)
8. Tank Mode Indicator has to be R/D/I (R - Receipt, D - Dispatch, I - Idle)
9. Tank Status has to be A/I/R (A - Active, I - Inactive, R - Repair)
10. Any value not available should have blank or 0 if numeric as default. Null values i.e. two consecutive "I" should not be there
11. Each tank details would come as separate line as per the fields in the above table. A location having 15 bulk tanks will have 15 lines & information will be coming as per the details above in the table separated by “I”
12. The name of the file would LLLLL_DDMMYYYY_HHMMSS.TXT

Where

LLLLL – is the location code

DDMMYYYY – Date Month & Year

HHMMSS – Hours Minutes & Seconds

Sample Data

12401ISPHERE2102/06/20081230001LPG Sphere No. 2-2322113053741.000LT109490006101086.5011139645.25111139645.251127.0010.560010001000.001000011A16.5127
12401ISPHERE3102/06/20081230002LPG Sphere No. 3-23222130546301LT109490006100248.5011141277.2681141277.268129.0010.755010001000.001000011A16.5129
12401ISPHERE1102/05/20081230000LPG Sphere No. 1-2322013054003.000LT109490006101295.8711207995.82811207995.828136.3010.513710001000.001000011A17.2136

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SPECIFICATIONS FOR UPS SYSTEMS

(For the Regulated Power Supply for instrumentation & ROVs, High level alarms)

- | | | | |
|----|---------------------|---|---|
| a) | Type | : | True, “ON-LINE” parallel redundant 5 kVA. |
| b) | Output Wave form | : | Pure Sine-wave |
| c) | Input Power Supply | : | 230 V \pm 30% |
| d) | Output | : | 220 V \pm 2% |
| e) | Input Frequency | : | 50 Hz \pm 5 Hz |
| f) | Output Frequency | : | 50 Hz \pm 1 Hz |
| g) | Backup time | : | 30 Minutes |
| h) | Battery type/make | : | Sealed Maintenance free.
(Any reliable make such as Standard
Furukawa, Exide, Hitachi, Panasonic, CSB or Amco –
Yuasa) |
| i) | Qty/Capacity of UPS | : | As per instrumentation specifications in this tender
document |

The UPS is intended for all instruments of **3 x 650 MT** mounded LPG storage vessels, ROVs & High level alarm switches.

- | | | |
|----|---------|---|
| j) | Makes : | The UPS should be of a reputed make
such as APC (American Power Conversion) or Tata
Libert (Emerson Network Power Ltd), Siemens or Hi-Rel
Electronics. |
|----|---------|---|

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SPECIFICATIONS FOR UPS SYSTEMS
(for the Regulated Power Supply for Cathodic Protection System)

- | | | | |
|----|---------------------|---|---|
| a) | Type | : | “ON - LINE” |
| b) | Output Wave form | : | Pure Sine-wave |
| c) | Input Power Supply | : | 230 V \pm 30% |
| d) | Output | : | 220 V \pm 2% |
| e) | Input Frequency | : | 50 Hz \pm 5 Hz |
| f) | Output Frequency | : | 50 Hz \pm 1 Hz |
| g) | Backup time | : | 30 Minutes |
| h) | Battery type/make | : | Sealed Maintenance free.
(Any reliable make such as Standard Furukawa, Exide, Hitachi, Panasonic, CSB or Amco – Yuasa) |
| i) | Qty/Capacity of UPS | : | As per Cathodic Protection System requirement and vendor recommendations. |

The UPS is intended for C P System of 3 x **650 MT mounded** LPG storage vessels.

- | | | | |
|----|-------|---|--|
| j) | Makes | : | The UPS should be of a reputed make such as APC (American Power Conversion) or Tata Libert (Emerson Network Power Ltd), Siemens, Hi-Rel Electronics, |
|----|-------|---|--|

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SPECIFICATION OF HIGH LEVEL ALARM SWITCH

Level alarm switch displacer type, Flame-proof explosion-proof weather proof construction certified by CMRS & Chief Controller of Explosives, Nagpur. The instrument shall be suitable for use with liquefied petroleum gas (LPG) in Horton spheres / bullets. The switch shall change contact only when the liquid level in the sphere/bullet reaches the maximum safe filling level i.e. 85% of the volumetric capacity of the sphere/bullet. The instrument shall be tank top mounting type and equipped with:

- 1.1 One no. 100 NB matching flange of material SA 350 Gr. LF2 and rating conforming to ANSI B-16.5 Class 300 R/F.
- 1.2 All wetted parts like displacer, wire, spring etc. shall be made up of stainless steel AISI 316.
- 1.3 Power supply : 230 V 50 HZ
- 1.4 Cable glands : Explosion proof, flame proof, double compression type.
- 1.5 Accessory : Audio / visual Alarm (Flameproof type) for installation in Pump House. This unit shall be CMRS / CCOE approved

Note:

Vendor will be required to import above Level switch through their own import license and at their own cost. No assistance in import of this item will be rendered by HPCL to the Vendor. However, Vendor is required to indicate in their quotation as to how Level Switch will be arranged by them.

DATA SHEET

LEVEL SWITCH-(HIGH LEVEL ALARM SWITCH)

Make	: TOKYO KEISO, JAPAN
Quantity	: As per scope of supply
Specific gravity	: 0.5
Liquid	: LPG
Type	: Displacer type
Construction & Enclosure	: Explosion proof as per IS-2148 and IP-65 weather protection
Flange	: 4" ANSI # 300 RF
Op. Temperature	: -27 to +55 deg C
Pressure	: 17 Kg./sq.cm. gauge
Test pressure	: 22.5 Kg./sq.cm. gauge
Alarm type	: H (1 point alarm)

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Conduit size : NPT 1/2 adapter

Power source : 230 V / 50 Hz.

Transmitter : Approved by CCOE Nagpur

Switch type : SPDT

Accuracy : *

* Vendor to provide the technical literature of the model being offered.

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SPECIFICATIONS FOR SAFETY RELIEF VALVES FOR LPG PRESSURE VESSELS

(Supply includes supply of Safety Valves along with lock open type Gate Valves, vent pipes.)

SERVICE	: LPG VAPOUR
QUANTITY	: 2 NOS. PER LPG PR. VESSEL
FULL NOZZLE/SEMI NOZZLE	: FULL NOZZLE
CONVENTIONAL/BELLOWS	: MULTIPOINT TYPE (4-PORT)
BONNET OPEN/CLOSED	: STRAIGHT THROUGH DISCHARGE
SIZE-INLET/OUTLET	: VTS AS REQUIRED
FLANGE RATING - INLET/OUTLET	: 300#
TYPE OF FACING	: RF SERRATED
BODY/CYLINDER	: ASTM 216 GR.WCB
SEAT DISC	: SS 316
SPRING	: CS, CD PLATED
NOZZLE/GUIDE RING	: SS 316
CAP SCREWED/BOLTED	:
LEVER PLAIN/PACKED	: NOT REQUIRED
TEST GAG	: NOT REQUIRED
CODE	: ASME SEC VIII DIV II
CALCULATION CODE	: API 520
BASIS FOR SIZING	: FGE (FIRE GAS EXPANSION) OR AS PER CODE REQUIREMENTS.
RELIEVES TO	: ATMOSPHERE
FLUID & STATE	: LPG VAPOUR
SP.GR.AT 60 DEG F(AIR=1)	: 1.90
MOLECULAR WT	: 50.00
OPERATING PRESSURE (Kg/Sq.CM)	: 2-11 (GAUGE)
SET PRESSURE (Kg/Sq.CM)	: 14.5 (GAUGE)
OPERATING TEMPERATURE	: 3-45 DEG.C

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RELIEVING TEMP	: 55 DEG. C
BACK PRESSURE	: ATMOSPHERIC
ALLOWABLE OVER PRESSURE	: 21 PERCENT
CP/CV	: 1.12
VISCOCITY FACTOR	: NIL
RELIEVING CAPACITY	: VTS
SELECTED AREA	: VTS
ORIFICE DESIGN	: VTS

MISCELLANEOUS:

1. VENT PIPES : 3 MTR. HIGH PIPE VENTS WITH RAIN
WATER CAPS TO BE PROVIDED ON ALL
THE 4 PORTS OF EACH SRV.
2. GATE VALVES (FOR Safety valve isolation) : API 6FA, Fire Safe and having API monogram.

- NOTE:**
- (a) VENDOR SHALL INDICATE THE MAKE OF THE SRV IN THE Technical BID.
 - (b) THE CAPACITY OF SRV SHALL NOT BE LESS THAN 30 % OF THE CAPACITY
REQUIRED FOR AN ABOVE GROUND TANK OF EQUAL CAPACITY.
 - (c) THE SRV'S SHALL BE APPROVED BY CCOE.

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SUPPLY OF LOW TEMPERATURE CARBON STEEL (LTCS) VALVES

Shut off (Isolation) valves for low temp service upto minus 27 deg C. The valves shall be cast steel gate type with flanged ends as per ANSI B16.5 class 300# RF.

The body material and the gate material shall be low carbon steel to ASTM A352 Gr LCB. The seat, stem, bonnet gasket and other internals shall be in AISI-304. The bolting shall be in ASTM - A - 320 Gr. L7.

The valves shall conform to API 600 / API 602 (for design) and the testing shall be carried out as per API - 598. **The valve shall bear the API 600 / API 602 Monogram.**

Sizes shall be suitable for the intended service as per tender enquiry.

The valves shall be inspected and certified by owner approved TPIA at vendor's cost.

Mounting accessories:

The vendor shall also include the following accessories also for mounting the above valves at site:

- a) Low temp alloy steel fasteners (fully threaded UNC studs each with 2 nos hex nuts) as per ASTM - A - 320 Gr L7 / ASTM - A 194 Gr. 7. Sizes and quantity shall be suitable for the above supply.
- b) Spiral wound SS 316 with CS outer ring gaskets. Sizes and quantity shall be suitable for the above supply.

The above accessories shall also be certified by owner approved TPIA at vendor's cost.

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CIVIL WORKS

GROUP-1: EARTHWORK

1.0 SCOPE :

This section covers general requirements of carrying out earthwork in excavation in different materials, filling in areas as shown in drawings, backfilling in site grading, around foundations, in plinths, etc., conveyance and disposal of surplus spoils or stacking them properly as shown on the drawings & as directed by ENGINEER and all operations covered within the intent & purpose of this specification.

2.0 APPLICABLE STANDARDS / CODES:

The following Indian Standards / Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the Standards / Codes, shall be referred to :-

IS – 783 Code of Practice for laying of concrete pipe.

IS – 1200 Method of Measurement of Building Works.

IS – 3764 Safety code for excavation work.

3.0 GENERAL :

CONTRACTOR shall furnish all tools, plants, instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables, anything and everything necessary, whether or not such items are specifically stated herein, for completion of the job in accordance with specification and requirements.

CONTRACTOR shall carry out the survey of the site before commencing excavation and set properly all lines and establish levels for various works such as earthwork in excavation for site grading, foundations, plinth filling, roads, drains, cable trenches, pipelines, etc. Such survey shall be carried out by studying thoroughly the drawings for the existing plant and modus operandi for earthwork shall be discussed with ENGINEER. Ground levels shall be taken and properly recorded by the CONTRACTOR and shall be checked and certified by ENGINEER.

The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps to ensure safety at night.

The rates quoted shall also include for dumping of excavated materials in required heaps, bunds, riprap with regular slope as directed by ENGINEER, within the lead specified and leveling the same so as to provide stability and natural drainage. Soil excavated shall be stacked properly as directed by ENGINEER. As a rule, all softer materials shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and the top.

4.0 CLEARING :

The area to be excavated, and / or filled shall be cleared of fences, plants, bushes, vegetation, slush, etc. and other objectionable matter. The materials so removed shall be disposed off as directed by ENGINEER. Where earth fill is intended, the area shall be stripped of all loose / soft patches, top soil containing objectionable matter / materials removed before fill commences.

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5.0 EXCAVATION AND DEWATERING :

5.1 ALL TYPES OF SOILS INCLUDING SOFT ROCKS :

All excavation work shall be carried out in all types of soils, disintegrated rock, boulders, weathered rock, etc., manually or by mechanical equipment, as directed by ENGINEER.

Excavation for permanent work shall be taken out to such widths, lengths, depths, and profiles of P.C.C. / Plum concrete as are shown on the drawings, or such other lines are grades as may be specified by ENGINEER. Initially, excavation shall be carried out to a depth 150 mm above the final level. The balance shall be excavated with special care. Soft pockets shall be removed even below the final excavation and shall be carried out just prior to laying the P.C.C.

CONTRACTOR may, to facilitate his work or similar other reasons, excavate and also backfill later, if specifically approved by ENGINEER, at his own cost, outside the lines shown on the drawings. Should any excavation be taken below the specified elevation, CONTRACTOR shall fill it up, with concrete of the grade specified on drawings, up to the required elevation. No extra payment shall be made to CONTRACTOR on this account.

All excavations shall be done to the minimum dimensions as required for safety and working facility. However, prior approval of ENGINEER shall be obtained by CONTRACTOR in each individual case, for the method he proposes to adopt for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval, however, shall not in any way absolve CONTRACTOR of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will stand safely for the actual soil conditions encountered. Every precaution shall be taken and the slope dressed to a modified stable one. Removal of the slipped earth will not be paid for.

Excavation shall be carried out with such tools, tackles and equipment as described hereinbefore.

5.2 DEWATERING :

All excavation shall be kept free of water. Grading in the vicinity of excavation shall be controlled to prevent surface water running into excavated areas. CONTRACTOR shall remove by pumping or other means approved by ENGINEER any water, inclusive of rain water and subsoil water accumulated in excavation, and shall keep all excavated areas dewatered until the foundation work is completed and backfilled. Sumps made for dewatering must be kept clear of the excavations / trenches required for further work. Method of pumping shall be approved by ENGINEER but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in thereof due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction.

When there is a continuous inflow of water and quantum of water to be handled is considered, in the opinion of ENGINEER, as large, well point system. Single stage or multistage, shall be adopted. CONTRACTOR shall submit to ENGINEER his scheme of well point system including the stages, the spacing, number of diameter of well points, headers, etc. and the number, capacity and location of pumps for approval. The cost of dewatering shall be included in the items for excavation.

6.0 FILL AND BACK FILLING :

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6.1 GENERAL :

All fill material shall be subject to ENGINEER's approval. If any material is rejected by ENGINEER, CONTRACTOR shall remove the same forthwith from the site within 24 hours at no extra cost to the OWNER. Surplus fill material shall be deposited / disposed off as directed by ENGINEER after the fill work is complete.

No earth-filling shall commence until surface drains have been properly intercepted, or otherwise properly dealt with, as directed by ENGINEER.

6.2 MATERIAL :

Only selected excavated materials shall be used as backfill. Fill material shall be free from clods, silt, salts, sulphates, organic or other foreign material. All clods of earth shall be removed.

If any selected fill material is required to be borrowed, CONTRACTOR shall make arrangements for bringing such material from outside borrow pits. The material and source shall be subject to prior approval of ENGINEER. The approved borrow pits areas shall be cleared of all bushes, plants, rubbish, etc. Top soil containing salts / sulphate and other foreign material shall be removed. The materials so removed shall be disposed off, as directed by ENGINEER.

6.3 FILLING IN PITS AND TRENCHES AROUND FOUNDATIONS OF STRUCTURES, WALLS, ETC.

As soon as the work in foundation has been accepted and measured, the space around the foundations, structures, pits, trenches, etc. shall be cleared of all debris and filled with earth in layers not exceeding 15 cm., each layer being watered, rammed and properly consolidated, before the succeeding layer is laid. Each layer shall be consolidated to the satisfaction of ENGINEER. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless ENGINEER is satisfied that in some cases manual compaction by tampers is unavoidable. The final backfilled surface shall be trimmed and leveled to proper profile, as shown on the drawings and as directed by ENGINEER.

SAND / MURUM FILLING IN OTHER PLACES :

At places backfilling shall be carried out with local sand / murum if directed by ENGINEER. The sand / murum used shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. Any temporary work required to contain sand under flooded condition shall be to CONTRACTOR'S account. The surface of the consolidated sand / murum shall be dressed to required level or slope. Construction of floors or other structures on fill shall not be started until ENGINEER has inspected and approved the fill.

6.5 FILLING IN TRENCHES :

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipes and drains have been tested and approved by ENGINEER. The backfilling material shall be properly consolidated by watering and ramming, taking due care that no damage is caused to the pipes.

In case of trenches in cutting, the filling upto a level 30 cm above the top of the pipe shall be carried out with approved fine materials, such as earth, sand, murum, etc. The filling upto the level of the centreline of the pipe shall be carried out by hand compaction in layers not exceeding 8 cm. Whereas, the filling above the centre line of the pipe shall be carried out by hand

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compaction or by approved means in layers not exceeding 15 cm, the filling from a level 30 cm. above the top of the pipe to the top of the trench shall be carried out manually or other approved mechanical methods, as directed by ENGINEER.

Filling of the trenches shall be carried out simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.

MEASUREMENT AND PAYMENT :

7.0

FOR EXCAVATION IN ALL TYPES OF SOILS EXCEPT HARD ROCK :

7.1

All excavation except in hard rock shall be measured net. Dimensions for the purpose of payment shall be reckoned on the horizontal area of the P.C.C./ Plum concrete at the base for foundations of the walls, columns, footings, bullets, rafts, or other foundations / structures to be built, multiplied by the mean depth from the surface of the ground in accordance with the drawings and recorded ground levels duly approved by ENGINEER. Excavation in side slopes will not be paid for. CONTRACTOR may make such allowance in his rates to provide for excavation in side slopes keeping in mind the nature of the soil and safety of excavation.

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Group – 2 : CEMENT CONCRETE AND ALLIED WORKS

1.0 SCOPE :

This specification covers the general requirements for concrete to be used on jobs using on-site production facilities including requirements in regard to the quality, handling, storage of ingredients, proportioning, batching, mixing & testing of concrete, and also requirements in regard to the quality, storage, bending and placement of reinforcement. This also covers the transportation of concrete from the mixer to the place of final deposit and the placing, curing, protecting, repairing and finishing of concrete.

2.0 APPLICABLE CODES AND SPECIFICATIONS :

The following specification, standards and codes shall form part of this specification. All standards, tentative specifications, codes of practice, referred to herein, shall be the latest editions, including all applicable official amendments and revisions.

In case of discrepancy, if any, between this specification and those referred hereunder, the more stringent shall govern. Decision of the Engineer shall be final in this regard.

APPLICABLE I.S. SPECIFICATIONS AND CODES OF PRACTICE

I.S. : 269 - Specification for Ordinary, and Low Heat Portland Cement.

I.S. : 383- Specification for coarse and fine aggregates from natural source for concrete.

I.S. : 432 - Specification for mild steel and medium tensile steel (parts I & II) bars and hard drawn steel wire for concrete reinforcement.

IS : 456 - Code of practice for plain and reinforced concrete.

IS : 516 - Method of test of strength of concrete.

IS : 1199 - Method of sampling and analysis of concrete.

IS : 1200 - Method of measurement of building & civil Engineering works.

IS : 1566 - Specification for hard drawn steel wire fabric for concrete reinforcement.

IS : 1786 - Specification for HYSD bars for concrete reinforcement.

IS : 2386 - Method of test for aggregates for concrete. (parts I to VIII)

I.S : 2502 - Code of practice for bending and fixing of bars for Concrete reinforcement.

I.S. : 2645 - Method for integral cement waterproofing compound.

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I.S. : 3025 - Method of sampling and test (Physical and Chemical) for water & waste water.

IS : 3370 - Code of practice for concrete structures for storage (parts I-IV) of liquids.

IS : 3696 - Safety code for scaffolds and ladders. (parts I & II).

IS : 8112 - High strength ordinary Portland Cement 43 grade.

IS : 9103 - Specification for Admixtures for concrete.

IS : 10262 - Recommended guidelines for concrete mix design.

IS : 12269 - High strength ordinary portland cement - 53 grade.

3.0 GENERAL :

The quality of materials & method and control of manufacture and transportation of all concrete work irrespective of mix, whether reinforced or otherwise, and shall conform to the applicable clauses of this specification.

4.0 MATERIALS FOR STANDARD CONCRETE :

The ingredients to be used in the manufacture of standard concrete shall consist solely of a standard type Portland Cement, clean sand natural coarse aggregate, clean water, and admixtures, if specially called for on drawings and/or in the specifications.

4.1 CEMENT :

Unless otherwise specified, cement shall be High Strength Ordinary Portland Cement (OPC) / Portland Pozzolana cement (PPC) & (Grade 43 / 53) of approved make in 50 kg bags. Changing of brands or type of cement within the same structure will not be permitted unless approved in writing by HPCL. CONTRACTOR shall make his own arrangements for the storage of adequate quantity of cement.

Approved makes are: Ultratech / JKLaxmi / Birla-Uttam / Birla Diamond & Prism / Vasavdatta / ACC / Nagarjuna / JPRewa / Gujarat Ambuja / Bhima of Coramandel / Zuari.

Cement bags shall be stored in a dry enclosed shed (storage under tarpaulin will not be permitted), well away from the outer walls and insulated from the floor to avoid contact with moisture from ground & walls, and so arranged as to provide ready access. Damaged or reclaimed or partly set cement will not be stacked in any tier and shall be stacked separately or removed from shed. The storage arrangement shall be approved by ENGINEER. Consignment of cement shall be stored as received and shall be consumed in the order of their receipts at site.

Cement held in storage for a period of ninety (90) days or longer shall be tested. Should at any time ENGINEER has reasons to consider that any cement is defective, then irrespective of its origin, date of manufacture and/or manufacturer's test certificate, such cement shall be tested immediately at a National Test Laboratory / Approved Laboratory and until the results of such tests are found acceptable, it shall not be used in any work. CONTRACTOR shall not be entitled to any claim of any nature on this account.

4.2 AGGREGATES :

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4.2.1 GENERAL :

- a) "Aggregates" in general designate both fine and coarse inert materials use in the manufacture of concrete.
- b) "Fine Aggregates" are aggregates most of which pass through 4.75 mm IS sieve.
- c) "Coarse Aggregates" are aggregates most of which are retained on 4.75 mm IS sieve.

All fine and coarse aggregates proposed for use in the work shall be subject to ENGINEER's approval and after specific materials have been accepted, the source of supply of such materials shall not be changed without prior approval of ENGINEER.

Aggregates shall, except as noted above, consist of natural sands, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically strong, hard, inert, durable against weathering, of limited porosity and free from deleterious materials that may cause corrosion of the reinforcement or may impair the strength and/or durability of concrete. The grading of aggregates shall be such as to produce a dense concrete of specified strength & consistency that will work readily into position without segregation and shall be based on test on concrete, as specified later in this group.

4.2.2 FINE AGGREGATES :

4.2.2.1 GENERAL :

Fine aggregates, except as noted above, shall consist of natural or crushed sand conforming to IS : 383. The sand shall be clean, sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coatings, clay, alkali, organic matter, mica, salt, or other deleterious substances which can be injurious to the setting qualities/strength/durability of concrete.

4.2.2.2 SCREENING AND WASHING :

Sand shall be prepared for use by such screening or washing or both, as necessary, to remove all objectionable foreign matters while separating the sand grains to the required size fraction.

4.2.2.3 FOREIGN MATERIAL LIMITATIONS :

The percentage of deleterious substances in sand shall conform to IS : 383.

4.2.2.4 GRADATION :

Unless otherwise directed or approved, the grading of sand shall be within the limits indicated hereunder :-

PERCENTAGE PASSING FOR				
I.S. Sieve Designation	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV

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10.00 mm	100	100	100	100
4.75 mm	90 – 100	90 – 100	90 – 100	95 – 100
2.36 mm	60 – 95	75 – 100	85 – 100	95 – 100
1.18 mm	30 – 70	55 – 90	75 – 100	90 – 100
600 micron	15 – 34	35 – 59	60 – 79	80 – 100
300 micron	5 – 20	8 – 30	12 – 40	15 – 50
150 micron	0 – 10	0 – 10	0 – 10	0 - 15

Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron I.S. sieve, by total amount not exceeding 5 %, it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron I.S. Sieve or to percentage passing any other sieve size on the coarser limit of Grading Zone I or conforming to Grading Zone IV shall be used. Sand used for preparing concrete shall belong to Grading Zone-II.

4.2.2.5 FINENESS MODULUS :

The sand shall have a fineness modulus of not less than 2.2 nor more than 3.2. The fineness modulus is determined by adding the cumulative percentages retained on the following I.S. Sieve sizes (4.75 mm, 2.36 mm, 1.18 mm, 600 micron and 150 micron) and dividing the sum by 100.

4.2.3 COARSE AGGREGATES :

4.2.3.1 GENERAL :

Coarse aggregates for concrete, except as noted above, shall conform to IS : 383. This shall consist of natural or crushed stone & gravel and shall be clean and free from elongated, flaky or laminated pieces, adhering coatings, clay lumps, coal residue, clinkers, slag, alkali, mica, organic matter or other deleterious matter.

4.2.4 SAMPLING AND TESTING :

Samples of the aggregates for determination of suitability shall be taken under the supervision of ENGINEER and delivered to the laboratory well in advance of the scheduled placing of concrete. Records of tests which have been made on proposed aggregates and on concrete made from this source of aggregates shall be submitted to ENGINEER.

4.2.5 STORAGE OF AGGREGATES :

All coarse and fine aggregates shall be stacked separately in stock piles in the material yard near the work site to avoid intermixing of different aggregates. Contamination with foreign materials and earth during storage and heaping of the materials shall be avoided. The aggregates shall be of specified quality not only at the time of receiving at site but also at the time of loading into the mixer. Rakers shall be used for lifting the coarse aggregates from stock

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piles. Coarse aggregates shall be piled in layers not exceeding 1.20 metres in height to prevent coning or segregation. Each layer shall cover the entire area of the stock pile before succeeding layers are started. Aggregates that have become segregated shall be rejected. Rejected material after remixing may be accepted, if subsequent tests demonstrate its conformity with required gradation.

4.2.6 SPECIFIC GRAVITY :

Aggregates having a specific gravity below 2.4 (saturated surface dry basis) shall not be used without special permission of EIC.

4.3 WATER :

Water used for both mixing and curing shall be free from injurious amounts of deleterious materials. Potable water is generally satisfactory for mixing curing concrete.

5.0 CONCRETING WORK :

5.1 DESIGN MIX :

Mix design shall be carried out giving proportions of the ingredients, sources of aggregates and cement, along with accompanying test results of trial mixes as per IS : 10262 shall be submitted to the ENGINEER for his approval before it is used for the works.

5.1.1 PROPORTIONING AND WORKS CONTROL :

5.1.1.1 GENERAL :

Proportioning of ingredients of concrete shall be made by any of the following two methods, as directed by ENGINEER.

- a) With preliminary tests by designing the concrete mix. Such concrete shall be called 'Design Mix Concrete'.
- b) Without preliminary tests, adopting Nominal Mix Concrete.

As far as possible, controlled concrete shall be used for all concrete works. Ordinary concrete in grades permitted in accordance with IS : 456 may be used if shown on drawings or approved by the ENGINEER. In all cases the proportioning of ingredients and works control shall be in accordance with IS : 456 and shall be adopted for use after the ENGINEER is satisfied regarding its adequacy and after obtaining his approval in writing.

5.1.1.2 MIX DESIGN CRITERIA :

Concrete mixes will be designed by the CONTRACTOR to achieve the strength, durability and workability necessary for the job, by the most economical use of the various ingredients. In general, the design will keep in view the following considerations :

Consistent with the various other requirements of the mix, the quantity of water shall be kept at the lowest possible level.

The nominal maximum size of coarse aggregate shall be as large as possible within the limits specified.

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The various fractions of coarse and fine aggregates should be mixed in such a proportion as to produce the best possible combined internal grading giving the densest and most workable mix.

The finished concrete should have adequate durability in all conditions to withstand satisfactorily the weather and other destructive agencies the structure is expected to be subjected to in actual service.

The requirement of adequate structural strength is catered for by the choice of proper grade of concrete by the ENGINEER. The CONTRACTOR shall strictly abide by the same in his design concrete mix.

Notwithstanding anything mentioned in various tables given in IS: 456 giving specific values and degrees of workability for different condition of concrete placing minimum cement content and maximum water-cement ratio for concrete exposed to sulphate attack and for concrete to ensure durability under different conditions of exposure, strength requirement for different grades of concrete.

5.1.2 MINIMUM CEMENT CONTENT :

The Minimum cement content for each grade of concrete shall be as per BIS 456, 2000.

5.1.3 STRENGTH REQUIREMENT :-

In case of Design Mix Concrete, the water cement ratio of such value has to give acceptable test results as per IS : 456, will be selected by trial and error. The values of water-cement ratios for different concrete grades and mix designs shall be established after conducting sufficiently large number of preliminary tests in the laboratory to the satisfaction of the ENGINEER. Frequent checks on tests shall be carried out and the water-cement revised if the tests produce unsatisfactory results. Notwithstanding anything stated above, CONTRACTOR's responsibility to produce satisfactory test results and to bear all the consequences in case of default remain unaltered

In case of ordinary concrete, the maximum water-cement ratio for different grades of concrete specified in Table-3 of IS : 456 and no tests are necessary. The acceptance test criteria for nominal mix concrete shall be as per IS : 456.

5.2 SURFACE PREPARATION

5.2.1 FOUNDATION BEDDING, BONDING AND JOINTS :

All surfaces upon or against which concrete will be placed shall be suitably prepared by thoroughly cleaning, washing and dewatering, as indicated on the drawings, or as directed by the ENGINEER, to meet the situations encountered in the work.

Soft or spongy areas shall be cleaned and backfilled with either a soil-cement mixture, lean concrete or clean sand, till compacted to a minimum density of 90% Modified Proctor, unless otherwise mentioned in Schedule of Quantities.

5.2.2 PREPARATION OF EARTH STRATA OF FOUNDATIONS :

All earth surfaces upon or against which concrete is to be placed, shall be well compacted and free from moisture mud or debris. Soft, yielding soil shall be removed and replaced with P.C.C. as directed by ENGINEER. The surface of absorptive soils, against which concrete is to be placed, shall be moistened thoroughly so that no moisture will be drawn from the freshly placed concrete.

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5.2.3 PREPARATION OF CONCRETE SURFACES :

The preparation of concrete surfaces upon which additional concrete is to be placed later, shall preferably be done by scarifying and cleaning, while the concrete is between its initial and final set. This method shall be used wherever practicable and shall consist of cutting the surface with picks and stiff brooms and by use of an approved combination of air and water jet as directed by ENGINEER. Utmost care shall be exercised in performing this work to removal of mortar and the weakening of the surface by loosening of aggregates.

The final required result shall be that pitted surface from which all dirt, unsound concrete, laitance and glazed mortar have been removed.

5.2.4 BONDING TREATMENT (MORTAR) :

After rock or Concrete surfaces upon which new concrete is to be placed have been scarified, cleaned and wetted, as specified herein, they shall receive a bonding treatment, immediately before placement of the concrete.

The bonding medium shall be a coat of cement-sand mortar. The mortar shall have the same cement-sand proportions as the concrete which shall be placed thereon. The water-cement ratio shall be determined by site conditions and as approved by ENGINEER.

Bonding mortar shall be placed in sufficient quantity to completely cover the surface by about 5 mm thick for concrete surfaces. It shall be brushed or broomed over the surface and worked thoroughly into all cracks, crevices and depressions. Accumulations or puddles of mortar shall not be allowed to settle in depressions and shall be brushed out to a satisfactory degree, as approved by ENGINEER.

Mortar shall be placed at such a rate that it can be brushed over the surface just in advance of placement of concrete. Only as much area shall be covered with mortar as can be covered with concrete before initial set in the mortar takes place. The amount of mortar that will be permitted to be placed at any one time, or the area which it is required to cover, shall be in accordance with ENGINEER's directions.

5.2.5 CLEANING AND BONDING FORMED CONSTRUCTION JOINTS :

Vertical construction joints shall be cleaned as specified above or by other method as approved by ENGINEER. In placing concrete against formed construction joints, the surfaces of the joints, where accessible, shall be coated thoroughly with the specified bed-joint bonding mortar immediately before they are covered with concrete, or by scrubbing with wire brooms dipped into the fresh concrete. Where it is impracticable to apply such a mortar coating, special precautions shall be taken to ensure that the new concrete is brought in intimate contact with the surface of the joint, by careful puddling and spading with aid of vibrators and suitable tools.

5.3 PREPARATION PRIOR TO CONCRETE PLACEMENT, FINAL INSPECTION AND APPROVAL

:

Before the concrete is actually placed in position, the inside of the formwork shall be inspected to see that they have been cleaned and oiled. Non-staining oil / Linseed oil shall be used as approved by ENGINEER. Temporary openings shall be provided to facilitate inspection, especially at bottom of wall forms, to permit removal of saw dust, wood shavings, binding wire, rubbish, dirt, etc. Openings shall be placed or holes drilled so that these materials and water can

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be removed easily. Such openings/holes shall later be properly plugged.

Various trades shall be permitted ample time to install drainage and plumbing lines, floor & trench, drains, conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedments to be cast in the concrete as indicated on the drawings or, as is necessary for the proper execution of the work. CONTRACTOR shall co-operate fully with all such agencies and shall permit the use of scaffolding, formwork, etc. by other trades at no extra cost.

All embedded parts, inserts, etc. shall be correctly positioned and securely held in the forms to prevent displacement during placing and vibrating of concrete.

All anchor bolts shall be positioned using templates and kept in place.

Reinforcement and other items to be cast in concrete shall have clean surfaces that will not impair bond.

Prior to concrete placement, all work shall be inspected and approved by ENGINEER. If found unsatisfactory, concrete shall not be poured until after all defects have been rectified by the CONTRACTOR. All the costs in respect of rectification work shall be deemed to be included in the quoted rates.

5.4 PROCEDURE FOR CONCRETE PLACEMENT :

5.4.1 ENGINEER'S APPROVAL OF EQUIPMENT & METHODS :

Before any concrete is placed, the entire placing programme consisting of equipment, layout, proposed procedures and methods shall be submitted to ENGINEER for approval and no concrete shall be placed until ENGINEER's approval has been received in writing. Equipment for conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete during depositing without segregation of materials, considering the size of the job and placement location.

5.4.2 TIME INTERVAL BETWEEN MIXING AND PLACING :

Concrete shall be placed in its final position before the cement reaches its initial set and concrete shall normally be compacted in its final position within thirty minutes of leaving the mixer. Concrete once compacted, it shall not be disturbed.

5.4.3 AVOIDING SEGREGATION :

Concrete shall, in all cases, be placed from as near as practicable position directly in its final position, and shall not be re-handled or caused to flow in a manner which will cause segregation, loss of materials, displacement of reinforcement, shuttering or embedded inserts, or impair its strength.

For locations where direct placement is not possible, and in narrow forms, CONTRACTOR shall provide suitable chute and "Elephant Trunks" to confine the movement of concrete.

5.4.4 PLACING BY MANUAL LABOUR

Except when otherwise approved by ENGINEER, concrete shall be placed in the shuttering by shovels or other approved equipment and shall not be dropped from a height more than 1.5 M or handled in a manner which will cause segregation.

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5.4.5 PLACING CONCRETE THROUGH REINFORCING STEEL :

When placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregate. Where the congestion of steel makes placing difficult, it may be necessary to temporarily move the top steel aside to get proper placement and restore reinforcing steel to its design position.

5.4.6 BLEEDING :

Should bleeding of free water on top of concrete being placed into the forms occur, the conditions causing this defect shall be corrected before further concreting is resumed.

5.5 COMPACTION :

5.5.1 GENERAL :

Concrete shall be compacted during placing, with approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregates and fits tightly against all form surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the form faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix and caution exercised not to over vibrate the concrete to the point that segregation results and water appears on the top surfaces.

5.5.2 USE OF VIBRATORS :

The exact manner of application and the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Immersion vibrators shall be withdrawn very slowly. In no case shall immersion vibrators be used to transport concrete inside the forms.

Particular attention shall be paid to vibration at the top lift of wall.

5.5.3 PENETRATION OF VIBRATORS :

The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below while the under layer is still plastic, to ensure good bond and homogeneity between the two layers and prevent the formation of joints.

5.5.4 VIBRATION AGAINST REINFORCEMENT :

Care shall be taken to prevent contact of immersion vibrator with reinforcement steel and / or embedded parts. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms of finished surfaces.

5.6 STONE POCKETS AND MORTAR PONDAGES :

The formation of stone pockets or mortar ponding in corners and against faces of forms shall not be permitted. Should these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for thorough bonding, as directed by ENGINEER.

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5.7 CONSTRUCTION JOINTS AND KEYS :

5.7.1 GENERAL :

Concrete shall be placed without interruption until completion of the part of the work between predetermined construction joints, as specified hereinafter. Time lapse between the pouring of adjoining units shall be as specified on the drawings or as directed by ENGINEER.

If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made where the work is stopped. Joints shall be either vertical or horizontal unless otherwise shown on drawings. In case of an inclined or curved member, the joint shall be at the right angles to the axis of the member. Vertical joints in walls shall be kept to a minimum. Vertical joints shall be formed against a stop board; horizontal joints shall be level and wherever possible, arranged so that the joint lines coincide with the architectural features of the finished work. Battens shall be nailed to the form work to ensure a horizontal line, and if directed, shall also be used to form a grooved joint. For water storage bullet walls and similar work, joints shall be formed as per IS : 3370. Concrete that is in the process of setting shall not be disturbed or shaken by traffic either on the concrete itself or upon the shuttering. Horizontal and vertical construction joints and shear keys shall be located and shall conform in detail to the requirements of plans, unless otherwise directed by ENGINEER

5.7.2 DOWELS :

Dowels for concrete work, not likely to be taken up in the near future, shall be encased in concrete as per drawings and as directed by the ENGINEER.

5.7.3 TREATMENT OF CONSTRUCTION JOINTS OF RESUMING CONCRETING:

A stiffer mix shall be used for the top lift of horizontal pours to avoid laitance. All laitance and loosed stones shall be thoroughly and carefully removed by wire brushing / hacking and surface washed. Just before concreting is resumed, the roughened joint surface shall be thoroughly cleaned and loose matter removed and then treated with a thin layer of cement grout of proportion specified by ENGINEER and worked well into the surface. The new concrete shall be well worked against the prepared surface before the grout mortar sets. Special care shall be taken to obtain thorough compaction and to avoid segregation of the concrete along the joints / plane.

5.7.4 EXPANSION AND CONTRACTION JOINTS :

Provision shall be made for expansion and contraction of concrete by use of special type joints located as shown on the drawing, Contraction joint surfaces shall be treated as per specifications, drawings or as directed by ENGINEER.

5.8 RAIN OR WASH WATER :

No concrete shall be placed in wet weather or on a water covered surface. Any concrete that has been washed by heavy rains shall be entirely removed, if there is any sign of cement and sand having been washed away from the concrete placed. To guard against damage which may be caused by rains, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted. Any water accumulated on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid flow of water over/around freshly placed concrete, suitable drains and sumps shall be provided.

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5.9 BONDING MORTAR :

Immediately before concrete placement begins, prepared surfaces except formwork, which will come in contact with the concrete to be placed, shall be covered with the bonding mortar.

5.10 CLEANING OF EQUIPMENT :

All equipment used for mixing, transporting and placing of concrete shall be maintained in clean condition. All pans, buckets, hoppers, chutes, pipelines & other equipment shall be thoroughly cleaned after each period of placement.

5.11 CURING, PROTECTING, REPAIRING AND FINISHING :

5.11.1 CURING :

All concrete shall be cured by keeping it continuously damp for the period of time required for complete hydration and hardening to take place. Preference shall be given to the use of continuous sprays, or ponded water, continuously saturated coverings of sacking, canvas, hessians or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even-textured coat. Extra precautions shall be exercised in curing concrete during cold and hot weathers as outlined hereinafter. The quality of curing water shall be the same used for mixing concrete.

5.11.2 CURING WITH WATER :

Fresh concrete shall be kept continuously wet for a minimum period of 14 days from the date of placing of concrete, following a lapse of about 12 hours after laying concrete.

The curing of horizontal surfaces exposed to the drying winds shall, however, begin immediately after the concrete has hardened. Water shall be applied to unformed concrete surfaces within 1 hour after concrete has set. Water shall be applied to formed surfaces immediately upon the removal of forms. Quantity of water applied shall be controlled so as to prevent erosion of freshly placed concrete.

5.11.3 CONTINUOUS SPRAYING :

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances like hose, sprinklers and spraying devices. Continuous fine mist spraying or sprinkling shall be used, unless otherwise specified or approved by ENGINEER.

5.11.4 CURING EQUIPMENT :

All equipment and materials required for curing shall be on hand and ready for use before concrete is placed.

5.12 PROTECTING FRESH CONCRETE :

Fresh concrete shall be protected from the elements, from defacement & damage due to construction operations by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun & winds. Steps, as approved by ENGINEER, shall also be taken to protect green

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concrete from damage by debris, excessive loading, vibration, abrasion or contact with other materials, etc. that may impair the strength and/or durability of the concrete. Workmen shall be warned against and prevented from disturbing green concrete during its setting period. If it is necessary that workman have to enter the area of freshly placed concrete bridges shall be placed over the area, as directed by ENGINEER.

5.13 REPAIR AND REPLACEMENT OF UNSATISFACTORY CONCRETE :

5.13.1 GENERAL :

Immediately after the shuttering is removed, the surface of concrete shall be very carefully gone over all defective areas called to the attention of ENGINEER. Defective areas shall be repaired or replaced by CONTRACTOR as directed by HPCL at no additional cost to HPCL.

5.14 SAMPLING AND TESTING CONCRETE IN THE FIELD :

Facilities required for sampling materials and concrete in the field, shall be provided by CONTRACTOR at no extra cost.

Test cubes for each grade of concrete and for quantity placed in each pour shall be made as specified in IS: 456. Such samples shall be drawn on each day, for each grade of concrete & during each concreting operations. Additional cubes shall be taken for 7 days test as required by ENGINEER. The laboratory test results shall be tabulated maintained at site and furnished to ENGINEER. ENGINEER will accept the concrete according to 'Acceptance Criteria' specified in the IS : 456.

5.15 CONSISTENCY :

Slump test shall be carried out as often as demanded by ENGINEER invariably from the same batch of concrete from which the test cubes are made. Slump test shall be done immediately after sampling.

LIMITS OF CONSISTENCY

Degree of workability	Slump in mm with standard Cone as per IS:1199		Use for which concrete is suitable
	Min.	Max.	
Very low	0	25	Concreting of shallow sections with vibration
Low	25	50	Concreting of lightly reinforced sections with vibration.
Medium	25	75	Concreting of lightly reinforced sections without vibration, or heavily reinforced section with vibration.

5.16 HOT WEATHER EQUIPMENT :

All concrete work performed in hot weather shall be in accordance with IS : 456, except as herein modified.

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Admixture may be used only when approved by ENGINEER.

Adequate provisions shall be made to lower concrete temperatures by selecting timing of concreting, normally cool hours, using cool ingredients, eliminating excessive mixing, preventing exposure of mixers and conveyors to direct sun-light, the use of reflective paint on mixers, etc. The temperature of the freshly placed concrete shall not be permitted to exceed 38 deg. C.

Consideration shall be given to providing shade aggregate stockpiles from direct rays of the sun and spraying stockpiles with water, use of cold water when available and burying, insulating, shading and / or painting white the pipe lines & water storage bullets.

In order to reduce loss of mixing water, the aggregates, wooden forms, sub-grade, adjacent concrete and other moisture absorbing surfaces shall be well wetted prior to concreting. Placement and finishing shall be done as quickly as possible.

Extra precautions shall be taken for the protection and curing of concrete. Consideration shall be given to continuous water curing and protection against high temperatures and drying hot winds for a period of at least 14 days immediately after concrete has set and after which normal curing procedures may be resumed.

5.17 SLOTS, OPENINGS ETC. :

Slots, openings, holes, pockets, pipe sleeves, etc. shall be provided in the concrete work in the positions indicated on the drawings or as directed by ENGINEER. Any deviation from the approved drawings shall be made good by CONTRACTOR at his own expense without damaging any other work. Sleeves, bolts, inserts, etc. shall also be provided in concrete work where so specified.

6.0 FORMWORK :

The formwork shall consist of shores, bracings, sides of beams and columns, bottom of slabs, etc. including ties, anchors, hangers, inserts, etc. complete which shall be properly designed and planned for the work. False work shall be so constructed that vertical adjustments can be made to compensate for take up and settlements. Wedges shall be used at the top or bottom of timber props, but not at both ends, to facilitate vertical adjustment or dismantling of the formwork.

6.1 DESIGN OF FORMWORK :

The design and engineering of the formwork as well as its construction shall be the responsibility of CONTRACTOR. If so instructed, the drawings and/or calculations for the design of the formwork shall be submitted to ENGINEER for approval before proceeding with work, at no extra cost to OWNER. ENGINEER's approval shall not, however, absolve the CONTRACTOR of his full responsibility for the design and construction of the formwork. The design shall take into account all the loads, vertical as well as lateral, forms would be carrying, including live and vibration loadings.

6.2 FORMWORK REQUIREMENTS :

Forms shall conform to the shapes, lines, grades and dimensions, including camber of the concrete as called for on the drawings. Ample studs, wailers, braces, ties, straps, shores, etc. shall be used to hold the forms in proper position without any distortion whatsoever until concrete has set sufficiently to permit the removal of forms. Forms shall be strong enough to permit the use of immersion vibrators. The formwork shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, work holes, warps or other surface defects.

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Faces coming in contact with concrete shall be free from adhering grout, plaster, paint projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss of water and cement slurry from concrete.

Plywood shall be used for Exposed Concrete surfaces. Where called for, sawn and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces which are to be rubbed finished shall be planed to remove irregularities or unevenness in the face. Formwork with linings will be permitted.

All new and used material for lumber shall be maintained in a good condition with respect to shape, strength, rigidity, water tightness, smoothness and cleanliness of surfaces. Form lumber unsatisfactory in any respect shall not be used and, if rejected by ENGINEER, shall be removed from the site.

Formwork, during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contours shown on the drawings, shall be repositioned and strengthened. Poured concrete affected by the faulty formwork, shall be removed in its entirety and the formwork corrected, as directed by ENGINEER, prior to placing new concrete.

Forms for substructure concrete may be omitted when, in the opinion of ENGINEER, the open excavation is firm enough to act as the form. Such excavation shall be slightly larger than that required by the drawings to compensate for irregularities in excavation and to ensure concrete cover and the design requirements.

Forms shall be so designed and constructed that their removal will not damage the concrete. Face formwork shall provide true vertical and horizontal joints, conform to the architectural features of the structure as to location of joints and be as directed by ENGINEER.

When exposed smooth or rubbed concrete finishes are required, the forms shall be constructed with special care so that the resulting concrete surfaces require a minimum finish.

6.3 MOULD OIL :

Care shall be taken to see that the faces of formwork coming in contact with concrete are perfectly cleaned and two coats of mould oil or any other approved material applied before fixing reinforcement and placing concrete. Such coating shall be insoluble in water, non-staining and not injurious to the concrete. It shall not become flaky or be removed by rain or wash water. Reinforcement and / or other items to be cast in the concrete shall not be placed until coating of the forms is complete. Adjoining concrete surfaces shall also be protected against contamination from the coating material.

6.3.1 CHAMFERS AND FILLETS :

All corners and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 20 mm x 20 mm. Care shall be exercised to ensure accurate moulding. The diagonal face of the moulding shall be planed or surfaced to the same texture as the form to which it is attached.

6.4 WIRE TIES :

Wire ties passing through the walls shall not be allowed. In their place bolts passing through

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6.5 REUSE OF FORMS :

6.6 REMOVAL OF FORMS :

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For liquid retaining structures, no sleeves for through bolts shall be used, nor shall through bolts be removed. The bolts, in this case, shall be cut at 25 mm depth from the surface and then the hole shall be made good by sand cement mortar of the same proportion as that of concrete, just after striking the formwork.

7.0 REINFORCEMENT :

7.1 SUPPLY :

Reinforcement bars shall be High Yield Strength Deformer bars (TMT) Fe 415 Grade as per latest edition of IS 1786. Wire mesh or fabric shall be in accordance with I.S. 1566. Substitution of reinforcement will not be permitted except upon written approval from ENGINEER.

7.2 STORAGE :

The reinforcement shall not be kept in direct contact with the ground but stacked on top of an arrangement of timber sleepers or the like.

If the reinforcing rods / bars have to be stored for a long duration, they shall be coated with cement wash before stacking and / or be kept under cover or stored, as directed by ENGINEER. Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion and deterioration.

All reinforcement shall be clean, free from grease, oil, paint, dirt, loose mill scale, loose rust, dust, bituminous material, or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used. All bars shall be rigidly held in position before concreting. No welding of rods to obtain continuity shall be allowed, unless approved by ENGINEER.

7.3 LAPS :

Laps and splices for reinforcement shall be as shown on the drawings. Splices in adjacent bars shall be staggered and the locations of all splices, except those specified on the drawings, shall be approved by ENGINEER. The bars shall not be lapped unless the length required exceeds the maximum available length of bars at site.

7.4 BENDING :

Reinforcing bars, supplied bent or in coils, shall be straightened before they are cut to size. Straightening of bars shall be done in cold and without damaging the bars. This is considered as a part of reinforcement bending fabrication work and contractor's rates are deemed to include this work.

All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and re-bent in a manner that will injure the material; bars containing cracks or splits shall be rejected. They shall be bent cold.

Bars incorrectly bent shall be used only if the means used for straightening and re-bending shall be such as shall not, in the opinion of ENGINEER, injure the material. No reinforcement shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

7.5 FIXING :

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Reinforcement shall be accurately fixed by any approved means and maintained in the correct position shown in the drawings by the use of blocks, spacers and chairs as per I.S. 2502 to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing points shall be securely bound together at all such points with 16 gauge annealed soft iron wire. The vertical distances required between successive layers of bar in beams or similar members shall be maintained by the provision of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

7.6 **COVER :**

Clear concrete cover for reinforcement shall be maintained as stated on drawings.

The correct cover shall be maintained by cement mortar blocks or other approved means. Reinforcement for footings, grade beams and slabs on subgrade shall be supported on precast concrete blocks as approved by ENGINEER. The use of pebbles or stones will not be permitted.

The 28 days crushing strength of cement mortar cubes/precast cover blocks shall be at least equal to the specified strength of concrete in which these cubes/blocks are embedded.

7.7 **INSPECTION :**

Erected and secured reinforcement shall be inspected and approved by ENGINEER prior to placement of concrete.

8.0 **EMBEDDED PARTS ENCASED IN CONCRETE :**

Embedded parts to be encased in concrete shall be unpainted. The encasing shall be done in concrete with 10 mm maximum size aggregate.

9.0 **GROUTING :**

9.1 **STANDARD GROUT :**

The proportions of grout shall be such as to produce a flowable mixture consistent with minimum water content and shrinkage. The grout proportions shall be as specified on drawings and as directed by ENGINEER.

- a) Sand shall be such as to produce a flowable grout without any tendency to segregate.
- b) Surfaces to be grouted shall be thoroughly roughened and cleaned of all foreign matter and laitance.
- c) Prior to grouting, the hardened concrete surfaces to be grouted shall be saturated with water.

Forms around base plates shall be reasonably tight to prevent leakage of the grout. Adequate clearance shall be provided between forms and base plate to permit grout to be worked into place properly.

Grouting, once started, shall be carried out quickly and continuously to prevent segregation, bleeding and breakdown of initial set. Grout shall be worked from one side of one end to the other to prevent entrapment of air. To distribute the grout and to ensure more complete contact between base plate & foundation and to help release entrapped air, link chains can be used to work the grout into plate.

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Grouting through holes in base plates shall be by pressure grouting. Variations in grout mixes and procedures shall be permitted if approved by ENGINEER.

9.2 INSPECTION :

All materials, workmanship and finished construction shall be subject to the continuous inspection and approval of ENGINEER.

All materials supplied by CONTRACTOR and all work or construction performed by CONTRACTOR immediately replaced at no additional expense to the OWNER and to the entire satisfaction of the ENGINEER.

Approval of any preliminary materials or phase of work shall in no way absolve the CONTRACTOR from his responsibility of supplying concrete and/or producing Finished concrete in accordance with the specifications and drawings.

All concrete shall be protected by the CONTRACTOR against damage until finally accepted by the OWNER or his representative.

9.3 CLEAN-UP :

Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris resulting from the work shall be removed from the premises. All the debris i.e. empty containers, scrap wood, etc. shall be removed daily, as directed by ENGINEER.

The finished concrete surfaces shall be left in a clean condition to the entire satisfaction of the ENGINEER.

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GROUP-3 : BRICK WORK AND UNCOURSED RUBBLE MASONRY WORK

1.0 BRICKS :

Bricks used in works shall conform to the relevant Indian Standards. They shall be sound, hard, homogenous in texture, well burnt in kiln without being vitrified, table moulded, deep red, cherry or copper coloured, of regular shape & size shall have sharp & square edges and parallel faces. The bricks shall be free from pores, chips, flaws or humps of any kind. Bricks containing un-ground particles and / or which absorb water more than 15% of their weight when soaked in water for twenty-four hours shall be rejected. Over-burnt or under-burnt shall be liable to rejection. The bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 35 Kg/sq.cm. unless otherwise noted on drawings. The classes and quality requirements or bricks shall be as laid down in IS : 1077.

The size of the brick shall be 23.0 x 11.5 x 7.5 cm, unless otherwise specified, but tolerance of up to plus 3 mm in each direction shall be permitted. However, bricks conforming in size stated in IS : 1077 could be used. Bricks shall be provided with frogs. Only full size bricks shall be used for masonry work. Brickbats shall be used only with the permission of the ENGINEER to make up required wall length or for bonding. Sample bricks shall be submitted to the ENGINEER for approval and bricks supplied and used in works shall conform to the approved samples. Brick samples shall be got tested as per IS –3495 by the CONTRACTOR at no extra cost to OWNER. Bricks rejected by ENGINEER shall be removed from the site of works within 24 hours.

Specification of sand used for brickwork shall be same as that specified for concrete work shall belong to Grading Zone-II.

2.0 MORTAR :

Mortar for brick masonry shall be prepared as per IS : 2250. Mix for cement mortar shall be as specified in the respective items of work. Gauge boxes for sand shall be of such dimensions that one complete bag of cement containing 50 kgs. of cement forms one unit. Sand shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be approved by ENGINEER. It shall be thoroughly washed until it is free of any contamination.

For preparing cement mortar, the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. The mortar shall be thoroughly mixed and the same shall be used within 25 minutes of mixing. Mortar left unused beyond the above specified period shall not be used in work and shall be rejected.

The CONTRACTOR shall arrange for test on mortar samples, if so directed by the ENGINEER. Re-tempering of mortar will not be permitted.

3.0 WORKMANSHIP :

All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work. For laying bricks a layer of mortar shall be spread over the full width of the length of the lower course. Each brick shall be pressed into the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs up.

4.0 UNCOURSED RUBBLE MASONRY PITCHING WORK :

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Rubble stone for uncoursed masonry pitching work carried out using approved trap / basalt / granite and shall be hard, tough, sound, durable, dense, clean, of close texture and free from unsound material, cracks, decay and weathering. Water absorption when tested as per IS standards shall not be more than 5%.

The stone shall, in the smallest dimension, be equal to the thickness of the pitching course specified with a tolerance of 25 mm. Stone shall be sufficiently flat bedded.

Specification for mortar shall be as per clause No.2.0

Specification for workmanship shall be as per clause No.3.0.

5.0 CEMENT POINTING :

The joints of masonry shall be raked at least 12 mm deep. The dust shall then be brushed out of the joints and the wall washed with water.

The mortar shall consist of cement & sand in proportion of 1:2. This mortar shall be filled into joints and well pressed with special steel trowels. The joints shall not be touched again after it has once begun to set.

The joints of the pointed work shall be neat. The lines shall be regular and uniform in breadth and the joints shall be flat as directed. No false joints shall be allowed.

The work shall be kept wet for seven days after the pointing is complete.

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GROUP-4 : MECHANICAL

SUPPLY FABRICATION AND ERECTION OF STRUCTURAL STEEL

1.0 SCOPE :

This section covers the general requirements for supply of steel material, where specified, fabrication and delivery at site of structural and miscellaneous steelwork.

2.0 APPLICABLE CODES AND SPECIFICATIONS :

a) MATERIALS :

- | | | | |
|-----|-----------|---|---|
| 1. | IS : 808 | - | Rolled Steel Beam, Channel and Angle Sections. |
| 2. | IS : 814 | - | Specifications for Covered Electrodes for Metal Arc Welding for Structural Steel. |
| 3. | IS : 823 | - | Code of Procedure for manual metal arc welding of mild steel. |
| 4. | IS : 919 | - | Recommendations for limits & fits for engineering (part I & II). |
| 5. | IS : 1161 | - | Specifications for Steel Tubes for structural purpose. |
| 6. | IS : 1363 | - | Hexagon Head Bolts. |
| 7. | IS : 1367 | - | Technical supply conditions for threaded steel fasteners. |
| 8. | IS : 1369 | - | Dimension for screw thread runouts & undercuts. |
| 9. | IS : 1852 | - | Rolling and cutting tolerances for hot-rolled steel products. |
| 10. | IS : 2062 | - | Structure Steel (Standard Quality) |
| 11 | IS : 2074 | - | Ready Mixed Paint, Red Oxide Zinc Chromate And Priming. |
| 12 | IS : 4353 | - | Recommendations for submerged arc welding of mild steel and alloy steels. |

b) CODES OF PRACTICE :

- | | | | |
|---|-----------|---|---|
| 1 | IS : 800 | - | Code of Practice for Construction in Steel. |
| 2 | IS : 8060 | - | Code of Practice for use of tubes in general building construction. |
| 3 | IS : 816 | - | Code of Practice for use of Metal Arc Welding for General |

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Construction in Mild Steel.

3.0 STEEL SUPPLIED BY THE CONTRACTOR :

The CONTRACTOR shall furnish to the ENGINEER duplicate copies of all mill orders covering the material ordered by him for this project and the test reports received from the Mills for the ENGINEER's check and information.

If mill tests reports are not available for any steel materials the same shall be got tested by the CONTRACTOR to the ENGINEER'S satisfaction to demonstrate conformity with the relevant specification.

Unidentified stock material may be used, only with the prior permission from the ENGINEER in writing, for short sections at locations specifically selected by the ENGINEER and also for connections where, in the opinion of the ENGINEER, the quality of such materials would not adversely affect the strength and / or durability of the structure. The ENGINEER may also permit use of such materials for other works, if adequate random samples taken out and tested demonstrate conformity with specification and requirement for the work for which these materials are proposed to be carried out.

4.0 SUBSTITUTIONS :

Wherever the CONTRACTOR, in order to accommodate his / others materials in stock, desires to substitute structural steel or plates for the sizes shown on drawings, such substitutions shall be made only after authorisation in writing is given by the ENGINEER.

The ENGINEER may also direct the substitution to be made, when he considers that such substitutions are necessary.

5.0 FABRICATION :

5.1 GENERAL :

All workmanship and finish shall conform to IS : 800 . All materials shall be finished straight as per the tolerance limits as specified. All holes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately carried out and all portions of work exposed to view shall be neatly and accurately done and finished. Material in the shops shall be kept clean and shall be protected from damage.

5.2 CONNECTIONS :

Shop connections shall be effected either by welding, or bolting, as specified on the drawings. Bolts shall be in accordance with specifications.

5.3 STRAIGHTENING :

Rolled material, before being worked, shall be straightened. If straightening or flattening is necessary, it shall be done by methods that will not injure the material. Heating and/or forging shall not be permitted for straightening.

5.4 CUTTING :

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Cutting may be carried out by shearing, cropping or machine flame cutting, if permitted by the ENGINEER. All re-entrant corners shall be shaped notch free to a radius of at least 12 mm. Sheared or cropped edges shall be dressed to a neat workman like finish and shall be free from distortion and burrs. The kerf on machine flame cut edges shall be removed.

Hand flame cutting shall be undertaken only if so permitted by the ENGINEER and shall only be carried out by an expert in such work. Hand flame cut edges shall be ground smooth and straight. Edge planing of sheared, cropped or gas cut edges is not intended, unless the sheared, cropped or gas cut edges are such as to warrant it, or is specifically called for.

5.5 WELDING :

Electrodes for shielded-arc manual welds shall comply with the requirements of IS : 814 and shall be of approved make.

The electrodes for manual arc welding shall be suitable for use in the position and type of work, as laid down in the above specifications and type of work, and as recommended by the manufacturers. Electrode classification group 1 or 2 as given in IS : 814 shall be used for welding steel conforming to IS : 2062.

All welds shall be made by only welders and welding operators who have been properly trained and are qualified by tests and to perform the type of work required as prescribed in the relevant applicable standards.

All welds shall be free from defects like blow holes, slag inclusions, lack of penetration, undercutting, cracks, etc. All welds shall be cleaned of slag or flux and show uniform sections, smoothness of weld metal, feather edges without overlap and freedom from porosity.

5.6 TOLERANCES :

The dimensional and weight tolerance for rolled shapes shall be in accordance with IS : 1852. The acceptable limits for straightness (slope and camber) for rolled or fabricated members are :-

Struts and columns – $L/1000$ or 10 mm whichever is smaller

For all other members not primarily in compression such as purlins, girds, bracings and the web members of trusses and latticed girders. $L/500$ or 15 mm whichever is smaller

Where 'L' is the length of finished member, as the ENGINEER may specify.

5.7 DIMENSIONS, WORKMANSHIP & CLEANLINESS :

Members shall be inspected at all stages of fabrication and assembly to verify that dimensions, tolerances, alignment, surface finish and painting are in accordance with the requirements shown on the approved shop drawing.

5.8 HANDRAILS :

Handrails shall be provided on open sides of platform, stairways and landings as shown on drawings. Handrails shall be of standard weight mild steel pipe of flush welded construction, ground smooth, provided with double rail, top rail about 1 metre above platform level and pipe posts spaced as shown on drawings.

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Smooth uniform curves and bends shall be provided at stair return and also wherever required / specified. Posts connected to curb plates shall have a neat closure at the a bottom and 6 mm. Thick plate neatly welded to posts for attachments to curb plate. All necessary fittings including inner dowels at splices, brackets, bolts, bends, flanges and chains, where required shall be furnished by the CONTRACTOR. Open ends of all the pipe posts shall be plugged and welded. A minimum radius of 3 times the pipe diameter shall be provided at all points of direction changes in the handrail.

The rate quoted for handrails shall be as per running metre of completed handrailing including posts, fitting, etc. It shall be clearly understood that individual lengths of runners, posts, etc. will not be measured for purposes of payment.

6.0 ERRORS :

Any error in shop work which prevents proper assembling and fitting up of parts in the field by moderate use of drift pins or moderate amount of reaming will be classified by the ENGINEER as defective workmanship. All charges incurred by the ENGINEER either directly or indirectly because of the poor workmanship will be deducted from the amount due to the CONTRACTOR before payments made. The amount of such deduction will consist of the sum total of the costs of labour direct or indirect, material, plant, transportation, equipment rental and overhead expenses. In case the ENGINEER choose to reject the material because of poor workmanship, the cost of all handling and returning the material to the CONTRACTOR, if he so desires, shall entirely be to CONTRACTOR's account. All the replacement materials shall conform to the same specification as for the original materials, & shall be supplied free and in

All such cases, the cost of handling, transport and delivery to site shall be borne by the CONTRACTOR.

7.0 PAINTING :

All fabricated steel material, except those galvanised, shall receive protective paint coating.

The surface of steelwork to be painted shall be thoroughly cleaned of all loose mill scale, rust, grease, dirt and other foreign matter by hand tool cleaning, power tool cleaning or flame cleaning as specified and as directed. In power brushing, sufficient care shall be exercised not to burnish mill scale to a slick finish to which paint may not adhere properly.

The paint treatment specified shall be applied either by brushing or spraying on the thoroughly cleaned and dry surface. Airless spraying shall be done if so specified. Surfaces inaccessible after assembly shall receive an additional coat of the specified paint prior to assembly.

Paint shall be stirred frequently to keep the pigment in suspension. All paint delivered to the fabrication shop shall be ready mixed in original sealed containers as packed by the paint manufacturers and no thinners shall be permitted. No painting shall be done in frosty/foggy weather or when the humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is 45 deg. or higher.

8.0 STRUCTURAL STEELWORK IN TUBES :

8.1 SCOPE :

This section covers the specific technical requirements for the following:-

- a) Supply, inspection, and testing at site of tubular structural steelwork.

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b) Fabrication, erection and testing at steelwork.

8.2 SUPPLY, ERECTION AND TESTING OF MATERIALS :

Materials for tubular steelwork supplied by CONTRACTOR shall conform to IS:1161, YST 210. The class of tubes shall be as specified on drawing. All materials shall be free from injurious defects.

9.0 FABRICATION ERECTION AND TESTING OF TUBULAR STEELWORK :

The supply and erection of tubular steel work shall include inspection, delivery at site,

cleaning, cutting, aligning welding connecting and installing all tubular steelwork in position as shown on drawing and as directed by ENGINEER.

Wherever tubes of different thickness are to be butt welded, the necessary beveling shall be carried out by the CONTRACTOR at no extra cost to OWNER.

The CONTRACTOR shall be supplied with the drawings for tubular steel work connections. The tubes shall be cut to the exact shape and welded properly. The thickness of the weld shall be as specified on drawing. Welded joint shall be ground smooth.

10.0 WELDING :

Tack welds used in assembling tubes shall be made by a qualified welder. Tack welds which are not to be removed shall be made with an electrode which is the same as or equivalent to the electrode to be used for the first pass.

All welds shall be full penetration, welds and homogenous with no voids. Any cracks or blowholes that appear on the surface of joint shall be removed by chipping.

All stipulations for welding work as mentioned in this specification (para 6.6) shall apply for the welding of tubular steelwork, in addition to that mentioned above.

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GROUP - 5

SPECIFICATION FOR VESSEL MOUND MATERIALS

1.0 GENERAL SCOPE OF WORK :

The area to be covered by the mound shall be cleared of all trees, stumps, roots, bushes and other objectionable matter before starting the works. The excavation shall be carried out as per the specifications laid down in 'Group I' of these specifications and the excavated natural soil surface shall be dressed and well compacted with a vibro roller before commencement of the murrum filling works.

The contractor shall take precautions to prevent the excavated area and the sub-grade formation level being flooded by rain or surface water. If required the contractor shall make his own arrangements at no extra cost for dewatering of trenches.

2.0 GROUND IMPROVEMENT & SAND BED

2.1 Murrum / sand as specified shall be used for the ground improvement work.

The quality of MURRUM shall be strictly as approved by HPCL and the decision of HPCL in this regard will be final and binding on the contractor. Murrum shall be laid in layers, each layer in loose state shall not be more than 300 mm in thickness. Water as per OMC requirement shall be sprinkled on the layer and after allowing for soaking, compaction shall be done using a vibro roller (10 MT static weight) of 20 MT - 30 MT weight in dynamic state. The layer shall be compacted to obtain a degree of minimum 98% with respect of the max. Dry density (Modified Proctor density) determined in the lab under Optimum Moisture Content (OMC) condition. Each layer shall be tested for compaction at rate of 1 test per every 1000 Sqm area. Each test shall consist of 6 samples. Contractor shall bear the cost of all laboratory and field tests for the job.

2.2 The sand used for ground improvement shall be as per clause 2.4 below. The quality of sand shall be strictly as approved by HPCL and the decision of HPCL in this regard will be final and binding on the contractor.

2.3 The geo-textile layer (Terram 1000 or equivalent approved quality) shall be laid directly on the top and bottom of the murrum layer as per the drawings prior to the commencement of the sand bed preparation work as per the approved drawings.

2.4 The bullet bed material shall be sand laid in layers, each layer in loose state shall not be more than 300 mm in thickness so as to give compacted thickness of 200-250 mm. Water to the tune of 3 to 5 lit/ sq.m. shall be sprinkled on the sand layer and after allowing for soaking, compaction shall be done using a vibro roller (10 MT static weight) of 20 MT-30 MT weight in dynamic state. The layer shall be compacted to obtain a degree of compaction of minimum 98% with respect to vibrated dry density of sand determined in lab. The required sand filling shall be completed in layers as above to reach the desired level up to the bottom of the bullets. (Ref BS: 1377 1900 Part 4, Clauses 3.3 and 3.4.)

2.5 The sand bed shall be laid to the falls & to the levels and full depth as shown on the drawings and the bed for the bullets shall be excavated out of the fully compacted bed using a template formed to the exact shape and size of the bullets.

2.6 If welding trenches are to be used they shall be backfilled with sand and compacted in accordance with the above clauses. The trenches shall be adequately propped and braced to ensure that there is no loss of compaction of the adjacent sand bed.

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3.0 SAND SURROUND / FILLING BETWEEN VESSELS

- 3.1 The sand surround to each bullet shall be material in compliance with clause 5.2 laid around the bullets during the mound filling operation to a 300 mm minimum thickness and shall be hand compacted into position.
- 3.2 Filling material between bullet surrounds shall be sand in compliance with clause 5.2 laid in maximum 200 mm layers, or other suitable material.
- 3.3 Sand filling placed between bullets and a line extending out at 45 degrees from the center of the bullet above the bullets enter line shall be hand compacted and fill placed outside this line shall be light machine compacted (both to minimum of 93% maximum dry density).
- 3.4 Compaction shall be sufficient to avoid significant settlement of the sand filling/mound surface but shall be such as not to impose undue stresses on the bullets.
- 3.5 The sand filling shall be placed equally, in maximum 200 mm layers (uncompacted depth), on each side of the bullets so as to avoid any lateral displacement/rotation of the bullets during compaction.
- 3.6 Sand filling shall be brought up to the levels and slopes as denoted on the drawings to below the drainage layer.

4.0 DRAINAGE LAYER ABOVE BULLETS

- 4.1 A 1000 micron UPVC membrane shall be laid on top of the compacted sand fill, to falls and levels denoted on the drawings, with 500 mm minimum lap at joints and with the higher sheet overlapping the lower sheet.
- 4.2 A geo textile membrane of Terram 1000 or equivalent (to be approved by HPCL / TPIA) shall be laid on top of the UPVC membrane to protect it from the stone layer laid above this membrane.
- 4.3 A perforated PVC drain pipe shall be laid as denoted on the drawings, between the Terram and the UPVC membrane and shall be surrounded by pea gravel and overlain by a 5 mm to 50 mm stone layer. The PVC drainage pipe shall conform to BS 4962:1989, whereas the drainage pipe shall conform to BS:5911.

5.0 MATERIAL SPECIFICATION

- 5.1 The sand fill required for ground development shall be as per Clause 5.2 below.
- 5.2 The sand for the bullet bed, bullet surround and filling between bullets shall consist of material complying with the following specification :-
 - a) Good quality clean, non-aggressive sand with a maximum organic Material Content of 3% by weight.
 - b) A max. silt content of 20% by weight (particles smaller than 0.063 mm).
 - c) A maximum particle size of 5 mm.
 - d) A grain size distribution Uniformity Coefficient (D60/D10) of between 2 & 8
- 5.3 The stone layer to the top of the mound shall consist of clean, well graded, rounded river pebble stone free from all organic material, sulphates, or any other deleterious material, and with a particle size of 5mm to 50mm. Depth varies from 300 mm minimum to 500 mm maximum.

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- 5.4 The side slopes to the mound shall be protected by good quality stone pitching constructed out of stones of average size 225 and grouted together to form an impermeable finish, all as denoted on the drawings with 1:4 cement mortar for joints. Raised pointing of pitching is to be carried out with 1:2 cement mortar.

6.0

SUMMARY TABLE

6.1

A summary of the proposed materials, grading and compaction requirements for the bullet mound is given in the following

Table 6.1.

ITEM	GRADING	COMPACTION
Fill to underside of sand bed	Clean Sand to Clause 5.2	98% of max. laboratory dry density,
Bullet sand bed	Clean sand to Clause 5.2	98% of max. laboratory dry density,
Bullet sand surround, 300 mm	Clean sand to Clause 5.2	Hand compacted to minimum 93% max. laboratory dry density.
Mound filling between bullets	Clean sand to Clause 5.2 or other suitable Material	Hand compacted or light machine compacted to minimum 93% max. laboratory dry density.
Pebble Stone Drainage Layer	Clean stone to Clause 5.3	N/A
Stone Pitching	Stone to Clause 5.4	N/A

NOTE: Contractor shall submit the Quality Assurance Plan for the Entire mounded bullets construction

POLYURETHANE BULLET PROTECTIVE COATING

The minimum requirements for the coating materials, equipment, application, inspection, repair, handling & other aspects of external (surface) corrosion protection of mounded bullets (cylindrical unfired pressure vessels) are covered under these technical specifications.

1. SCOPE OF WORK

This specification governs the minimum requirements for materials (coating as well as surface preparation prior to coating), equipment, coating application, inspection, repair, handling and all other aspects of external corrosion protection of Mounded Bullets for bulk storage of the liquefiable (hazardous) gases under pressure.

It is envisaged that the Polyurethane coating (100% solids, high build, elastomeric) on the external surface of the mounded bullets shall provide a hard, tough, high electrical resistance (for corrosion prevention in conjunction with cathodic protection system) surface with outstanding adhesion and impact resistance to protect against damage during the process of mounding (compaction of graded sand followed by earth cover). The coating system shall be suitable for service temperatures between minimum -55 ° C and ambient + 55 ° C (although these temperatures may not be normally

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achieved/ encountered) in service. Also very high levels of chlorides & sulphates, particularly in coastal installations, should be withstood by the coating during entire design life span.

In mounded bullets, with internal pressures the unfired shell areas widen more than the ring stiffened region. The coating system shall withstand, without damage during the entire service life span, the constraint developed thus producing bending moments in the mounded bullets in longitudinal direction, the maximum of which occur / are likely to occur in the plane of the ring stiffener.

The work to include furnishing all labour (skilled & unskilled), materials, tools & tackles, equipment & performance of all operations and incidentals necessary for coating handling, storing and transporting of coated bullets or part thereof. The coating operations will have to be carried out in narrow space around the mounded bullet prior to graded sand filling and compaction around the fabricated bullet.

The steel surface preparation prior to actual commencement of coating shall conform to STEEL STRUCTURE PAINTING COUNCIL: SURFACE PREPARATION SPECIFICATION: SSPC-SP10

Removal of all equipment and excess materials from site, following completion of coating operations is included in the scope of work.

Prior approval from owner/ consultant shall be obtained by the coating applicator for any deviations from the requirements of this specification and/ or the standards referred therein.

2. REFERENCE DOCUMENTS:

STIP3 (STEEL BULLET INSTITUTE , USA)	CORROSION CONTROL SYSTEMS OF UNDERGROUND STEEL BULLETS
NACE 6H 284 (NATIONAL ASSOCIATION OF CORROSION ENGINEERS)	URETHANE TOP COATS FOR ATMOSPHERIC APPLICATION (TECHNICAL COMMITTEE REPORT)
SSPC- SP1	STRUCTURAL STEEL PAINTING COUNCIL: SOLVENT CLEANING
SSPC- SP10	STRUCTURAL STEEL PAINTING COUNCIL: NEAR WHITE BLAST CLEANING
SIS 055900	PICTORIAL SURFACE PREPARATION STANDARD FOR PAINTING OF STEEL STRUCTURES
NACE TM-01-7	VISUAL STANDARD FOR SURFACE & NEW STEEL AIR BLAST CLEANED SAND ABRASIVES
NACE TM-01-75	VISUAL STANDARD FOR SURFACE & NEW STEEL CENTRIFUGALLY BLAST CLEANED WITH STEEL GRIT 7 SHOT

3. GENERAL REQUIREMENTS:

The applicator shall submit for owner / consultant's approval, coating procedure including quality assurance (QA) & quality control (QC) methodology, prior to commencement of coating of the bullets. Only duly approved methodology shall be followed in coating application.

The applicator shall provide standard equipment for coating work and no improvised equipment will be accepted / allowed.

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The applicator shall supply all coating materials required as per this specification & provide test data / reports from standard laboratories. The applicator shall also carry out tests on applied coating for adhesion, film thickness and pinhole / holiday detection. The results of these tests shall be through a owner / consultant approved laboratory.

Considering logistical and technical aspects, coating of bullets shall be carried out in the mound (prior to grade sand filling & compaction) after post weld heat treatment and hydrostatic testing.

All manpower (skilled, unskilled) shall be applicator's responsibility and only personnel skilled in the coating application shall be deployed by the applicator.

The coating shall be inspected by qualified inspectors. The qualification of inspectors shall be verified/ approved by owner / consultant.

The applicator shall provide access during all phases of work to the owner / consultants and their inspectors. Any expenses incurred by the applicator due to owner / consultant's inspectors stopping the coating work because it is not being carried out as per these specifications, shall be borne by the applicator.

All equipment shall be subject to owner / consultant's approval and should be of good quality, maintained in good operating condition and suitable for use to apply materials as per this specification.

All cleaning, priming, coating machines shall be preferably equipped with rubber or wheels overlaid with hard fiber to prevent marking or denting the external surface of the bullet.

The owner shall provide coating schedules & engineering information including drawings when available, showing all dimensions, obstructions and access to the surface area to be coated as well as the calculations of area to be sprayed.

Before, bid submission, the applicators are advised to acclimatize themselves with site working conditions and owner will permit such visits by applicators.

During surface preparation, any acceptable metal defects detected shall be immediately brought to the notice of owner / consultant and the applicator shall hold the work on such steel piece till such time as cleared for further action by the owner / consultant.

Only plural component air less spray system shall be used as per recommendation of the manufacturer of Primer Polyurethane.

4. SAFE PRACTICES:

High performance spray applied coatings may contain potentially toxic ingredients and require all (local, state, central) safety regulations to be observed during coating operations. Proper safety precautions must be observed against recognised safety hazards even during storage of primer & coating materials at site. Applicable (statutory, state, local) regulations governing safe handling practices shall be enforced.

5. MATERIAL SPECIFICATION

Sr	Property	Value	Test Method
1	Tensile Strength	15 N/ sqmm (Min)	ASTM-D638
2	Adhesion (elecometer pull off)	8 N/ sqmm (Min)	ASTM-D4541
3	Recoverable Elongation	50% Min. At 25 ° C	ASTM-D638

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4	Surface Hardness (cured film)	50 (Min)	SHORE D
5	Water vapour permeability	0.5 gms/24hr/sqm (max.)	ASTM-E96
6	Operating Temperatures	-55 ° C to +55 ° C	
7	Salt Spray (6000 hrs)	No Effect	ASTM-B117-73
8	Nom. Film thickness(film build)	1000 micron. (unless otherwise specified)	
9	Impact Resistance	2.3*10 ⁵ gms. Cms (min)	ASTM G-14 on steel pipe
10	Tear Strength	175 PLI (Min)	ASTM D-624
11	Abrasion Resistance (Taber Abraser H-10 wheel 1000 gm 1000 cycles)	Weight loss 0.05 gm (Max.)	ASTM-D-4060
12	Cathodic Disbondment (-1.5 v 70-75 ° F 30 days)	Average radius 10 mm (max)	ASTM G-8, G-95
13	Flexibility at 25 ° C	To pass 180 ° C\ bend over 0.5" mandrel @ 750 microns.	ASTM D 1737
14	Accelerated Weathering	Excellent Some Chalking	ASTM G-23

PRIMER

The type of primer used shall be as per coating manufacturer's specifications

- a) For areas not to be cathodically protected: Polyvinyl Butyl (wash) type
- b) For areas to be cathodically protected : Aluminium filled moisture cured Urethane Primer or two (2) component chemical cured Urethane Primer

Single package moisture-cured Urethane primers containing non-leafing Aluminium pigmented, are fast curing, chemical & corrosion resistant and eliminate the mixing & pot life limitation of two pack materials.

The primer shall have following characteristics;

Flash Point: 28 ° C TCC

Coverage: for @ 1 Mil DFT square feet per gallon
810 - theoretical
648 - practical (assuming 10% loss factor due to over spray etc.)

Shelf Life : Six (6) months

Drying time : at 25 ° C

To touch	30 mts
To handle	45 mts
To recant	4 hours

Clean up : Toluene (immediately)

6. SURFACE PREPARATION:

Although, Elastomeric 100% solids Polyurethane coating material has excellent Corrosion and Erosion resistant properties, it must however, be considered part of an engineered system which includes adequate/ appropriate surface preparation. It is axiomatic in protective coating work that the

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performance of most appropriately chosen coating will be no better than the surface preparation. Accordingly, the surface shall be blast cleaned as follows;

The external surface of bullets (or part thereof) shall be blast cleaned to SSPC-SP10 specification near white blast cleaning with 2-3 Mil anchor profile (or else conform to SIS Gr Sa 2-1/2 Specifications)

Near white blast cleaned surface finish is defined as one from which all Oil, grease, dirt mill scale, rust, corrosion products, oxides, paints or other foreign matter have been completely removed from the surface.

The abrasive shall not be reused as this could be detrimental to the surface.

Dry sand blasting using, compressed air blast nozzles and dry sand of maximum particle size not larger than that passing through a 16 mesh screen US Sieve Series, shall only be used.

Grit blasting shall be using compressed air blast nozzles & crushed grit made of cast iron, malleable iron, steel or synthetic agents other than sand of a maximum particle size no longer than passing through a 16 mesh screen US Sieve Series. The largest commercial grade of metal grit permitted by this specification is SAE No. G-25 abrasive material.

Closed re-circulating nozzle blasting using compressed air, vacuum and any of the preceding abrasive may be used.

The blasted surface shall be brushed with clean brushes made of hair, bristle or fiber or else blown off with compressed air (from which detrimental oil & water have been removed) or cleaned by vacuum for the purpose of removing any traces or blast products from the surface and also for removal of abrasives from pockets & corners.

Blast cleaning operation shall be done in such a manner that no damage is done to partially or entirely completed portions of the bullet.

If any rust is formed on Bullet (external surface) after Blast Cleaning, the surface shall be re-blast cleaned before painting.

The blast cleaned surface shall be examined for any traces of oil, grease or smudges. If present, these shall be removed as outlined in SSPC-SP1-63 specification.

The height of profile of the Anchor pattern product on the surface shall be 50 microns. The height of Anchor Pattern, shall be determined by an Elcometer 123 or equivalent surface profile gauge. The average reading from ten (10) randomly selected areas shall constitute the height of the profile. The profile measurement shall be done on flat (with out curvature) areas only.

The blast cleaned surface should be further treated or primed preferably within 24 hours after blast cleaning but in any event before any visible or detrimental rusting occurs.

All above operations shall be witnessed by & certified by owner / consultant's inspector.

7. PRIMING

Measure humidity (using PSYCHROMETER) to ensure Dew Point is at least 3° C below the ambient temperature. Under controlled conditions, heating steel surface may be resorted, to eliminate the condensation problems.

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Two component chemicals cure urethane primer shall be sprayed onto the cleaned surface in a fog coat as thinly as possible (approximately 1 Mil) so as to tint but not mask the colour of the substrate. The primer on application shall be free from runs & drips. The primed surface shall be protected so that it will not come in contact with rain, Mist, Dust or other foreign substances until completely hardened & the Urethane top coat has been applied.

The Urethane top coat shall be applied before the Prime Coat has completely cured not less than two (2) hours, nor more than five (5) days after the prime coat has been applied. However, the Prime Coat at the time of Urethane application shall be hard and not tacky.

8. COATING

Equipment for spray application shall be plural component Airless spray system (Graco Hydra Cat 45:1 or equivalent)

Pressure produced at Tip	2200 - 3000 PSI
Tip Size	0.66 - 0.76 mm

Temperature	
Resin	50 °C - 60 °C
Activator	10 °C - 30 °C

Standard instructions from the Manufacturer shall be followed for Spray, material handling & storage. Always, dry nitrogen (gas) blanket over material shall be maintained.

Nominal thickness of 100% solids elastomeric urethane shall be 40 Mils (1000 micro) unless otherwise specified. The finished polyurethane shall be generally smooth & free of sharp protuberances. A minor amount of sags, dimpling & curtaining, which otherwise meets specifications requirement shall however be not considered as cause for rejection.

Before actual coating application on the vessel surface, a test patch shall be applied & inspected for Runs, drips & Gel time as well as Tack free time. In case of doubt, Adhesion test shall be carried out.

“Unit Repeat Area” is calculated along with the Material volume in counter numbers (counters are attached on the units that measure the volume of materials dispensed), approximate speed and number of passes. Spray apply requisite thickness in multiple passes in single application keeping spray gun perpendicular to the substrate. If the surface is large enough to require more than one day for coating, the edges of the coated area shall be feathered and roughened with a grinding tool for over spraying and primed.

Skips, if any, holidays, detected should be repaired with 100% solids Elastomer Urethane hand mix kit or equivalent after the edges are roughened.

9. INSPECTION

All work under this specification shall be subject to Inspection by the owner / consultants' Inspector. All part of the work shall be accessible to the owner / consultant's inspector. The applicator shall correct any defective work indicated by the Inspector.

During coating application the wet film thickness shall be measured using Nordson or equivalent wet film gauge as per ASTM D4414. The dry film thickness shall be checked with a magnetic mil gauge (by De Flesko or equivalent). The coating shall be checked for Holidays using Tinkor & Rasor (USA)

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Holiday detector or equivalent. Due caution shall be taken not to use detector voltage exceeding dielectric strength of the coating (400 V/Mil) to avoid damage to the coating.

Pull off Adhesion to steel shall be measured using Elecometer adhesion tester as per ASTM D 4541 using an Aluminium dolly attached to the coating & a perpendicular force applied to the dolly. Average reading from three (3) randomly selected spots shall be at least 8 N/sqmm. Adhesion test shall be carried out on fully cured coating (7 days at 25 °C) & on flat (without curvature) test area.

Applicator shall supply certificate from the coating manufacturer that the material used (with batch numbers) are free from manufacturing defects & will meet all performance criteria when properly applied as given in this specifications.

All above test shall be witnessed & certified by owner/ consultant's inspector.

Inspection and Testing

All painting materials including primers and thinners for application shall be procured directly from manufacturers as per specifications and shall be accompanied by manufacturer's test certificates. Paint formulations without certificates are not applicable.

10. QUALITY ASSURANCE

The contractor shall guarantee that the chemical and physical properties of paint materials used are in accordance with the specifications contained herein / shall be provided during execution of work.

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CATHODIC PROTECTION OF LPG TANKS

1.0 GENERAL

The cathodic protection system shall be designed as per latest specifications and industry standards and the same shall be executed only thru' expert agencies with prior experience of design and providing of CP system for mounded LPG storage vessels in India. The decision of HPCL with respect to the design of the CP system shall be final and binding on the contractor.

The impressed current cathodic protection system should provide a uniform cathodic current density to the target bullet structure in order to maintain the steel at a potential between -0.85 V and -1.5 V relative to a Cu/CuSO₄ reference electrode.

Steel potential needs to be greater than -0.85 V to avoid corrosion and less than -1.5V to avoid excessive hydrogen evolution which induces hydrogen embrittlement of high carbon steels used in the fabrication of bullet tanks. The protected structure thus needs to be maintained within a narrow window of 0.65V.

The type of Anode and its positioning relative to the bullet tank has a critical influence on both achieving the uniform current density and maintaining the potential of the structure within the -0.85 V to -1.5 V potential range. In addition, the relative positions of the associated pipes and tanks have to be considered.

2.0 DESIGN BASIS

For designing the system, the following parameters should be considered:

- | | | |
|----|--------------------|---|
| 1. | Soil Resistivity | - Min 10,000 ohm-cm (*) |
| 2. | CP current density | - VENDOR TO DESIGN & SPECIFY
(approx. 10mA per Sq M) |
| 3. | LPG bullet dia | - 7.0 Mtrs (apprx) |
| 4. | LPG Bullet length | - 42 Mtrs (appx) |
| 5. | %age bare steel | - 10% |
| 6. | Design Life | - 50 years |

(*) Exact measurements should be taken at site, of mound soil.

Based on the above design parameters, the CP contractor shall design a suitable system taking particular care with the positioning of the ANODES and the Cu/CuSO₄ reference cells.

3.0 MONITORING

A suitable Cu/CuSO₄ reference cell monitoring system shall be proposed to ensure that the design parameters can be checked over the lifetime of the CP system.

4.0 TRANSFORMER RECTIFIER UNIT

The transformer rectifier shall be automatically controlled C.P. rectifier of rating - Single Phase or 3 Phase, 415 Volts - 50 V with Auto / Manual override facility. The ampere rating is a function of the type of coating used on the tank.

Control : Constant Voltage / Constant current Control

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Construction : Outdoor type - IP 65 with an additional canopy.

5.0 POTENTIAL CONTROL

The C.P. system shall be provided with automatic potential control. A switch shall be provided to switch the system between automatic and manual operation. Automatic reference selector logic with 3 Nos. reference inputs located in the TR unit will be capable to control the current output such that the structure to soil potential at the connected reference cell is maintained within 10 millivolts of the set value.

The potential measuring circuit shall be capable of working with both Cu/CuSO₄ and Zinc reference cells. At any given time the system shall be either controlled by one type of reference cell and other type shall be kept on the standby mode. The changeover, if required, shall be effected manually at site in the TLP (Test Lead Point).

The TR unit shall be provided with the following Visual annunciation and alarm:

Under Protection
Over Protection
All Reference Failure
Over Current

A panel-mounted meter to read the bullet-to-soil potential at the selected control reference cell through a selector switch shall be provided.

6.0 ELECTRICAL SEPARATION

Monolithic Insulating joints of IGP or equivalent approved make shall be provided on each tank at Manhole covers, gauges and pipe connections to each tank. The Insulation joint shall be approved by TPIA before erection. Contractor has to get the design approved by HPCL / TPIA.

7.0 EARTHING

The LPG bullets shall be connected to the central earthing system through two polarisation cells.

LIST OF APPROVED CONTRACTORS / VENDORS FOR CP SYSTEM

Long Line Polymer Anodes	Raychem – USA / Matcor - USA
Transformer Rectifier Unit	Canara Electric Controls
Reference Electrodes – Cu/Cu So ₄	Borin – USA / Harco (Corrporo) USA
Polarisation Cell	Kirk – USA
Monolithic Isolating Joints	IGP / ALFA / ZUNT
Cables	Netco/ Macrotherm/Suyog/Fort Gloster
Surge Arrestors	Dehn + Sohne - Germany
Junction Boxes	Flexpro / FEPL / Sudhir Electricals

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TESTING OF CIVIL CONSTRUCTION MATERIALS

For particle size test, it is recommended that the set of sieves and weighing machines be arranged by the contractor at site. Necessary manpower, for conduction of the tests, shall also be arranged by the contractor.

For crushing strength of concrete, it is recommended that the contractor arrange the compression testing machine at the site along with the calibration certificate for gauge.

In case, if any of the machine goes under repairs and tests could not be carried out at the site, contractor shall arrange to transport the material to an approved laboratory to carry out the tests.

SI. NO.	MATERIAL	TESTS	TEST PROCEDURE	ACCEPTANCE CRITERIA	PERIODICITY
1	Water	a) Ph value b) Limits of Acidity c) Limits of Alkalinity d) Percentage of solids e) Chlorides f) Suspended matter g) Sulphates h) Inorganic solids i) Organic solids	I.S. 3025	I.S. 456	From the source at the beginning of work / change of source.
2	Cement	(a) Fineness (b) Soundness (c) Setting time (Initial & Final) (d) Compressive strength (e) Consistency	I.S. 4031	I.S. 8112 / 12269	Manufacturer's test certificate and Lab test for each batch brought to site.
3	Sand For concreting	(a) Particle Size distribution (b) Sp. Gravity (c) Deleterious substance (d) Organic impurities (e) Water absorption (f) Fineness modulus	IS 2386	IS 383 Zone – II	Every 40 Cum or part thereof.
4.	Coarse aggregate For concreting	(a) Percentage of soft / deleterious material (b) Particle Size distribution (c) Organic impurities (d) Sp. Gravity (e) Bulk density (f) Aggregate crushing strength (g) Aggregate impact value (h) Alkali Reactivity (i) Flakiness index	I.S. 2386	I.S. 383	One test for each source Every 40 cum or part thereof
5	Reinforcement steel	(a) Physical properties (b) Chemical test (c) Bend & rebend test (d) Elongation test (e) 0.2% Proof stress (f) Tensile strength	I.S. 1608	I.S. 1786	Each lot from each source for each dia. Min. Qty 10 MT. Test to be repeated for every 10 MT or part

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					there of.
6.	Concrete For PCC> M10	(a) Slump test	I.S. 1199	I.S. 456	15 Cum or part thereof
7	Cement concrete (For RCC)	(a) Slump test (b) Cube test (Each sample consists of 6 cubes, three cubes for 7 days strength and 3 cubes for 28 days strength.)	I.S. 1199	I.S. 456	Every 5 cum Qty. No. of Samples 1-5 M ³ : 1 6-15 M ³ : 2 16-30 M ³ : 3 31-50 M ³ : 4 51& above: 4 plus one additional sample for each additional 50 M ³ or part thereof.
8	Sand for filling	(a) Particle size distribution (b) Organic content (c) Silt content (d) Uniformity coefficient (D60/D10) (e) Max. Dry density (f) Optimum Moisture content	I.S. 2386 I.S. 2720	Max. organic content 3% by wt. Silt content 10% by weight Particle size max. 5mm Uniformity coefficient 2.0 to 8.0 Compaction as per PO specs.	One lab test for each source or as per direction of Engineer-in-charge Field compaction test: 1 test for 500 M2 area of each layer. There shall be min. 10 density measurements for each test.

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SPECIAL COMMERCIAL TERMS

1. PAYMENT TERMS

All payments will be made by HPCL in Indian Rupees only including for B.Q. Steel Plates / other materials / equipment imported by the contractor. All import of materials / equipment required as per the tender shall be done by the Contractor under their own Import License. HPCL will not issue any Import License to the contractor.

Vendor to note that no Payment shall be released till the Design is approved by TPIA, CCOE & HPCL. All payments shall be released after basic Design is approved.

ITEM NO.20 – Drawings & Approvals

The payment released shall be subject to following conditions:

1. 45% of the item rate will be paid, on completion of Design, Preparation of fabrication / construction drawings, obtaining approval of third party inspection agency & HPCL, against a bank guarantee for an equal amount.
2. 45% of the item rate will be paid, on obtaining approval of CCOE, against a bank guarantee for an equal amount.
3. 10% of item rate will be paid after completion of the total work and handing over the mounded bullets.
4. BG shall be released after completion of the total work and handing over the Mounded Bullets.

ITEM NO.21: Supply of BQ Plates & Fabrication of vessels

1. 50% of the item rate will be released on supply of steel plates at site with all documents – Invoices from SAIL, Manufacturer Test Certificates, TRs etc complete in originals for verification and after certification by TPI.
2. 10% of the item rate will be paid on Rolling of the shells, completion of L-Seam welding and Radiography at site on pro-rata basis.
3. 5% of the item rate will be paid on completion of dish ends fabrication including Radiography.
4. 15% of the item rate will be paid on completion of C-seam welding, Internal Stiffeners, Erection of the dish ends including welding on pro-rata basis.
5. 10% of the item rate will be paid on completion of all nozzles, flanges, lifting lugs, Pads, Manholes, Bottom pipeline, vortex breaker, internal ladder including NDT and radiography.
6. 5% of the item rate will be paid on completion of Post weld heat treatment on prorata basis.
7. 5% of the item rate will be paid on completion of Hydro-testing, erection of accessories and handing over the vessel complete in all respects after nitrogen purging, which will be the final bill.

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ITEM NO.27: Polyurethane Coating of Vessels

1. 40% of the item rate will be paid on supply of material to site on pro-rata basis.
2. 60% of the item rates will be paid on completion of the coating as per specifications on pro-rata basis.

ITEM NOS. 39 - 42: SERVO / RADAR Gauges, SRV & HLA

1. 70% of the item rate on supply of equipment along with third party inspection reports.
2. 30% of the item rate on completion of erection and commissioning of the instruments.

ITEM NO. 52: TANK FARM MANAGEMENT

1. 70% of the item rate on supply of equipment along with third party inspection reports.
2. 30% of the item rate on completion of erection and commissioning of the instruments.

ITEM NO.55: CATHODIC PROTECTION SYSTEM

1. 40% of the item rate will be paid on supply of material to site on pro-rata basis.
2. 60% of the item rates will be paid on completion and testing of the system as per specifications.

ITEM Nos. Except above mentioned (20, 21, 28, 39-42, 52 & 55): All items

1. 100% of the item rate on progress at site along with Running Account Bills.

NOTE:

AGAINST ALL THE ABOVE PAYMENTS NECESSARY STATUTORY DEDUCTIONS WILL BE EFFECTED AND 10% RETENTION MONEY WILL BE WITHHELD.

ALTERNATIVELY THE PARTY CAN SUBMIT A BANK GUARANTEE FOR 10% OF THE ORDER VALUE, BEFORE RAISING ANY BILLS, IN WHICH CASE THE 10% DEDUCTION TOWARDS RETENTION MONEY WILL NOT BE EFFECTED FROM THE RUNNING BILLS.

2.0 RETENTION MONEY :

For details of retention money clause No.11 of General Terms and Conditions shall be referred.

3.0. BASIS OF PRICE AND DUTIES:

The entire work of design of foundation, supply, fabrication, erection, testing of mounded vessel as per scope of work covered under this contract shall be treated as "**Indivisible Works Contract**". The tenderer should quote for this work accordingly. The price quoted should be firm and inclusive of all duties including sales tax on works contract, Excise duty, Central sales tax, Octroi, Packing & Forwarding Charges, Freight and insurance including Transit-cum-storage-cum-erection / Third party insurance and all other taxes, royalties and duties.

The tenderer shall quote their basic price on the above-said lines. HPCL does not have any project duty concession. Hence, full duty should be paid by the contractor.

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4. **WATER & POWER:** Water & Power shall be arranged by the Contractor at no extra cost. HPCL will not provide the same.
5. **DELIVERY PERIOD:** 11 (Eleven) Months from the date of issue of LOI or advise to start the work by Site / Manager-LPG Projects HQO, whichever is later.
6. **Site will be handed on “AS IS WHERE IS BASIS” for the execution of this job. HPCL will not provide any infrastructure to the contractor at site.**
7. **COMPENSATION FOR DELAY (LIQUIDATED DAMAGE CLAUSE)**

For details of Liquidated damages Clause No.10 of the General Terms and Conditions shall be referred.

In addition to Clause 10 of General Terms & Conditions, the amount paid by HPCL for TPIA services during the period beyond Delivery Period shall be recovered from the RA Bills of the vendor. The amount paid to TPIA as per the Purchase Order / LOI shall be considered for deduction.

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Schedule of Items

ITEM NO.	DESCRIPTION	UNIT	QTY
1	Area Cleaning – Clearing of area including cutting bushes, vegetation, roots etc by manual methods or using suitable machinery. Job includes disposing the fellings, roots etc in an unobjectionable area inside the plant area or as advised by HPCL or outside the premises including loading, transportation, unloading, cost of all labour, material, equipment, lead, lift etc. all complete as per technical specifications and as directed by the Engineer-in-charge.	sqm	4000
2	Excavation in soil - Earth work in excavation in all types of soils including soft rock at all depths, spreading, leveling to the required profile & compacting the excavated earth for ground improvement in layers as per design for ground improvement (soling for ground improvement will be measured under respective item) , and in low lying areas inside the plant premises, disposing of the excess unusable soil outside the plant premises as per the local body statutory requirements or to location as specified by HPCL including the cost of all labour, material, equipment, lead, lift etc. all complete as per technical specifications and as directed by the Engineer-in-charge.	cum	6750
3	Excavation in HARD ROCK - Earth work in excavation in HARD ROCK at all depths, spreading, leveling to the required profile & stacking the excavated rock for measurements in regular shapes inside the plant premises, disposing of the muck after measurements outside the plant premises as per the local body / statutory requirements or to location as specified by HPCL including the cost of all labour, material, equipment, lead, lift etc., all complete as per technical specifications and as directed by the Engineer-in-charge.	cum	20
4	Supply & laying Murrum - Supplying good and approved quality MURRUM , filling in layers, watering and compacting with vibro-roller to achieve the desired compaction including the cost of all labour, material, equipment, lead, lift etc., all complete as per technical specifications and as directed by the Engineer-in-charge.	cum	500
5	Supply & laying Soling - Supplying good and approved quality soling in thickness of 230 mm, filling in layers to meet the ground improvement design / as per drawings, (earth for ground improvement is to be taken from the excavated earth available at site, and this activity is included in the respective item), compacting with vibro-roller to achieve the desired compaction including the cost of all labour, material, equipment, lead, lift etc., all complete as per technical specifications and as directed by the Engineer-in-charge.	cum	3500
6	Supply & laying sand - Supplying good and approved quality locally available sand, filling in layers, watering and compacting with vibro-roller to achieve the desired compaction including the cost of all labour, material, equipment, lead, lift etc. all complete for mound bed, around mounds, in between and top of vessels, below the pavement and any other places as	cum	15000

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	advised by HPCL as per technical specifications, approved drawings and as directed by the Engineer-in-charge.		
7	Supply & laying Geotextile sheet - Supplying and laying Terram 1000 or approved equivalent geotextile sheet including laps including the cost of all labour, material and equipments complete as per specifications, approved drawings and as directed by the Engineer-in-charge	sqm	3500
8	Supply & laying UPVC Sheet - Supplying and laying 1000 Micron thick UPVC sheet including laps including the cost of all labour, material, adhesive and equipments complete as per specifications, approved drawings and as directed by the Engineer-in-charge. Plan area between enclosures on four sides on top of mound shall only be measured for making payment. All overlaps / vertical spread over kerb wall etc shall not be measured.	sqm	1200
9	Supply & laying stone pitching - Supplying and laying 225 mm average thick stone pitching in cement mortar 1:4 (1 cement : 4 coarse sand), finishing the joints with cement mortar 1:2 raised pointing including the cost of all labour, material, equipments complete as per specifications, approved drawings and as directed by the Engineer-in-charge	sqm	1800
10	Supply & laying rounded pebbles 50-80 mm - Supply and laying clean, washed, graded, rounded, hard river stones of size 50-80 mm free from all organic material, sulphates or any other deleterious material including the cost of all labour, material, transportation, spreading, equipments all complete as per specifications, approved drawings and as directed by the Engineer-in-charge.	cum	300
11	Supply & laying Pea gravel 8-20 mm - Supply and laying clean, washed, graded, rounded, hard Pea Gravel of size 8-20 mm free from all organic material, sulphates or any other deleterious material including the cost of all labour, material, transportation, spreading, equipments all complete as per specifications, approved drawings and as directed by the Engineer-in-charge.	cum	125
12	Supply & laying UPVC drain pipe - Supply, laying and jointing UPVC perforated drain pipe of 150 dia including the cost of all labour, material, equipments etc., complete as per approved drawings, and as directed by the Engineer-in-charge.	Rmt	250
13	Supply & laying 150 mm dia NP2 Concrete Pipe - Supply, laying and jointing NP2 concrete pipe of 150 dia with collar including the cost of all labour, material, equipments etc., complete as per approved drawings and as directed by the Engineer-in-charge.	Rmt	60
14	Providing & laying PCC M10 - Providing and laying Plain Cement Concrete 1:3:6 (M10 grade) including the cost of all labour, material, equipments, shuttering, supports, compaction, curing all complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge.	cum	400
15	Providing & laying RCC M20 - Providing and laying Reinforced Cement Concrete Design mix of M20 or 1:1.5:3 nominal mix for drains at top of retaining wall, paving etc including the cost of all labour, material, equipments, shuttering, scaffolding, supports, compaction by vibrators, curing all complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge. Reinforcement steel will be measured and paid separately under	cum	120

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	relevant item.		
16	Providing & laying RCC M30 - Providing and laying Reinforced Cement Concrete Design Mix of grade M30 for Retaining wall, Tunnels etc., including the cost of all labour, material, equipments, shuttering, scaffolding, supports, compaction by vibrators, curing all complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge. Reinforcement steel will be measured and paid separately under relevant item.	cum	3500
17	HYSD Reinforcement Steel Fe415 - Reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding with annealed GI wire, providing spacers, chairs all complete with HYSD TMT Reinforcement - Fe 415 Grade as per BIS 1786 including the cost of all labour, material, equipment etc., complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge.	MT	320
18	GI Pipe 100 mm - Supply, fabrication, erection and painting and embedding in retaining wall of 100 mm dia Class C G.I. pipe as per IS 1239 including the cost of all labour, material, equipment complete as per specifications, approved drawings and as directed by the Engineer-in-charge.	Rmt	200
19	Painting of Retaining wall / Pitching with Apex or Weathershield Paint - Finishing Retaining wall, Kerb wall & pitching with two coats of Apex or Weathershield Brand or approved equivalent acrylic emulsion paint of required shades including the cost of scaffolding for working at all heights (approximately 10 m), all labour, material, equipment complete as per manufacturer's specifications and as directed by the Engineer-in-charge.	Sqm	2500
20	Preparation of Drawings & CCOE Approvals - Carrying out Detailed Engineering, Design, preparation of drawings, applying to CCOE for approval, etc., complete. The drawings & designs shall be for - civil foundations, retaining wall, tunnels etc., and mechanical drawings including Vessel, cutting schedule, BOM, etc., complete. Vendor shall submit all detailed design calculations after approval by their Back up consultants, to HPCL / TPIA, appointed by HPCL for approval. Vendor shall also arrange for carrying out FEM Analysis of vessel designs to assess the stresses in the vessel & stiffener for various loading conditions & report shall be submitted to TPIA / HPCL for approval. The approved structural designers are M/s. Systech Consultancy Services, Mumbai & M/s. ProSim R&D centre, Bangalore. and Civil designer is M/s. GP Engineering Services. For any change in the agencies other than the approved above, vendor shall obtain prior written permission from HPCL.	LS	1
21	Supply of BQ plates & Fabrication of bullets - Fabrication, erection, installation, hydro- testing, calibration and commissioning of 3 x 650 MT Mounded Storage Vessels at site including supply of SAIL made BQ plates as per technical specifications including edge preparation, profiling, pressing, all NDT tests, PWHT etc., as per scope of work and technical specifications, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge. The scope of work includes supply of all consumables, tools & tackles, most modern erection equipment, labours, skilled manpower for satisfactory completion of the entire works. BQ Steel Plates components like shell, dish ends, Nozzles, domes, stiffeners, pad plates, lifting lugs, bench mark pad, any other material made of	MT	800

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	BQ plate shall only be <u>measured for payment purposes</u> as per the technical specifications and approved drawings & approved Quality Assurance Plan (QAP).The area of BQ Plates multiplied by theoretical weight is considered for payment purpose. The scrap generated, if any, shall NOT be measured for payment. The scrap shall be the property of the contractor and the same shall be removed from the site by the Contractor at no extra cost to HPCL.		
22	Structural steel - Supply, fabrication, erection and painting of Structural Steel work for STAIR CASE, MS insert plates, gusset plates, cleats embedded in retaining wall etc., including the cost of all labour, material, equipment complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge.	MT	10
23	MS Gratings - Supply, fabrication, erection and painting Structural Steel work in GRATINGS FOR TREADS & LANDINGS including the cost of all labour, material, equipment, welding, grinding, cleaning, painting all complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge.	MT	6
24	Tubular Steel Hand railing - Supply, fabrication, erection and painting Tubular Steel work in hand rail for staircase in both sides of slopes including the cost of all labour, material, equipment, welding, grinding, painting, cleaning all complete as per specifications, approved drawings, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge.	MT	1
25	Neoprene rubber pads - Providing 100 mm thick Resilient Neoprene pad of approved make above Inspection tunnels as per approved drawings and as directed by the Engineer-in-charge.	Sqm	10
26	Providing Flexible SS bellows - Providing Stainless Steel Flexible Expansion bellow of approved make all around bottom nozzle above the inspection tunnels as per approved drawings and as directed by the Engineer-in-charge.	Set	3
27	PU coating of Vessels - Supply and application of Polyurethane tank protective coating for 3x 650 MT Mounded Storage Vessels as per technical specifications, manufacturer's guidelines, approved Quality Assurance Plan (QAP) and as directed by the Engineer-in-charge including providing skilled & specialist man-power for application works.	Sqm	3500
28	750 mm dia Manholes - Supply, fabrication and erection of 750 mm dia. Manholes, blind flange for 3x650 MT Mounded storage LPG Vessels as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL, including the cost of all labour, equipment, material etc., complete but excluding the cost of BQ plates for fabrication of neck and RF Pad, which shall be measured against relevant item above. Flange shall be 300# WNRF. Rate quoted shall include the cost of WNRF, BLRF and Studs as per the requirement of approved drawings	Each	6
29	250mm dia Liquid bottom nozzle - Supply, fabrication and erection of 250mm dia. Liquid receipt / withdrawal nozzle for 3x 650 MT Mounded storage LPG Bullets as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 80 Pipe, 300# WNRF and BLRF flanges, 90 deg. Elbow, high tensile studs and spiral wound metallic gaskets. The flange of bottom nozzle shall be placed 1 m outside from the edge of retaining wall outer face. (The length of each bottom nozzle shall be as per approved drawings)	Each	3

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30	100mm dia. Liquid return nozzle - Supply, fabrication and erection of 100mm dia. Sch. 80 Liquid return nozzle with dip pipe for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Pipe, 300# WNRF and BLRF flanges, 90 deg. Elbow, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
31	Nozzle for servo level Gauge - Supply, fabrication and erection of suitable dia. Nozzle and length for Servo level gauge for 3x 650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 80 Pipe, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
32	Nozzle for Radar level Gauge - Supply, fabrication and erection of suitable dia. Nozzle and length for Radar Level Gauge for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 80 Pipe, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
33	Nozzle for Pressure Gauge - Supply, fabrication and erection of 50mm dia. Nozzle for pressure gauge for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch.160 Pipe, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
34	Nozzle for Temperature Gauge - Supply, fabrication and erection of 50mm dia. Nozzle for Temperature gauge for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 160 Pipe, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
35	100mm dia. Vapour nozzle (out) - Supply, fabrication and erection of 100mm dia. vapour Nozzle (outlet) for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 160 Pipe, 90 deg. elbow, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
36	100mm dia. Vapour nozzle (recy) - Supply, fabrication and erection of 100mm dia. vapour Nozzle (recycle) for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 160 Pipe, 90 deg. elbow, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3

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37	100mm dia. nozzle for SRV - Supply, fabrication and erection of 100mm dia./suitable Nozzle for SRV for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 80 Pipe, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	6
38	100mm dia. nozzle for HLA - Supply, fabrication and erection of 100mm dia. Nozzle for High Level alarm for 3x650 MT Mounded storage LPG Bullet as per approved QAP under the stage-wise inspection of TPIA appointed by HPCL including the cost of all labour, equipment, material etc. complete. Rate quoted shall include the cost of supply of Sch. 80 Pipe, 300# WNRF and BLRF flanges, high tensile studs and spiral wound metallic gaskets as per the requirement of approved drawings.	Each	3
39	SERVO Level Gauge - Supply, erection, testing and commissioning of Servo Level Gauges (Electronic Level Transmitters) 0-6000 mm range for LPG application to be mounted on LPG mounded bullets, including SS floats, calibration chambers, isolation ball valves of 300# rating, stilling well, one no. FLP / ExP LPG tank side remote indicator, Communication Interface Unit (CIU) and facility to communicate with CIU & PC located in the Control room / Administrative Building all necessary accessories complete as per technical specifications, data sheets and as directed by the Site-in-charge	Each	3
40	Radar Level Gauge - Supply, installation & commissioning of Radar Level Gauge as per specifications with all accessories	Each	3
41	Multiport Safety Relief Valves - Supply, installation & commissioning of Safety Valves as per specifications with all accessories	Each	6
42	High Level Alarm switch - Supply, installation & commissioning of High Level Alarm switch as per specifications with all accessories	Each	3
43	50 NB 300# ball valve - Supply of Low Temperature Carbon Steel Valves for low temperature application as per specification.: Size: 50 NB 300# ball valve	Each	3
44	25 NB 800# Ball valve - Supply of Low Temperature Carbon Steel Valves for low temperature application as per specification.: Size: 25 NB 300# ball valve	Each	3
45	25 NB 800# Gate valve - Supply of Low Temperature Carbon Steel Valves for low temperature application as per specification.: Size: 25 NB 300# Gate valve	Each	3
46	FLP and WP Enclosures for ROV - Supply, installation and commissioning of flameproof & Weatherproof enclosures for housing remote indicators for the level gauges, high level alarm etc. in the LPG pump house including the cost of fabrication, erection and painting of Mounding panels for the enclosures as per approved drawings and as directed by the Engineer-in-charge.	Set	3

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47	Supply & laying of control cable in GI trays - Design, supply, laying in GI cable trays, all required Control Cables for instrumentation as per approved design, testing and commissioning as per specifications from the bullet / instruments upto the remote indicator in the LPG Pump House, including supply of suitable size GI cable trays and other accessories. The length between the bullet instruments and the remote indicator in the LPG Pump House shall be measured only once for payment purpose irrespective of number of cables / no. of cores of the cables.	Rmt	200
48	Design, supply, laying in cable trenches - Design, supply, laying in cable trenches, required control / communication cables for instrumentation system per approved drawings and standard specifications, testing and commissioning as per specifications from the mound top to Remote indicator installed in LPG Pump house, including excavation, backfilling, etc for laying of cables in underground cable trenches. For payment purpose the distances shall be measured only once irrespective of number of cables / no. of cores of the cables	Rmt	200
49	Supply & laying of power cabling - Design, supply, laying cables in cable trenches / GI trays including supply and erection as per approved drawings and standard specifications, testing and commissioning of required Power Supply Cables for instruments as per specifications from the mound top to the UPS installed in Office Building / MCC Room, including supply of suitable size GI cable trays and other accessories, excavation, backfilling, etc for laying of cables in underground cable trenches. For payment purpose the distance between the bullet top to the UPS as per approved cable layout shall be measured only once irrespective of number of cables / no. of cores of the cables	Rmt	700
50	UPS for instrumentation - Design, supply, installation and commissioning of on-line UPS as per specifications for 30 minutes back-up for instruments provided on the bullet.	LS	1
51	UPS for CP system - Design, supply, installation and commissioning of off-line UPS as per specifications for 30 minutes back-up for the cathodic protection system provided for the bullet.	LS	1
52	Tank Farm Management System - Design, supply, installation, testing, & commissioning of integrated tank farm management system excluding cables from the bullet to the PC / console in the Admin. Building, but including all other hardware like Desktop PC, printer etc., Scope includes supply , installation, testing, & commissioning of a user- friendly ITMS system to provide an efficient tool to the Plant Manager for the inventory management including Tank form Inventory Management software system with communication interface unit (CIU), Desktop computer (IBM/DELL/HP) with operating system as per specs and appropriate state of art hardware configuration, CD RW drive, 29" LCD Colour Monitor, suitable Laser jet Printer(HP) & other necessary accessories as required to make the system complete in all respects. The complete interfacing of the system shall be as per specifications	LS	1
53	Cabling for ITFMS - Design, supply, laying in underground trenches, GI Trays, through Hume pipes, over structure etc , testing, commissioning, of required control cables for instruments as per specifications from the remote indicator in the LPG Pump House to the Tank Farm Management System Computer installed in the Admin. Building, including supply of all accessories, excavation, backfilling etc. For payment purpose the distance	Rmt	800

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	between the LPG Pump House and the PC in the Admin. Building as per approved cable layout shall be measured only once irrespective of number of cables/ no. of cores of the cables.		
54	FLP Pr Display unit at Pump House - Design, supply, installation, testing & commissioning of FLP/ExP Display unit for displaying Pressure with communication facility to communicate with Pressure transmitter installed on bullets complete as per technical specifications, data sheets and as directed by EIC. The pressure transmitters installed on bullet top shall communicate both with the Display installed at LPG Pump House and the CIU installed at in the Control Room / Administrative building.	Each	3
55	Cathodic Protection System - Design, supply of IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM FOR 3x650 MT (7.0 M DIA X 42 M LONG Approx) MOUNDED STORAGE VESSELS as per approved QAP, technical specifications attached and as directed by the Engineer In Charge. The installation & commissioning charges for the entire CP system including all components shall be paid under the item no. 59 below.	LS	1
56	Mono isolation joint 250NB - Supply of Monolithic type isolation Joints of Make : IGP Engineers/ ALFA/ZUNT/ Equivalent with surge arrestor, of size 250NB	Each	3
57	Mono isolation joint 100NB - Supply of Monolithic type isolation Joints of Make : IGP Engineers/ ALFA/ZUNT/ Equivalent with surge arrestor, of size 100NB	Each	6
58	Portable reference cell – Supply of Portable Reference Cell (Cu/CuSO ₄) as per approved specifications and make.	Each	1
59	Installation & Commissioning of CP System - Installation, testing & commissioning of the CP system for the 3x650 MT mounded storage including all components i.e., all hardware, cabling, TR unit, monolythic joints, UPS system etc. complete.	LS	1
60	Spring support – Design, Supply and installation of Spring support suitable for 3x650 MT vessels to suit site and corrosion resistance type to be supported on RCC Floor of tunnel. "Teflon" is not acceptable. Load column should not bend under sliding condition. The design shall be submitted for floor mounted spring support for approval of HPCL / TPIA in FEM Analysis with all supporting pressure calculations. The work shall be completed as per approved drawings and specifications etc complete.	Each	3
61	Fire Screen up to 9 m Height - Design, supply, erection of fire screen of about 9 m height as per approved drawings including the cost of GI sheet screen, structural supports, civil foundation, all materials / equipments all complete as directed by the Engineer-in-charge. The design and drawings shall be as per IS 875 part 3. Contractor shall obtain prior approval of drawing from HPCL. The material used in the fire screen shall be property of the contractor and shall be dismantled and removed out of site after completion of the work without any additional cost to HPCL. (No water curtain is required for the fire screen)	Sqm	1500

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GENERAL TERMS & CONDITIONS OF WORKS CONTRACT (GTC)

1 PRELIMINARY:

1.1 This is a Contract for execution of **Carrying out detailed Engineering Design, supply, fabrication, erection, testing and commissioning of 3 x 650 MT Capacity Mounded LPG Storage Pressure Vessels at Dharwad LPG Plant.**

1.2 The tenderer for the abovementioned item of work is _____ (please give the name and address of the tenderer).

1.3 The terms and conditions mentioned hereunder are the terms and conditions of the Contract for the execution of the work mentioned under item 1.1 above.

1.4 It is the clear understanding between Hindustan Petroleum Corporation Limited and the tenderer _____ that (name and address of the tenderer) in case the tender of _____ is (name and address of the tenderer) accepted by Hindustan Petroleum Corporation Limited and an intimation to that effect is so issued and also a Purchase Order is placed with _____ (name and address of the tenderer) this document will be termed as a Contract between the parties and terms and conditions hereunder would govern the parties interest.

1.5 Interpretation of Contract Documents: All documents forming part of the Contract are to be taken mutually explanatory. Should there be any discrepancy, inconsistency, error or omission in the contract, the decision of the Owner/Engineer-in-Charge/Site-in-Charge shall be the final and the contractor shall abide by the decision. The decision shall not be arbitrable. Works shown upon the drawings but not mentioned in the specification or described in the specifications without being shown on the drawings shall nevertheless be deemed to be included in the same manner as if they are shown in the drawings and described in the specifications.

1.6 Special conditions of Contract : The special conditions of contract, if any provided and whenever and wherever referred to shall be read in conjunction with General Terms and Conditions of contract, specifications, drawings, and any other documents forming part of this contract wherever the context so requires Notwithstanding the subdivision of the documents into separate sections, parts volumes, every section, part or volume shall be deemed to be supplementary or complementary to each other and shall be read in whole. In case of any misunderstanding arising the same shall be referred to decision of the Owner/ Engineer-in-Charge/Site-in-Charge and their decision shall be final and binding and the decision shall not be arbitrable.

It is the clear understanding that wherever it is mentioned that the contractor shall do/perfrom a work and/or provide facilities for the performance of the work, the doing

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or the performance or the providing of the facilities is at the cost and expenses of the work not liable to be paid or reimbursed by the Owner.

2. DEFINITIONS:

In this contract unless otherwise specifically provided or defined and unless a contrary intention appears from the contract the following words and expressions are used in the following meanings;

2.1 The term "Agreement" wherever appearing in this document shall be read as "Contract".

2.2 The "Authority" for the purpose of this Contract shall be the **Chairman and Managing Director** or any other person so appointed or authorised.

2.3 The "**Chairman and Managing Director**" shall mean the Chairman and Managing Director of HINDUSTAN PETROLEUM CORPORATION LIMITED or any person so appointed, nominated or designated and holding the office of Chairman & Managing Director.

2.4 The "**Change Order**" means an order given in writing by the Engineer-in-Charge or by Owner to effect additions to or deletion from or alterations into the Work.

2.5 The "**Construction Equipment**" means all appliances and equipment of whatsoever nature for the use in or for the execution, completion, operation or maintenance of the work except those intended to form part of the Permanent Work.

2.6 The "**Contract**" between the Owner and the Contractor shall mean and include all documents like enquiry, tender submitted by the contractor and the purchase order issued by the owner and other documents connected with the issue of the purchase order and orders, instruction, drawings, change orders, directions issued by the Owner/Engineer-in-Charge/Site-in-Charge for the execution, completion and commissioning of the works and the period of contract mentioned in the Contract including such periods of time extensions as may be granted by the owner at the request of the contractor and such period of time for which the work is continued by the contractor for purposes of completion of the work.

2.7 "**The Contractor**" means the person or the persons, firm or Company whose tender has been accepted by the Owner and includes the Contractor's legal heirs, representative, successor(s) and permitted assignees.

2.8 The "**Drawings**" shall include maps, plans and tracings or prints thereof with any modifications approved in writing by the Engineer-in-Charge and such other drawings as may, from time to time, be furnished or approved in writing by the Engineer-in-Charge.

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2.9 The "**Engineer-in-Charge or Site-in-Charge**" shall mean the person appointed or designated as such by the Owner and shall include those who are expressly authorised by the owner to act for and on its behalf.

2.10 "**The Owner**" means the **HINDUSTAN PETROLEUM CORPORATION LIMITED** incorporated in India having its Registered office at **PETROLEUM HOUSE, 17, JAMSHEDJI TATA ROAD, BOMBAY - 400020** and Marketing office at LPG PROJECT DEPARTMENT, HINDUSTAN BHAWAN, 3RD FLOOR, 8, SHOORJI VALLABHDAS MARG, BALLARD ESTATE, MUMBAI-400 001 or their successors or assignees.

2.11 The "**Permanent Work**" means and includes works which form a part of the work to be handed over to the Owner by the Contractor on completion of the contract.

2.12 The "**Project Manager**" shall mean the Project Manager of **HINDUSTAN PETROLEUM CORPORATION LIMITED**, or any person so appointed, nominated or designated.

2.13 The "**Site**" means the land on which the work is to be executed or carried out and such other place(s) for purpose of performing the Contract.

2.14 The "**Specifications**" shall mean the various technical and other specifications attached and referred to in the tender documents. It shall also include the latest editions, including all addenda/corrigenda or relevant Indian Standard Specifications and Bureau Of Indian Standards.

2.15 The "Sub-Contractor" means any person or firm or Company (other than the Contractor) to whom any part of the work has been entrusted by the Contractor with the prior written consent of the Owner/Engineer-in-Charge/Site-in-Charge and their legal heirs, representatives, successors and permitted assignees of such person, firm or Company.

2.16 The "Temporary Work" means and includes all such works which are a part of the contract for execution of the permanent work but does not form part of the permanent work conforming to practices, procedures applicable rules and regulations relevant in that behalf.

2.17 The "Tender" means the document submitted by a person or authority for carrying out the work and the Tenderer means a person or authority who submits the tender offering to carry out the work as per the terms and conditions.

2.18 The "Work" shall mean the works to be executed in accordance with the Contract or part thereof as the case may be and shall include extra, additional, altered or substituted works as maybe required for the purposes of completion of the work contemplated under the Contract.

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3. SUBMISSION OF TENDER

3.1 Before submitting the Tender, the Tenderer shall at their own cost and expenses visit the site, examine and satisfy as to the nature of the existing roads, means of communications, the character of the soil, state of land and of the excavations, the correct dimensions of the work facilities for procuring various construction and other material and their availability, and shall obtain information on all matters and conditions as they may feel necessary for the execution of the works as intended by the Owners and shall also satisfy of the availability of suitable water for construction of civil works and for drinking purpose and power required for fabrication work etc. Tenderer, whose tender may be accepted and with whom the Contract is entered into shall not be eligible and be able to make any claim on any of the said counts in what so ever manner for what so ever reasons at any point of time and such a claim shall not be raised as a dispute and shall not be arbitrable.

A pre-bid meeting may be held as per the schedule mentioned in the tender.

3.2 The Tenderer shall be deemed to have satisfied fully before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the schedule of quantities which rates and prices shall except as otherwise provided cover all his obligations under the contract.

3.3 It must be clearly understood that the whole of the conditions and specifications are intended to be strictly enforced and that no work will be considered as extra work and allowed and paid for unless they are clearly outside the scope, spirit, meaning of the Contract and intent of the Owner and have been so ordered in writing by Owner and/or Engineer-in-Charge/Site-in-Charge, whose decision shall be final and binding.

3.4 Before filling the Tender the Contractor will check and satisfy all drawings and materials to be procured and the schedule of quantities by obtaining clarification from the Owner on all the items as may be desired by the Tenderer. No claim for any alleged loss or compensation will be entertained on this account, after submission of Tender by the Tenderer/Contractor and such a claim shall not be arbitrable.

3.5 Unless specifically provided for in the tender documents or any Special Conditions, no escalation in the Tender rates or prices quoted will be permitted throughout the period of contract or the period of actual completion of the job whichever is later on account of any variation in prices of materials or cost of labour or due to any other reasons. Claims on account of escalation shall not be arbitrable.

3.6 The quantities indicated in the Tender are approximate. The approved schedule of rates of the contract will be applicable for variations upto plus or minus 25% of the contract value. No revision of schedule of rates will be permitted for such variations in the contract value, including variations of individual quantities, addition of new items, alterations, additions/deletions or substitutions of items, as mentioned above. Quantities

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etc. mentioned and accepted in the joint measurement sheets shall alone be final and binding on the parties.

3.7 Owner reserve their right to award the contract to any tenderer and their decision in this regard shall be final. They also reserve their right to reject any or all tenders received. No disputes could be raised by any tenderer(s) whose tender has been rejected.

3.8 The Rates quoted by the Tenderer shall include Costs and expenses on all counts viz. cost of materials, transportation of machine(s), tools, equipments, labour, power, Administration charges, price escalations, profits, etc. etc. except to the extent of the cost of material(s), if any, agreed to be supplied by Owner and mentioned specifically in that regard in condition of Contract, in which case, the cost of such material if taken for preparation of the Contractor's Bill(s) shall be deducted before making payment of the Bill(s) of the Contractor. The description given in the schedule of quantities shall unless otherwise stated be held to include wastage on materials, carriage and cartage, carrying in and return of empties, hoisting, setting, fitting and fixing in position and all other expenses necessary in and for the full and complete execution and completion of works and in accordance with good practice and recognised principles in that regard.

3.9 Employees of the State and Central Govt. and employees of the Public Sector Undertakings, including retired employees are covered under their respective service conditions/rules in regard to their submitting the tender. All such persons should ensure compliance to the respective/applicable conditions, rules etc. etc. Any person not complying with those rules etc. but submitting the tender in violation of such rules, after being so noticed shall be liable for the forfeiture of the Earnest Money Deposit made with the tender, termination of Contract and sufferance on account of forfeiture of Security Deposit and sufferance of damages arising as a result of termination of Contract.

3.10 In consideration for having a chance to be considered for entering into a contract with the Owner, the Tenderer agrees that the Tender submitted by him shall remain valid for the period prescribed in the tender conditions, from the date of opening of the tender. The Tenderer shall not be entitled during the said validity period, to revoke or cancel the tender without the consent in writing from the Owner.

In case the tenderer revokes or cancels the tender or varies any of terms of the tender without the Consent of the Owner, in writing, the Tenderer forfeits the right to the refund of the Earnest Money paid along with the tender.

3.11 The prices quoted by the Tenderer shall be firm during the validity period of the bid and Tenderer agrees to keep the bid alive and valid during the said period. The Tenderers shall particularly take note of this factor before submitting their tender(s).

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3.12 The works shall be carried out strictly as per approved specifications. Deviations, if any, shall have to be authorised by the Engineer-in-Charge/Site-in-Charge in writing prior to implementing deviations. The price benefit, if any, arising out of the accepted deviation shall be passed on to the Owner. The decision of Engineer-in-Charge shall be final in this matter.

3.13 The contractor shall make all arrangements at his own cost to transport the required materials outside and inside the working places and leaving the premises in a neat and tidy condition after completion of the job to the satisfaction of Owner. All materials except those agreed to be supplied by the Owner shall be supplied by the contractor at his own cost and the rates quoted by the Contractor should be inclusive of all royalties, rents, taxes, duties, octroi, statutory levies, if any, etc. etc.

3.14 The Contractor shall not carry on any work other than the work under this Contract within the Owner's premises without prior permission in writing from the Engineer-in-Charge/Site-in-charge.

3.15 The Contractor shall be bound to follow and ensure compliance to all the safety and security regulations and other statutory rules applicable to the area. In the event of any damage or loss or sufference caused due to non-observance of such rules and regulations, the contractor shall be solely responsible for the same and shall keep the Owner indemnified against all such losses and claims arising from the same.

3.16 At any time after acceptance of tender, the Owner reserves the right to add, amend or delete any work item, the bill of quantities at a later date or reduce the scope of work in the overall interest of the work by prior discussion and intimation to the Contractor. The decision of Owner, with reasons recorded therefor, shall be final and binding on both the Owner and the Contractor. The Contractor shall not have right to claim compensation or damage etc. in that regard. The Owner reserves the right to split the work under this contract between two or more contractors without assigning any reasons.

3.17 Contractor shall not be entitled to sublet, sub contract or assign, the work under this Contract without the prior consent of the Owner obtained in writing.

3.18 All signatures in tender document shall be dated as well as all the pages of all sections of the tender documents shall be initialled at the lower position and signed, wherever required in the tender papers by the Tenderer or by a person holding Power of Attorney authorising him to sign on behalf of the tenderer before submission of tender.

3.19 The tender should be quoted in English, both in figures as well as in words. The rates and amounts tendered by the Tenderer in the Schedule of rates for each item and in such a way that insertion is not possible. The total tendered amount should also be indicated both in figures and words with the signature of tenderer.

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If some discrepancies are found between the rates given in words and figures of the amount shown in the tender, the following procedure shall be applied :

- (a) When there is a difference between the rates in figures and words, the rate which corresponds to the amount worked out by the tenderer shall be taken as correct.
- (b) When the rate quoted by the tenderer in figures and words tallies but the amount is incorrect, the rate quoted by the tenderer shall be taken as correct.
- (c) When it is not possible to ascertain the correct rate in the manner prescribed above the rate as quoted in words shall be adopted.

3.20 All corrections and alterations in the entries of tender paper will be signed in full by the tenderer with date. No erasures or over writings are permissible.

3.21 Transfer of tender document by one intending tenderer to the another one is not permissible. The tenderer on whose name the tender has been sent only can quote.

3.22 The Tender submitted by a tenderer if found to be incomplete in any or all manner is liable to be rejected. The decision of the Owner in this regard is final and binding. In case of any error/discrepancy in the amount written in words and figures, the lower amount between the two shall prevail.

4. DEPOSITS

a) EARNEST MONEY DEPOSIT (EMD):

The tenderer will be required to pay a sum as specified in the covering letter, as earnest money deposit along with the tender either thru a crossed demand draft or a non-revokable Bank Guarantee in favour of Hindustan Petroleum Corporation Limited, from any Scheduled Bank (other than a Co-Operative Bank) payable at Mumbai in favour of Hindustan Petroleum Corporation Limited, Mumbai in the proforma enclosed. The earnest money deposit will be refunded after finalisation of the contract.

Note: Public sector enterprises and small scale units registered with National Small Scale Industries are exempted from payment of Earnest Money Deposit. Small scale units registered with National Small Scale Industries should enclose a photocopy of their registration certificate with their quotation to make their quotation eligible for consideration. The Registration Certificate should remain valid during the period of the contract that may be entered into with such successful bidder. Such tenderers should ensure validity of the Registration Certificate for the purpose.

® b) SECURITY DEPOSIT:

The tenderer, with whom the contract is decided to be entered into and intimation is so given will have to make a security deposit of one percent (1%) of the total contract value in the form of account payee crossed demand draft drawn in favour of the Owner, within

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15 days from the date of intimation of acceptance of their tender, failing which the Owner reserves the right to cancel the Contract and forfeit the EMD.

1% of PO/Contract value as Security deposit will be acceptable in the form of Demand draft up to Rs. 50,000/- and in the form of Demand draft / Bank guarantee beyond Rs. 50,000/-. Composite Performance Bank Guarantee (CPBG) for 10% of PO value towards Performance Bank Guarantee inclusive of Security Deposit shall be accepted (in lieu of deduction of retention money); such CPBG shall be valid upto a period of 3 months beyond the expiry of defect liability period. Demand Draft should be drawn on Scheduled Banks, other than co-operative bank.

5. EXECUTION OF WORK

All the works shall be executed in strict conformity with the provisions of the contract documents and with such explanatory details, drawings, specifications and instructions as may be furnished from time to time to the Contractor by the Engineer-in-Charge/ Site-in-Charge, whether mentioned in the Contract or not. The Contractor shall be responsible for ensuring that works throughout are executed in the most proper and workman-like manner with the quality of material and workmanship in strict accordance with the specifications and to the entire satisfaction of the Engineer-in-Charge/Site-in-Charge.

The completion of work may entail working in monsoon also. The contractor must maintain the necessary work force as may be required during monsoon and plan to execute the job in such a way the entire project is completed within the contracted time schedule. No extra charges shall be payable for such work during monsoon. It shall be the responsibility of the contractor to keep the construction work site free from water during and off the monsoon period at his own cost and expenses. For working on Sundays/Holidays, the contractor shall obtain the necessary permission from Engineer Incharge/Site Incharge in advance. The contractor shall be permitted to work beyond the normal hours with prior approval of Engineer-In-Charge/Site-In-Charge and the contractors quoted rate is inclusive of all such extended hours of working and no extra amount shall be payable by the owner on this account.

5.a. SETTING OUT OF WORKS AND SITE INSTRUCTIONS

5.a.1. The Engineer-in-Charge/Site-in-Charge shall furnish the Contractor with only the four corners of the work site and a level bench mark and the Contractor shall set out the works and shall provide an efficient staff for the purpose and shall be solely responsible for the accuracy of such setting out.

5.a.2. The Contractor shall provide, fix and be responsible for the maintenance of all necessary stakes, templates, level marks, profiles and other similar things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for consequences of such removal or disturbance should the same take place and for their efficient and timely reinstatement. The Contractor shall also be

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responsible for the maintenance of all existing survey marks, either existing or supplied and fixed by the Contractor. The work shall be set out to the satisfaction of the Engineer-in-Charge/Site-in-Charge. The approval thereof or joining in setting out the work shall not relieve the Contractor of his responsibility.

5.a.3. Before beginning the works, the Contractor shall, at his own cost, provide all necessary reference and level posts, pegs, bamboos, flags ranging rods, strings and other materials for proper layout of the work in accordance with the scheme, for bearing marks acceptable to the Engineer-in-Charge/Site-in-Charge. The Centre longitudinal or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct marks at the centre to enable theodolite to be set over it. No work shall be started until all these points are checked and approved by the Engineer-in-Charge/Site-in-Charge in writing. But such approval shall not relieve the contractor of any of his responsibilities. The Contractor shall also provide all labour, materials and other facilities, as necessary, for the proper checking of layout and inspection of the points during construction.

5.a.4. Pillars bearing geodetic marks located at the sites of units of works under construction should be protected and fenced by the Contractor.

5.a.5. On completion of works, the contractor shall submit the geodetic documents according to which the work was carried out.

5.a.6. The Engineer-in-Charge/Site-in-Charge shall communicate or confirm his instructions to the contractor in respect of the executions of work in a "work site order book" maintained in the office having duplicate sheet and the authorised representative of the contractor shall confirm receipt of such instructions by signing the relevant entries in the book.

5.a.7. All instructions issued by the Engineer-in-Charge/Site-in-Charge shall be in writing. The Contractor shall be liable to carry out the instructions without fail.

5.a.8. If the Contractor after receipt of written instruction from the Engineer-in-Charge/Site-in-Charge requiring compliance within seven days fails to comply with such drawings or 'instructions' or both as the Engineer-in-Charge/Site-in-Charge may issue, owner may employ and pay other persons to execute any such work whatsoever that may be necessary to give effect to such drawings or 'instructions' and all cost and expenses incurred in connection therewith as certified by the Engineer-in-Charge/ Site-in- Charge shall be borne by the contractor or may be deducted from amounts due or that may become due to the contractor under the contract or may be recovered as a debt.

5.a.9. The Contractor shall be entirely and exclusively responsible for the horizontal and vertical alignment, the levels and correctness of every part of the work and shall rectify

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effectually any errors or imperfections therein. Such rectifications shall be carried out by the Contractor, at his own cost.

5.a.10. In case any doubts arise in the mind of the Contractor in regard to any expressions, interpretations, statements, calculations of quantities, supply of material rates, etc. etc., the contractor shall refer the same to the Site-in-Charge/ Engineer-in-Charge for his clarification, instructions, guidance or clearing of doubts. The decision of the Engineer-in-Charge/Site-in-Charge shall be final and the contractor shall be bound by such a decision.

5.a.11. "The Contractor shall take adequate precautions, to ensure that his operations do not create nuisance or misuse of the work space that shall cause unnecessary disturbance or inconvenience to others at the work site".

5.a.12. "All fossils, coins articles of value of antiquity and structure or other remains of geological or archaeological discovered on the site of works shall be declared to be the property of the Owner and Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such articles or thing and shall immediately inform the Owner/ Engineer-in-Charge/Site-in-Charge."

5.a.13. "Contractor will be entirely and exclusively responsible to provide and maintain at his expenses all lights, guards, fencing, etc. when and where even necessary or/as required by the Engineer-in-Charge/Site-in-Charge for the protection of works or safety and convenience to all the members employed at the site or general public."

5.b. COMMENCEMENT OF WORK

The contractor shall after paying the requisite security deposit, commence work within 15 days from the date of receipt of the intimation of intent from the Owner informing that the contract is being awarded. The date of intimation shall be the date/day for counting the starting day/date and the ending day/date will be accordingly calculated. Penalty, if any, for the delay in execution shall be calculated accordingly. Contractor should prepare detailed fortnightly construction programme for approval by the Engineer-in-Charge within one month of receipt of Letter Of Intent. The work shall be executed strictly as per such time schedule. The period of Contract includes the time required for testing, rectifications, if any, re-testing and completion of work in all respects to the entire satisfaction of the Engineer-in- Charge.

A Letter of Intent is an acceptance of offer by the Owner and it need not be accepted by the contractor. But the contractor should acknowledge a receipt of the purchase order within 15 days of mailing of Purchase Order and any delay in acknowledging the receipt will be a breach of contract and compensation for the loss caused by such breach will be recovered by the Owner by forfeiting earnest money deposit/bid bond.

5.c. SUBLETTING OF WORK

Page No.116 of 156 Tender No.11000138-HD-12001/JBK (14222) Signed & Stamp of the bidder

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5.c.1. No part of the contract nor any share or interest thereof shall in any manner or degree be transferred, assigned or sublet, by the Contractor, directly or indirectly to any firm or corporation whatsoever, without the prior consent in writing of the Owner.

5.c.2. At the commencement of every month the Contractor shall furnish to the Engineer-in-charge/ Site-in-Charge list of all sub-contractors or other persons or firms engaged by the Contractor.

5.c.3 The contract agreement will specify major items of supply or services for which the Contractor proposes to engage sub-Contractor/sub-Vendor. The contractor may from time to time propose any addition or deletion from any such list and will submit the proposals in this regard to the Engineer-in-charge/Designated officer-in-charge for approval well in advance so as not to impede the progress of work. Such approval of the Engineer-in- charge/Designated officer-in-charge will not relieve the contractor from any of his obligations, duties and responsibilities under the contract.

5.c.4. Notwithstanding any sub-letting with such approval as resaid and notwithstanding that the Engineer-in-Charge shall have received copies of any sub-contract, the Contractor shall be and shall remain solely to be responsible for the quality and proper and expeditious execution of the works and the performance of all the conditions of the contract in all respects as if such subletting or sub-contracting had not taken place and as if such work had been done directly by the Contractor.

5.c.5 Prior approval in writing of the Owner shall be obtained before any change is made in the constitution of the contractor/Contracting agency otherwise contract shall be deemed to have been allotted in contravention of clause entitled "sub-letting of works" and the same action may be taken and the same consequence shall ensue as provided in the clause of "sub- letting of works".

5.d EXTENSION OF TIME

® 1) If the Contractor anticipates that he will not be able to complete the work within the contractual delivery/ completion date (CDD), then the Contractor shall make a request for grant of time extension clearly specifying the reasons for which he seeks extension of time and demonstrating as to how these reasons were beyond the control of the contractor or attributable to the Owner. This request should be made well before the expiry of the Contractual Delivery/ Completion Date (CDD).

2) If such a request for extension is received with a Bank Guarantee for the full Liquidated Damages amount calculated on the Total Contract Value, the concerned General Manager of the Owner shall grant a Provisional extension of time, pending a decision on the request.

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3) The concerned General Manager of the Owner shall expeditiously decide upon the request for time extension and decide the levy of liquidated damages within a maximum period of 6 months from the CDD or date of receipt of the request, whichever is later.

4) Grant of any extension of time shall be by means of issuance of a Change Order.

5) In order to avoid any cash crunch to the Contractor, a Bank Guarantee could be accepted against LD, as stated above. Once a decision is taken, the LD shall be recovered from any pending bills or by encashment of the BG. Any balance sum of Contractor or the BG (if LD is fully recovered from the bills) shall be promptly refunded/returned to the Contractor.

5.e. SUSPENSION OF WORKS:

5.e.1. Subject to the provisions of this contract, the contractor shall if ordered in writing by the Engineer- in-Charge/Site-in-Charge for reasons recorded suspend the works or any part thereof for such period and such time so ordered and shall not, after receiving such, proceed with the work therein ordered to be suspended until he shall have received a written order to re-start. The Contractor shall be entitled to claim extension of time for that period of time the work was ordered to be suspended. Neither the Owner nor the Contractor shall be entitled to claim compensation or damages on account of such an extension of time.

5.e.2. In case of suspension of entire work, ordered in writing by Engineer-in-Charge/Site-in-Charge, for a period of 30 days, the Owner shall have the option to terminate the Contract as provided under the clause for termination. The Contractor shall not be at liberty to remove from the site of the works any plant or materials belonging to him and the Employer shall have lien upon all such plant and materials.

5.e.3. The contract shall, in case of suspension have the right to raise a dispute and have the same arbitrated but however, shall not have the right to have the work stopped from further progress and completion either by the owner or through other contractor appointed by the owner.

5.f. OWNER MAY DO PART OF WORK

Notwithstanding anything contained elsewhere in this contract, the owner upon failure of the Contractor to comply with any instructions given in accordance with the provisions of this contract, may instead of Contract and undertake charge of entire work, place additional labour force, tools, equipment and materials on such parts of the work, as the Owner may decide or engage another Contractor to carry out the balance of work. In such cases, the Owner shall have the right to deduct from the amounts payable to the Contractor the difference in cost of such work and materials with ten percent overhead added to cover all departmental charges. Should the total amount thereof exceed the amount due to the contractor, the Contractor shall pay the difference to the Owner.

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within 15 days of making demand for payment failing which the Contractor shall be liable to pay interest at 24% p.a. on such amounts till the date of payment.

5.g. INSPECTION OF WORKS

5.g.1. The Engineer-in-Charge/Site-in-Charge and Officers from Central or State Government will have full power and authority to inspect the works at any time wherever in progress, either on the site or at the Contractor's premises/workshops of any person, firm or corporation where work in connection with the contract may be in hand or where the materials are being or are to be supplied, and the Contractor shall afford or procure for the Engineer-in-Charge/Site-in-Charge every facility and assistance to carryout such inspection. The Contractor shall, at all times during the usual working hours and at all other times at which reasonable notice of the intention of the Engineer-in-Charge/Site-in-Charge or his representative to visit the works shall have been given to the Contractor, either himself be present to receive orders and instructions, or have a responsible agent, duly accredited in writing, present for the purpose. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the Contractor himself. The Contractor shall give not less than seven days notice in writing to the Engineer-in-Charge/Site-in-Charge before covering up or otherwise placing beyond reach of inspection and measurement any work in order that the same may be inspected and measured. In the event of breach of above, the same shall be uncovered at Contractor's expense for carrying out such measurement and/or inspection.

5.g.2. No material shall be removed and despatched by the Contractor from the site without the prior approval in writing of the Engineer-in-charge. The contractor is to provide at all times during the progress of the work and the maintenance period proper means of access with ladders, gangways, etc. and the necessary attendance to move and adapt as directed for inspection or measurements of the works by the Engineer-in-Charge/Site-in-Charge.

5.h. SAMPLES

5.h.1. The contractor shall furnish to the Engineer-in-charge/Site-in-Charge for approval when requested or required adequate samples of all materials and finishes to be used in the work.

5.h.2. Samples shall be furnished by the Contractor sufficiently in advance and before commencement of the work so as the Owner can carry out tests and examinations thereof and approve or reject the samples for use in the works. All material samples furnished and finally used/applied in actual work shall fully be of the same quality of the approved samples.

5.i. TESTS FOR QUALITY OF WORK

5.i.1. All workmanship shall be of the respective kinds described in the contract documents and in accordance with the instructions of the Engineer-in-Charge / Sitein-

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Charge and shall be subjected from time to time to such tests at Contractor's cost as the Engineer-in-Charge/Site-in-Charge may direct at the place of manufacture or fabrication or on the site or at all or any such places. The Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing any workmanship as may be selected and required by the Engineer-in-Charge/Site-in-Charge.

5.i.2. All the tests that will be necessary in connection with the execution of the work as decided by the Engineer-in-charge/Site-in-Charge shall be carried out at the contractors cost and expenses.

5.i.3. If any tests are required to be carried out in connection with the work or materials or workmanship to be supplied by the owner, such tests shall be carried out by the Contractor as per instructions of Engineer-in-Charge/Site-in-Charge and expenses for such tests, if any, incurred by the contractor shall be reimbursed by the Owner. The contractor should file his claim with the owner within 15 (fifteen) days of inspection/test and any claim made beyond that period shall lapse and be not payable.

5.j. ALTERATIONS AND ADDITIONS TO SPECIFICATIONS, DESIGNS AND WORKS

5.j.1. The Engineer-in-Charge/Site-in-Charge shall have powers to make any alterations, additions and/or substitutions to the schedule of quantities, the original specifications, drawings, designs and instructions that may become necessary or advisable or during the progress of the work and the Contractor shall be bound to carryout such altered/extra/new items of work in accordance with instructions which may be given to him in writing signed by the Engineer-in-Charge/Site-in-Charge. Such alterations, omissions, additions or substitutions shall not invalidate the contract. The altered, additional or substituted work which the Contractor may be directed to carryon in the manner as part of the work shall be carried out by the Contractor on the same conditions in all respects on which he has agreed to do the work. The time for completion of such altered added and/or substituted work may be extended for that part of the particular job. The rates for such additional altered or substituted work under this Clause shall, be worked out in accordance with the following provisions:

5.j.2. If the rates for the additional, altered or substituted work are specified in the contract for similar class of work, the Contractor is bound to carryout the additional, altered or substituted work at the same rates as are specified in the contract.

5.j.3. If the rates for the additional, altered or substituted work are not specifically provided in the contract for the work, the rates will be derived from the rates for similar class of work as are specified in the contract for the work. In the opinion of the Engineer-in-Charge/Site-in-Charge as to whether or not the rates can be reasonably so derived from the items in this contract, will be final and binding on the Contractor.

5.j.4. If the rates for the altered, additional or substituted work cannot be determined in the manner specified above, then the Contractor shall, within seven days of the date of

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receipt of order to carry out the work, inform the Engineer-in-Charge/ Site-in- Charge of the rate at which he intends to charge for such class of work, supported by analysis of the rate or rates claimed and the Engineer-In-Charge/ Site-in-Charge shall determine the rates on the basis of the prevailing market rates for both material and labour plus 10% to cover overhead and profit of labour rates and pay the Contractor accordingly. The opinion of the Engineer-in- Charge/Site-in- Charge as to current market rates of materials and the quantum of labour involved per unit of measurement will be final and binding on the contractor.

5.j.5. The quantities indicated in the Tender are approximate. The approved schedule of rates of the contract will be applicable for variations of upto +25% of the estimated contract value. No revision of schedule of rates will be permitted for such variations in the contract value, even for variations of individual quantities, addition of new items, alterations, additions/deletions or substitutions of items, as mentioned above. **(Already covered under Clause No. 3.6).**

5.j.6. In case of any item of work for which there is no specification supplied by the Owner and is mentioned in the tender documents, such work shall be carried out in accordance with Indian Standard Specifications and if the Indian Standard Specifications do not cover the same, the work should be carried out as per standard Engineering Practice subject to the approval of the Engineer-in-Charge/ Site-in-Charge.

5.k. PROVISIONAL ACCEPTANCE

Acceptance of sections of the works for purposes of equipment erection, piping, electrical work and similar usages by the Owner and payment for such work or parts of work shall not constitute a waiver of any portion of this contract and shall not be construed so as to prevent the Engineer from requiring replacement of defective work that may become apparent after the said acceptance and also shall not absolve the Contractor of the obligations under this contract. It is made clear that such an acceptance does not indicate or denote or establish to the fact of execution of that work or the Contract until the work is completed in full in accordance with the provisions of this Contract.

5.l. COMPLETION OF WORK AND COMPLETION CERTIFICATE

As soon as the work is completed in all respects, the contractor shall give notice of such completion to the site in charge or the Owner and within thirty days of receipt of such notice the site in charge shall inspect the work and shall furnish the contractor with a certificate of completion indicating:

- a) defects, if any, to be rectified by the contractor
- b) items, if any, for which payment shall be made in reduced rates
- c) the date of completion.

5.m. USE OF MATERIALS AND RETURN OF SURPLUS MATERIALS

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5.m.1. Notwithstanding anything contained to the contrary in any or all of the clauses of this contract, where any materials for the execution of the contract are procured with the assistance of Government either by issue from Government stocks or purchase made under orders or permits or licences issued by Government, the contractor shall use the said materials economically and solely for the purpose of the contract and shall not dispose them of without the permission of the Owner.

5.m.2. All surplus(serviceable) or unserviceable materials that may be left over after the completion of the contract or at its termination for any reason whatsoever, the Contractor shall deliver the said product to the Owner without any demur. The price to be paid to the Contractor, if not already paid either in full or in part, however, shall not exceed the amount mentioned in the Schedule of Rates for such material and in cases where such rates are not so mentioned, shall not exceed the CPW D scheduled rates. In the event of breach of the aforesaid condition the contractor shall become liable for contravention of the terms of the Contract.

5.m.3. The surplus (serviceable) and unserviceable products shall be determined by joint measurement. In case where joint measurement has failed to take place, the Owner may measure the same and determine the quantity.

5.m.4. It is made clear that the Owner shall not be liable to take stock and keep possession and pay for the surplus and unserviceable stocks and the Owner may direct the Contractor to take back such material brought by the Contractor and becoming surplus and which the Owner may decide to keep and not to pay for the same.

5.n. DEFECT LIABILITY PERIOD

The contractor shall guarantee the work executed for a period of 12 months from the date of completion of the job. Any damage or defect that may arise or lie undiscovered at the time of completion of the job shall be rectified or replaced by the contractor at his own cost. The decision of the Engineer In-charge/Site-Incharge/Owner shall be the final in deciding whether the defect has to be rectified or replaced.

Equipment or spare parts replaced under warranty/guarantees shall have further warranty for a mutually agreed period from the date of acceptance. The owner shall intimate the defects noticed in writing by a Registered A.D. letter or otherwise and the contractor within 15 days of receipt of the intimation shall start the rectification work and complete within the time specified by the owner failing which the owner will get the defects rectified by themselves or by any other contractor and the expenses incurred in getting the same done shall be paid by the Contractor under the provision of the Contract. Thus, defect liability is applicable only in case of job/works contract (civil, mechanical, electrical, maintenance etc.) where any damage or defect may arise in future (i.e. within 12 months from the date of completion of job) or lie undiscovered at the time of completion of job.

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In other words, in case of service contracts (like car hire etc.) where there is no question of damage or defect arising in future, the defect liability clause is not applicable.

5.o. DAMAGE TO PROPERTY

5.o.1. Contractor shall be responsible for making good to the satisfaction of the Owner any loss of and any damage to all structures and properties belonging to the Owner or being executed or procured by the Owner or of other agencies within the premises of the work of the Owner, if such loss or damage is due to fault and/or the negligence or willful acts or omission of the Contractor, his employees, agents, representatives or sub-contractors.

5.o.2. The Contractors shall indemnify and keep the Owner harmless of all claims for damage to Owner's property arising under or by reason of this contract.

6. DUTIES AND RESPONSIBILITIES OF CONTRACTOR

6.a. EMPLOYMENT LIABILITY TOWARDS WORKERS EMPLOYED BY THE CONTRACTOR

6.a.1 The Contractor shall be solely and exclusively responsible for engaging or employing persons for the execution of work. All persons engaged by the contractor shall be on Contractor's payroll and paid by Contractor. All disputes or differences between the Contractor and his/their employees shall be settled by Contractor.

6.a.2. Owner has absolutely no liability whatsoever concerning the employees of the Contractor. The Contractor shall indemnify Owner against any loss or damage or liability arising out of or in the course of his/their employing persons or relation with his/their employees. The Contractor shall make regular and full payment of wages and on any complaint by any employee of the Contractor or his sub contractor regarding non-payment of wages, salaries or other dues, Owner reserves the right to make payments directly to such employees or sub- contractor of the Contractor and recover the amount in full from the bills of the Contractor and the contractor shall not claim any compensation or reimbursement thereof. The Contractor shall comply with the Minimum Wages Act applicable to the area of work site with regard to payment of wages to his employees and also to employees of his sub contractor.

6.a.3. The Contractor shall advise in writing or in such appropriate way to all of his employees and employees of sub-contractors and any other person engaged by him that their appointment/employment is not by the Owner but by the Contractor and that their present appointment is only in connection with the construction contract with Owner and that therefore, such an employment/appointment would not enable or make them eligible for any employment/appointment with the Owner either temporarily or/and permanent basis.

6.b. NOTICE TO LOCAL BODIES

Page No.123 of 156 Tender No.11000138-HD-12001/JBK (14222) Signed & Stamp of the bidder

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The contractor shall comply with and give all notices required under any Government authority, instruction, rule or order made under any act of parliament, state laws or any regulations or by-laws of any local authority relating to the works.

6.c. FIRST AID AND INDUSTRIAL INJURIES

6.c.1 Contractor shall maintain first aid facility for his employees and those of his sub-contractors.

6.c.2. Contractor shall make arrangements for ambulance service and for the treatment of all types of injuries. Names and telephone numbers of those providing such services shall be furnished to Owner prior to start of construction and their name board shall be prominently displayed in Contractor's field office.

6.c.3. All industrial injuries shall be reported promptly to owner and a copy of contractor's report covering each personal injury requiring the attention of a physician shall be furnished to the Owner.

6.d. SAFETY CODE

6.d.1. The Contractor shall at his own expenses arrange for the Safety provisions as may be necessary for the execution of the work or as required by the Engineer-in-Charge in respect of all labours directly or indirectly employed for performance of the works and shall provide all facilities in connections therewith. In case the contractor fails to make arrangements and provide necessary facilities as aforesaid, the Owner shall be entitled to do so and recover the cost thereof from the Contractor.

6.d.2. From the commencement to the completion of the works, the contractor shall take full responsibility for the care thereof and of all the temporary works (defined as meaning all temporary works of every kind required in or for the execution, completion or maintenance of the works). In case damage, loss or injury shall happen to the works or to any part thereof or to temporary works or to any cause whatsoever repair at his (Contractor's) own cost and make good the same so that at the time of completion, the works shall be in good order and condition and in conformity in every respect with the requirement of the contract and Engineer-in-Charge's instructions.

6.d.3. In respect of all labour, directly or indirectly employed in the work for the performance of the Contractor's part of this agreement, the contractor shall at his own expense arrange for all the safety provisions as per relevant Safety Codes of C.P.W.D Bureau of Indian Standards, the Electricity Act/I.E. Rules. The Mines Act and such other Acts as applicable.

6.d.4. The Contractor shall observe and abide by all fire and safety regulations of the Owner. Before starting construction work, the Contractor shall consult with Owner's Safety Engineer or Engineer-in-Charge/Site-in-Charge and must make good to the

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satisfaction of the Owner any loss or damage due to fire to any portion of the work done or to be done under this agreement or to any of the Owner's existing property.

6.d.5. The Contractor will be fully responsible for complying with all relevant provisions of the Contract Labour Act and shall pay rates of Wages and observe hours of work/conditions of employment according to the rules in force from time to time.

6.d.6. The Contractor will be fully responsible for complying with the provision including documentation and submission of reports on the above to the concerned authorities and shall indemnify the Corporation from any such lapse for which the Government will be taking action against them.

6.d.7. Owner shall on a report having been made by an inspecting Office as defined in the Contract Labour Regulations have the power to deduct from the money due to the Contractor any sum required or estimated to be required for making good the loss suffered by a worker(s) by reasons of non-fulfillment of conditions of contract for the benefit of workers no-payment of wages or of deductions made from his or their wages which are not justified by the terms of contract or non observance of the said contractor's labour regulation.

6.e. INSURANCE AND LABOUR

Contractor shall at his own expense obtain and maintain an insurance policy with a Nationalised Insurance Company to the satisfaction of the Owner as provided hereunder.

6.e.1. EMPLOYEES STATE INSURANCE ACT

i. The Contractor agrees to and does hereby accept full and exclusive liability for the compliance with all obligations imposed by Employees State Insurance Act, 1948, and the Contractor further agrees to defend indemnify and hold Owner harmless from any liability or penalty which may be imposed by the Central, State or local authority by reason of any asserted violation by Contractor, or subcontractor of the Employees' State Insurance Act, 1948 and also from all claims, suits or proceedings that may be brought against the Owner arising under, growing out of or by reason of the work provided for by this contract whether brought by employees of the Contractor, by third parties or by Central or State Government authority or any political sub-division thereof.

ii. The Contractor agrees to file with the Employees State Insurance Corporation, the Declaration forms and all forms which may be required in respect of the Contractor's or sub-contractor's employee whose aggregate emuneration is within the specified limit and who are employed in the work provided or those covered by ESI Act under any amendment to the Act from time to time.

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The Contractor shall deduct and secure the agreement of the sub-contractor to deduct the employee's contribution as per the first schedule of the Employee's State Insurance Act from wages and affix the employee's contribution cards at wages payment intervals. The Contractor shall remit and secure the agreement of the sub contractor to remit to the State Bank of India, Employee's State Insurance Corporation Account, the Employee's contribution as required by the Act.

iii. The Contractor agrees to maintain all records as required under the Act in respect of employees and payments and the Contractor shall secure the agreement of the sub contractor to maintain such records. Any expenses incurred for the contributions, making contribution or maintaining records shall be to the Contractor's or subcontractor's account.

iv. The Owner shall retain such sum as may be necessary from the total contract value until the Contractor shall furnish satisfactory proof that all contributions as required by the Employees State Insurance Act, 1948, have been paid.

v. WORKMAN'S COMPENSATION AND EMPLOYEE'S LIABILITY INSURANCE

Provide Insurance for all the Contractor's employees engaged in the performance of this contract. If any of the work is sublet, the Contractor shall ensure that the sub contractor provides workmen's compensation and Employer's Liability Insurance for the latter's employees who are not covered under the Contractor's insurance.

vi. AUTOMOBILE LIABILITY INSURANCE

Contractor shall take out an Insurance to cover all risks to Owner for each of his vehicles plying on works of this contract and these insurances shall be valid for the total contract period. No extra payment will be made for this insurance. Owner shall not be liable for any damage or loss not made good by the Insurance Company, should such damage or loss result from unauthorised use of the vehicle. The provisions of the Motor Vehicle Act would apply.

vii. FIRE INSURANCE

Contractor shall within two weeks after award of contract insure the Works, Plant and Equipment and keep them insured until the final completion of the Contract against loss or damage by accident, fire or any other cause with an insurance company to be approved by the Employer/Consultant in the joint names of the Employer and the Contractor (name of the former being placed first in the Policy). Such Policy shall cover the property of the Employer only.

6.e.2. ANY OTHER INSURANCE REQUIRED UNDER LAW OR REGULATION OR BY OWNER

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- i. Contractor shall also provide and maintain any and all other insurance which may be required under any law or regulations from time to time. He shall also carry and maintain any other insurance which may be required by the Owner.
- ii. The aforesaid insurance policy/policies shall provide that they shall not be cancelled till the Engineer-in-Charge has agreed to their cancellation.
- iii. The Contractor shall satisfy to the Engineer-in-Charge/Site-in-Charge from time to time that he has taken out all insurance policies referred to above and has paid the necessary premium for keeping the policies alive till the expiry of the defects liability period.
- iv. The contractor shall ensure that similar insurance policies are taken out by his sub-contractor (if any) and shall be responsible for any claims or losses to the Owner resulting from their failure to obtain adequate insurance protections in connection thereof. The contractor shall produce or cause to be produced by his sub-contractor (if any) as the case may be, the relevant policy or policies and premium receipts as and when required by the Engineer-in-Charge/Site-in-Charge.

6.e.3. LABOUR AND LABOUR LAWS

- i. The contractor shall at his own cost employ persons during the period of contract and the persons so appointed shall not be construed under any circumstances to be in the employment of the Owner.
- ii. All payments shall be made by the contractor to the labour employed by him in accordance with the various rules and regulations stated above. The contractor shall keep the Owner indemnified from any claims whatsoever inclusive of damages/costs or otherwise arising from injuries or alleged injuries to or death of a person employed by the contractor or damages or alleged damages to the property.
- iii. No labour below the age of eighteen years shall be employed on the work. The Contractor shall not pay less than what is provided under the provisions of the contract labour (Regulations and Abolition) Act, 1970 and the rules made thereunder and as may be amended from time to time. He shall pay the required deposit under the Act appropriate to the number of workman to be employed by him or through sub contractor and get himself registered under the Act. He shall produce the required Certificates to the Owner before commencement of the work. The Owner recognises only the Contractor and not his sub contractor under the provisions of the Act. The Contractor will have to submit daily a list of his workforce. He will also keep the wage register at the work site or/and produce the same to the Owner, whenever desired. A deposit may be taken by the Owner from the Contractor to be refunded only after the Owner is satisfied that all workmen employed by the Contractor have been fully paid for the period of work in Owner's premises at rates equal to or better than wages provided for under the Minimum Wages Act. The contractor shall be responsible and liable for any complaints that may arise in this regard and the consequences thereto.

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iv. The Contractor will comply with the provisions of the Employee's Provident Fund Act and the Family Pension Act as may be applicable and as amended from time to time.

v. The Contractor will comply with the provisions of the payment of Gratuity Act, 1972, as may be applicable and as amended from time to time.

vi. IMPLEMENTATION OF APPRENTICES ACT, 1961

The Contractor shall comply with the provisions of the Apprentices Act, 1961 and the Rules and Orders issued thereunder from time to time. If he fails to do so, his failure will be a breach of the contract and the Engineer-in-Charge may, at his discretion, cancel the contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provision of the Act.

vii. MODEL RULES FOR LABOUR WELFARE

The Contractor shall at his own expenses comply with or cause be complied with Model rules for Labour Welfare as appended to those conditions or rules framed by the Government from time to time for the protection of health and for making sanitary arrangements for worker employed directly or indirectly on the works. In case the contractor fails to make arrangements as aforesaid the Engineer-in-Charge/Site-in-Charge shall be entitled to do so and recover the cost thereof from the contractor.

6.f. DOCUMENTS CONCERNING WORKS

6.f.1. All documents including drawings, blue prints, tracings, reproducible models, plans, specifications and copies, thereof furnished by the Owner as well as all drawings, tracings, reproducibles, plans, specifications design calculations etc. prepared by the contractor for the purpose of execution of works covered in or connected with this contract shall be the property of the Owner and shall not be used by the contractor for any other work but are to be delivered to the Owner at the completion or otherwise of the contract.

6.f.2. The Contractor shall keep and maintain secrecy of the documents, drawings etc. issued to him for the execution of this contract and restrict access to such documents, drawings etc. and further the Contractor shall execute a SECRECY agreement from each or any person employed by the Contractor having access to such documents, drawings etc. The Contractor shall not issue drawings and documents to any other agency or individual without the written approval by the Engineer-in-Charge/Site-in-Charge.

6.f.3. Contractor will not give any information or document etc. concerning details of the work to the press or a news disseminating agency without prior written approval from Engineer-in-charge/Site-in-Charge. Contractor shall not take any pictures on site without written approval of Engineer-in-Charge/Site-in-Charge.

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7. PAYMENT OF CONTRACTOR'S BILLS

@7.1. Payments will be made against Running Accounts bills certified by the Owner's Engineer-in-Charge/Site-in-Charge within 15 days from the date of receipt of the bill.

7.2. Running Account Bills and the final bill shall be submitted by the Contractor together with the duly signed measurements sheet(s) to the Engineer-in-Charge/Site-in-Charge of the Owner in quadruplicate for certification. The Bills shall also be accompanied by quantity calculations in support of the quantities contained in the bill along with cement consumption statement, actual/theoretical, wherever applicable duly certified by the Engineer-in-Charge/Site-in-Charge of the Owner.

7.3. All running account payments shall be regarded as on account payment(s) to be finally adjusted against the final bill payment. Payment of Running Account Bill(s) shall not determine or affect in any way the rights of the Owner under this Contract to make the final adjustments of the quantities of material, measurements of work and adjustments of amounts etc.etc. in the final bill.

7.4. The final bill shall be submitted by the Contractor within one month of the date of completion of the work fully and completely in all respects. If the Contractor fails to submit the final bill accordingly Engineer-in-Charge/Site-in-Charge may make the measurement and determine the total amount payable for the work carried out by the Contractor and such a certification shall be final and binding on the Contractor. The Owner/Engineer-in-Charge/Site-in-Charge may take the assistance of an outside party for taking the measurement, the expenses of which shall be payable by the Contractor.

7.5. Payment of final bill shall be made within 30 days from the date of receipt of the certified bill by the Disbursement Section of the owner.

7.6 Wherever possible, payment shall be tendered to the contractor in electronic mode (e-payment) through any of the designated banks. The contractor will comply by furnishing full particulars of Bank account (mandate) to which the payments will be routed. Owner reserves the right to make payment in any alternate mode also.

7.a. MEASUREMENT OF WORKS

7.a.1. All measurements shall be in metric system. All the works will be jointly measured by the representative of the Engineer-in-Charge/Site-in-Charge and the Contractor or their authorised agent progressively. Such measurement will be recorded in the Measurement Book/Measurement Sheet by the Contractor or his authorised representative and signed in token of acceptance by the Owner or their authorised representative.

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7.a.2. For the purpose of taking joint measurement, the Contractor/representative shall be bound to be present whenever required by the Engineer-in-Charge/Site-in-Charge. If, however, they are absent for any reasons whatsoever, the measurement will be taken by the Engineer-in-Charge/Site-in-Charge or his representative and the same would be deemed to be correct and binding on the Contractor.

7.a.3. In case of any dispute as to the mode of measurement for any item of work, the latest Indian Standard Specifications shall be followed. In case of any further dispute on the same the same shall be as per the certification of an outside qualified Engineer/Consultant. Such a measurement shall be final and binding on the Owner and the Contractor.

7.b. BILLING OF WORKS EXECUTED

The Contractor will submit a bill in approved proforma in quadruplicate to the Engineer-in-Charge/Site-in-Charge of the work giving abstract and detailed measurement for the various items executed during a month, before the expiry of the first week of the succeeding month. The Engineer-in-Charge/Site-in-Charge shall take or cause to be taken the requisite measurements for the purpose of having the bill verified and/or checked before forwarding the same to the disbursement office of the Owner for further action in terms of the Contract and payment thereafter. The Engineer-in-Charge/Site-in-Charge shall verify the bills within 7 days of submission of the Bill by the Contractor.

7.c. RETENTION MONEY

10% of the total value of the Running Account and Final Bill will be deducted and retained by the Owner as retention money on account of any damage/defect liability that may arise for the period covered under the defect liability period clause of the Contract free of interest. Any damage or defect that may arise or lie undiscovered at the time of issue of completion certificate connected in any way with the equipment or materials supplied by contractor or in workmanship shall be rectified or replaced by the contractor at his own expense failing which the Owner shall be entitled to rectify the said damage/defect from the retention money. Any excess of expenditure incurred by the Owner on account of damage or defect shall be payable by the Contractor. The decision of the Owner in this behalf shall not be liable to be questioned but shall be final and binding on the Contractor. Thus, deduction towards retention money is applicable only in case of job/works contracts (civil, mechanical, electrical, maintenance etc.) where any damage or defect may arise in future (i.e. within 12 months from the date of completion of job) or lie undiscovered at the time of issue of completion certificate.

@7.d. STATUTORY LEVIES

7.d.1 The Contractor accepts full and exclusive liability for the payment of any and all taxes, duties, octroi, rates, cess, levies and statutory payments payable under all or any of the statutes etc.

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Variations of taxes and duties arising out of the amendments to the Central /State enactments, in respect of sale of goods / services covered under this bid shall be to HPCL's account, so long as :

- They relate to the period after the opening of the price bid, but before the contracted completion period (excluding permitted extensions due to delay on account of the contractors, if any) or the actual completion period, whichever is earlier; and
- The vendor furnishes documentary evidence of incurrence of such variations, in addition to the invoices/documents for claiming Cenvat / Input Tax credit, wherever applicable. All contributions and taxes for unemployment compensation, insurance and old age pensions or annuities now or hereafter imposed by Central or State Governmental authorities which are imposed with respect to or covered by the wages, salaries or other compensations paid to the persons employed by the Contractor and the Contractor shall be responsible for the compliance with all obligations and restrictions imposed by the Labour Law or any other law affecting employer employee relationship and the Contractor further agrees to comply and to secure the compliance of all subcontractors with all applicable Central, State, Municipal and local laws, and regulations and requirements of any Central, State or Local Government agency or authority. Contractor further agrees to defend, indemnify and hold harmless from any liability or penalty which may be imposed by the Central, State or Local authorities by reason of any violation by Contractor or sub-contractor of such laws, regulations or requirements and also from all claims, suits or proceedings that may be brought against the Owner arising under, growing out of, or by reasons of the work provided for by this contract by third parties, or by Central or State Government authority or any administrative sub-division thereof. The Contractor further agrees that in case any such demand is raised against the Owner, and Owner has no way but to pay and pays/makes payment of the same, the Owner shall have the right to deduct the same from the amounts due and payable to the Contractor. The Contractor shall not raise any demand or dispute in respect of the same but may have recourse to recover/receive from the concerned authorities on the basis of the Certificate of the Owner issued in that behalf.

7.d.2. The rates quoted should be inclusive of all rates, cess, taxes and sales tax on works contracts wherever applicable. However, wherever the sales tax on works contract is applicable and is to be deducted at source, the same will be deducted from the bills of the Contractor and paid to the concerned authorities. The proof of such payments of sales tax on works contract will be furnished to the contractor.

7.d.3. Income tax will be deducted at source as per rules at prevailing rates, unless certificate, if any, for deduction at lesser rate or nil deduction is submitted by the Contractor from appropriate authority.

7.d.4 The contractor shall provide accurate particulars of PAN number as required, under Section 206AA of Income Tax Act 1961.

7.e. MATERIALS TO BE SUPPLIED BY CONTRACTOR

Page No.131 of 156 Tender No.11000138-HD-12001/JBK (14222) Signed & Stamp of the bidder

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7.e.1. The Contractor shall procure and provide the whole of the materials required for construction including tools, tackles, construction plant and equipment for the completion and maintenance of the works except the materials viz. steel and cement which may be agreed to be supplied as provided elsewhere in the contract. The contractor shall make arrangement for procuring such materials and for the transport there of at their own cost and expenses.

7.e.2. The Owner may give necessary recommendation to the respective authority if so desired by the Contractor but assumes no responsibility of any nature. The Contractor shall procure materials of ISI stamp/certification and supplied by reputed suppliers borne on DGS&D list.

7.e.3. All materials procured should meet the specifications given in the tender document. The Engineer-in-charge may, at his discretion, ask for samples and test certificates for any batch of any materials procured. Before procuring, the Contractor should get the approval of Engineer-in-Charge/Site-in-Charge for any materials to be used for the works.

7.e.4. Manufacturer's certificate shall be submitted for all materials supplied by the Contractor. If, however, in the opinion of the Engineer-in-Charge/Site-in-Charge any tests are required to be conducted on the material supplied by the Contractor, these will be arranged by the Contractor promptly at his own cost.

7.f. MATERIALS TO BE SUPPLIED BY THE OWNER

7.f.1. Steel and Cement maybe supplied by the Owner to the contractor against payment by Contractor from either godown or from the site or within work premises itself and the contractor shall arrange for all transport to actual work site at no extra cost.

7.f.2. The contractor shall bear all the costs including loading and unloading, carting from issue points to work spot storage, unloading, custody and handling and stacking the same and return the surplus steel and cement to the Owner's storage point after completion of job.

7.f.3. The contractor will be fully accountable for the steel and cement received from the Owner and contractor will give acknowledgement/receipt for quantity of steel and cement received by him each time he uplifts cement from Owner's custody.

7.f.4. For all computation purposes, the theoretical cement consumption shall be considered as per CPWD standards.

7.f.5. Steel and Cement as received from the manufacturer/stockists will be issued to the contractor. Theoretical weight of cement in a bag will be considered as 50 Kg. Bags weighing up to 4% less shall be accepted by the contractor and considered as 50 Kg. per bag. Any shortage in the weight of any cement bag by more than 4% will be to the

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Owner's account only when pointed out by the Contractor and verified by Engineer-in-Charge/Site in Charge at the time of Contract or taking delivery.

7.f.6. The contractor will be required to maintain a stock register for receipt, issuance and consumption of steel and cement at site. Cement will be stored in a warehouse at site. Requirement of cement on any day will be taken out of the warehouse. Cement issued shall be regulated on the basis of FIRST RECEIPT to go as FIRST ISSUE.

7.f.7. Empty cement bag shall be the property of the Contractor. Contractor shall be penalised for any excess/under consumption of cement. The penal rate will be twice the rate of issue of cement for this work.

7.f.8. All the running bills as well as the final bills will be accompanied by cement consumption statements giving the detailed working of the cement used, cement received and stock-on-hand.

7.f.9. The Contractor will be fully responsible for safe custody of cement once it is received by him and during transport. Owner will not entertain any claims of the contractor for theft, loss or damage to cement while in their custody.

7.f.10. The contractor shall not remove from the site any cement bags at any time.

7.f.11. The Contractor shall advise Engineer-in-charge/Site-in-charge in writing at least 21 days before exhausting the Cement stocks already held by Contractor to ensure that such delays do not lead to interruptions in the progress of work.

7.f.12. Cement shall not be supplied by the Owner for manufacturing of mosaic tiles, precast cement jali and any other bought out items which consume cement and for temporary works.

7.f.13. Cement in bags and in good usable condition left over after the completion of work shall be returned by the contractor to the Owner. The Owner shall make payment to the Contractor at the supply rate for such stocks of cement they accept and receive. Any refused stock of cement shall be removed by the Contractor from the site at his cost and expenses within 15 days of completion of the work.

8. PAYMENT OF CLAIMS AND DAMAGES

8.1. Should the Owner have to pay money in respect of claims or demands as aforesaid the amount so paid and the costs incurred by the Owner shall be charged to and paid by the Contractor and the Contractor shall not be entitled to dispute or question the right of the Owner to make such payments notwithstanding the same may have been without his consent or authority or in law or otherwise to the contrary.

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8.2. In every case in which by virtue of the provisions of Workmen's Compensation Act, 1923, or other Acts, the Owner is obliged to pay Compensation to a Workman employed by the Contractor in execution of the works, the Owner will recover from the Contractor the amount of compensation so paid and without prejudice to the rights of Owner under the said Act. Owner shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due to the Contractor whether under this contract or otherwise. The Owner shall not be bound to contest any claim made under Section 12 sub section (1) of the said Act, except on the written request of the Contractor and upon his giving to the Owner full security for all costs for which the owner might become liable in consequence of contesting such claim.

8.a. ACTION AND COMPENSATION IN CASE OF BAD WORK

If it shall appear to the Engineer-in-Charge/Site-in-Charge that any work has been executed with bad, imperfect or unskilled workmanship, or with materials, or that any materials or articles provided by the Contractor for execution of the work are not of standards specified/inferior quality to that contracted for, or otherwise not in accordance with the contract, the CONTRACTOR shall on demand in writing from the Engineer-in-Charge/Site-in-Charge or his authorised representative specifying the work, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the work so specified and at his own charge and cost and expenses and in the event of failure to do so within a period of 15 days of such intimation/ information/knowledge, the Contractor shall be liable to pay compensation equivalent to the cost of reconstruction by the Owner. On expiry of 15 days period mentioned above, the Owner may by themselves or otherwise rectify or remove and re-execute the work or remove and replace with others, the materials or articles complained of as the case may be at the risk and expenses in all respects of the Contractor. The decision of the Engineer-in- Charge/ Site-in-Charge as to any question arising under this clause shall be final and conclusive and shall not be raised as a dispute or shall be arbitrable.

8.b. INSPECTION AND AUDIT OF CONTRACT AND WORKS

This project is subject to inspection by various Government agencies of Government of India. The contractor shall extend full cooperation to all the Government and other agencies in the inspection of the works, audit of the Contract and the documents of Contract Bills, measurements sheets etc. etc. and examination of the records of works and make enquiries interrogation as they may deem fit, proper and necessary. Upon inspection etc. by such agencies if it is pointed out that the contract work has not been carried out according to the prescribed terms and conditions as laid down in the tender documents and if any recoveries are recommended, the same shall be recovered from the contractors running bills/final bill/from ordered/suggested Security Deposit/retention money. The Contractor shall not rise any dispute on any such account and the same shall not be arbitrable.

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9. CONTRACTOR TO INDEMNIFY THE OWNER

The Contractor shall indemnify the Owner and every member, officer and employee of the Owner, also the Engineer-in-Charge/Site-in-Charge and his staff against all the actions, proceedings, claims, demands, costs, expenses, whatsoever arising out of or in connection with the works and all actions, proceedings, claims, demands, costs, expenses which may be made against the Owner for or in respect of or arising out of any failure by the Contractor in the performance of his obligations under the contract. The Contractor shall be liable for or in respect of or in consequence of any accident or injury to any workmen or other person in the employment of the Contractor or his sub contractor and Contractor shall indemnify and keep indemnified the Owner against all such damages, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

10. LIQUIDATED DAMAGES

® i) In case of any delay in completion of the work beyond the CDD, the Owner shall be entitled to be paid Liquidated Damages by the Contractor. The liquidated damages shall be initially at the rate of 0.5% (half percent) of the total contract value for every week of the delay subject to a maximum of 5% of the total contract value. The liquidated damages shall be recovered by the Owner out of the amounts payable to the Contractor or from any Bank Guarantees or Deposits furnished by the Contractor or the Retention Money retained from the Bills of the Contractor, either under this contract or any other contract.

ii) The Contractor shall be entitled to give an acceptable unconditional Bank Guarantee in lieu of such a deduction if Contractor desires any decision on a request for time extension.

iii) Once a final decision is taken on the request of the Contractor or otherwise, the LD shall be applicable only on the basic cost of the contract and on each full completed week(s) of delay (and for part of the week, a pro-rata LD amount shall be applicable).

iv) This final calculation of LD shall be only on the value of the unexecuted portion/quantity of work as on the CDD.

v) Contractor agrees with the Owner, that the above represents a genuine preestimate of the damages which the Owner will suffer on account of delay in the performance of the work by Contractor. The Contractor further agrees that the LD amount is over and above any right which owner has to risk purchase under Clause 12.4 and any right to get the defects in the work rectified at the cost of the contractor.

11. DEFECTS AFTER TAKING OVER OR TERMINATION OF WORK CONTRACT BY OWNER

The Contractor shall remain responsible and liable to make good all losses or damages that may occur/appear to the work carried out under this Contract within a period of 12

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months from date of issue of the Completion Certificate and/or the date of Owner taking over the work, whichever is earlier. The Contractor shall issue a Bank Guarantee to the Owner in the sum of 10% of the work entrusted in the Contract, from any nationalised Bank acceptable to the Owner and if however, the Contractor fails to furnish such a Bank Guarantee the Owner shall have right to retain the Security Deposit and Retention Money to cover the 10% of the Guarantee amount under this clause and to return/refund the same after the expiry of the period of 12 months without any interest thereon.

12. TERMINATION OF CONTRACT

12.1 The owner may terminate the contract at any stage of the construction for reasons to be recorded in the letter of termination.

12.2 The Owner inter alia may terminate the Contract for any or all of the following reasons that the contractor

- a) has abandoned the work/Contract.
- b) has failed to commence the works, or has without any lawful excuse under these conditions suspended the work for 15 consecutive days.
- c) has failed to remove materials from the site or to pull down and replace the work within 15 days after receiving from the Engineer written notice that the said materials or work were condemned and/or rejected by the Engineer under specified conditions.
- d) has neglected or failed to observe and perform all or any of the terms acts, matters or things under this Contract to be observed and performed by the Contractor.
- e) has to the detriment of good workmanship or in defiance of the Engineer's instructions to the contrary sub-let any part of the Contract.
- f) has acted in any manner to the detrimental interest, reputation, dignity, name or prestige of the Owner.
- g) has stopped attending to work without any prior notice and prior permission for a period of 15 days.
- h) has become untraceable.
- i) has without authority acted in violation of the terms and conditions of this contract and has committed breach of terms of the contract in best judgement of the owner.
- j) has been declared insolvent/bankrupt.
- k) in the event of sudden death of the Contractor.

12.3 The owner on termination of such contract shall have the right to appropriate the Security Deposit, Retention Money and invoke the Bank Guarantee furnished by the contractor and to appropriate the same towards the amounts due and payable by the contractor as per the conditions of Contract and return to the contractor excess money, if any, left over.

12.4 In case of Termination of the contract, Owner shall have the right to carry out the unexecuted portion of the work either by themselves or through any other contractor(s) at the risk and cost of the Contractor. In view of paucity of time, Owner shall have the

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right to place such unexecuted portion of the work on any nominated contractor(s). However, the overall liability of the Contractor shall be restricted to 100 % of the total contract value.

12.5 The contractor within or at the time fixed by the Owner shall depute his authorised representative for taking joint final measurements of the works executed thus far and submit the final bill for the work as per joint final measurement within 15 days of the date of joint final measurement. If the contractor fails to depute their representative for joint measurement, the owner shall take the measurement with their Engineer-in-Charge/Site-in-Charge or any other outside representatives. Such a measurement shall not be questioned by the Contractor and no dispute can be raised by the Contractor for purpose of Arbitration.

12.6 The Owner may enter upon and take possession of the works and all plant, tools, scaffoldings, sheds, machinery, power operated tools and steel, cement and other materials of the Contract at the site or around the site and use or employ the same for completion of the work or employ any other contractor or other person or persons to complete the works. The Contractor shall not in any way object or interrupt or do any act, matter or thing to prevent or hinder such actions, other Contractor or other persons employed for completing and finishing or using the materials and plant for the works. When the works shall be completed or as soon thereafter the Engineer shall give a notice in writing to the Contractor to remove surplus materials and plant, if any, and belonging to the Contractor except as provided elsewhere in the Contract and should the Contractor fail to do so within a period of 15 days after receipt thereof the Owner may sell the same by public auction and shall give credit to the contractor for the amount realised. The Owner shall thereafter ascertain and certify in writing under his hand what (if anything) shall be due or payable to or by the Owner for the value of the plant and materials so taken possession and the expense or loss which the Owner shall have been put to in procuring the works, to be so completed, and the amount if any, owing to the Contractor and the amount which shall be so certified shall thereupon be paid by the Owner to the Contractor or by the Contractor to the Owner, as the case may, and the Certificate of the Owner shall be final and conclusive between the parties.

12.7 When the contract is terminated by the Owner for all or any of the reasons mentioned above the Contractor shall not have any right to claim compensation on account of such termination.

13. FORCE MAJEURE

13.1. Any delay in or failure of the performance of either part hereto shall not constitute default hereunder or give rise to any claims for damage, if any, to the extent such delays or failure of performance is caused by occurrences such as Acts of God or an enemy, expropriation or confiscation of facilities by Government authorities, acts of war, rebellion, sabotage or fires, floods, explosions, riots, or strikes. The Contractor shall keep records of the circumstances referred to above and bring these to the notice of the

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Engineer-in-Charge/Site-in-Charge in writing immediately on such occurrences. The amount of time, if any, lost on any of these counts shall not be counted for the Contract period. Once decision of the Owner arrived at after consultation with the Contractor, shall be final and binding. Such a determined period of time be extended by the Owner to enable the Contractor to complete the job within such extended period of time.

13.2. If Contractor is prevented or delayed from the performing any of its obligations under this Agreement by Force Majeure, then Contractor shall notify Owner the circumstances constituting the Force Majeure and the obligations performance of which is thereby delayed or prevented, within seven days of the occurrence of the events.

14. ARBITRATION

14.1 All disputes and differences of whatsoever nature, whether existing or which shall at any time arise between the parties hereto touching or concerning the agreement, meaning, operation or effect thereof or to the rights and liabilities of the parties or arising out of or in relation thereto whether during or after completion of the contract or whether before after determination, foreclosure, termination or breach of the agreement (other than those in respect of which the decision of any person is, by the contract, expressed to be final and binding) shall, after written notice by either party to the agreement to the other of them and to the Appointing Authority hereinafter mentioned, be referred for adjudication to the Sole Arbitrator to be appointed as hereinafter provided.

14.2 The appointing authority shall either himself act as the Sole Arbitrator or nominate some officer/retired officer of Hindustan Petroleum Corporation Limited (referred to as owner or HPCL) or a retired officer of any other Government Company in the Oil Sector of the rank of Ch. Manager & above or any retired officer of the Central Government not below the rank of a Director, to act as the Sole Arbitrator to adjudicate the disputes and differences between the parties. The contractor/vendor shall not be entitled to raise any objection to the appointment of such person as the Sole Arbitrator on the ground that the said person is/was an officer and/or shareholder of the owner, another Govt. Company or the Central Government or that he/she has to deal or had dealt with the matter to which the contract relates or that in the course of his/her duties, he/she has/had expressed views on all or any of the matters in dispute or difference.

14.3 In the event of the Arbitrator to whom the matter is referred to, does not accept the appointment, or is unable or unwilling to act or resigns or vacates his office for any reasons whatsoever, the Appointing Authority aforesaid, shall nominate another person as aforesaid, to act as the Sole Arbitrator.

14.4 Such another person nominated as the Sole Arbitrator shall be entitled to proceed with the arbitration from the stage at which it was left by his predecessor. It is expressly agreed between the parties that no person other than the Appointing Authority or a person nominated by the Appointing Authority as aforesaid, shall act as an Arbitrator. The failure on the part of the Appointing Authority to make an appointment on time shall

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only give rise to a right to a Contractor to get such an appointment made and not to have any other person appointed as the Sole Arbitrator.

14.5 The Award of the Sole Arbitrator shall be final and binding on the parties to the Agreement.

14.6 The work under the Contract shall, however, continue during the Arbitration proceedings and no payment due or payable to the concerned party shall be withheld (except to the extent disputed) on account of initiation, commencement or pendency of such proceedings.

14.7 The Arbitrator may give a composite or separate Award(s) in respect of each dispute or difference referred to him and may also make interim award(s) if necessary.

14.8 The fees of the Arbitrator and expenses of arbitration, if any, shall be borne equally by the parties unless the Sole Arbitrator otherwise directs in his award with reasons. The lumpsum fees of the Arbitrator shall be Rs. 40,000/- per case for transportation contracts and Rs. 60,000/- for engineering contracts and if the Sole Arbitrator completes the arbitration including his award within 5 months of accepting his appointment, he shall be paid Rs. 10,000/- additionally as bonus. Reasonable actual expenses for stenographer, etc. will be reimbursed. Fees shall be paid stagewise i.e. 25% on acceptance, 25% on completion of pleadings/documentation, 25% on completion of arguments and balance on receipt of award by the parties.

14.9 Subject to the aforesaid, the provisions of the Arbitration and Conciliation Act, 1996 or any statutory modification or re-enactment thereof and the rules made thereunder, shall apply to the Arbitration proceedings under this Clause.

14.10 The Contract shall be governed by and constructed according to the laws in force in India. The parties hereby submit to the exclusive jurisdiction of the Courts situated at Mumbai for all purposes. The Arbitration shall be held at Mumbai and conducted in English language.

14.11 The Appointing Authority is the Functional Director of Hindustan Petroleum Corporation Limited.

15. GENERAL

15.1. Materials required for the works whether brought by the or supplied by the Owner shall be stored by the contractor only at places approved by Engineer-in-Charge/Site-in-Charge. Storage and safe custody of the material shall be the responsibility of the Contractor.

15.2. Owner and/or Engineer-in-Charge/Site-in-Charge connected with the contract, shall be entitled at any time to inspect and examine any materials intended to be used in or on the works, either on the site or at factory or workshop or at other place(s)

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manufactured or at any places where these are laying or from which these are being obtained and the contractor shall give facilities as may be required for such inspection and examination.

15.3. In case of any class of work for which there is no such specification supplied by the owner as is mentioned in the tender documents, such work shall be carried out in accordance with Indian Standard Specifications and if the Indian Standard Specifications do not cover the same the work should be carried out as per standard Engineering practice subject to the approval of the Engineer-in-Charge/Site-in-Charge.

15.4. Should the work be suspended by reason of rain, strike, lockouts or other cause the contractor shall take all precautions necessary for the protection of the work and at his own expense shall make good any damages arising from any of these causes.

15.5 The contractor shall cover up and protect from injury from any cause all new work also for supplying all temporary doors, protection to windows and any other requisite protection for the whole of the works executed whether by himself or special tradesmen or sub- contractors and any damage caused must be made good by the contractors at his own expense.

15.6 If the contractor has quoted the items under the deemed exports, then it will be the responsibility of the contractor to get all the benefits under deemed exports from the Government. The Owner's responsibility shall only be limited to the issuance of required certificates. The quotation will be unconditional and phrases like "subject to availability of deemed exports benefit" etc. will not find place in it.

@16. Integrity Pact : Effective 1st September, 2007, all tenders and contracts shall comply with the requirements of the Integrity Pact (IP) if the value of such tenders or contracts exceed Rs.1 crore. Failure to sign the Integrity Pact shall lead to outright rejection of bid.

17. Grievances of parties participating or intend to participate in the tender shall be addressed in writing to the officer designate of the Grievance Redressal Cell where the tenders have to be submitted within the stipulated period. Detailed mechanism of Grievance Redressal is available on the HPCL website.

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(SPECIMEN)
BANK GUARANTEE FOR MOBILISATION ADVANCE

(On Non-Judicial stamp paper of appropriate value)

Hindustan Petroleum Corporation Ltd.,
(Address as applicable)

1. In consideration of M/s Hindustan Petroleum Corporation Ltd., Government of India Company registered under the Companies Act, 1956 having its Registered Office at 17, Jamshedji Tata Road, Bombay - 400 020 (hereinafter called the "Corporation" which expression shall include its successors in business and assigns having placed an order on M/s _____ a partnership firm/sole proprietor/a Company registered under the Companies Act 1956, having its office at _____ (complete address) _____ (hereinafter called "the supplier/contractor" (which expression shall include its successors in business and assigns) vide Purchase Order No. _____ dated _____ for (specify nature of job) _____ (hereinafter called "the Order" which expression shall include any amendments / alterations thereto as issued by "the Corporation") for the supply of goods to/the execution of service for "the Corporation" and having agreed to pay the suppliers as and by way of advance upto a sum of Rupees _____ being _____ % of the value of "the Order" in terms of "the order" on production of an acceptable Bank Guarantee for an amount of ₹ _____.
2. We, _____ Bank (hereinafter referred to as "the Bank") , do at the request and on behalf of "The Suppliers / Contractor" hereby agree to pay to "the Corporation" without any demur on first demand an amount not exceeding ₹ _____ (in words) against any loss or damage, costs, to or suffered by "the Corporation" by reason of any breach on the part of "the Supplier/Contractor" of any of the terms and conditions of the said "Order".
3. We, _____ Bank, further agree that "the Corporation" shall be the sole judge whether the said "Supplier/Contractor" has committed breach of any of the terms and conditions of "the Order" and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by "the Corporation" on account thereof and we waive in favour of "the Corporation" all the rights and defense to which we as guarantors and/or the supplier may be entitled to.
4. We, _____ Bank, further agree that the amount demanded by "the Corporation" as such shall be final and binding on "the Bank" as to "the Bank's" liability to pay the amount demanded and "the Bank" undertake to pay "the Corporation" the amount so demanded on first demand without any demur notwithstanding any dispute raised by "the Supplier/Contractor" or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional.
5. We, _____ Bank, further agree that the guarantee herein contained shall remain in full force and continue to have full effect so long as the said amount remains unadjusted.

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6. We, _____ Bank, further agree with "the Corporation" that "the Corporation" shall have the fullest liberty without any consent and without affecting in any manner our obligations hereunder to vary any of the terms and condition of the said "Order" or to extended time of performance by "the Supplier/Contractor" from time to time or to postpone for any time or from time to time any of the powers exercisable by "the Corporation" against "the Supplier / Contractor" and to forbear to enforce any of the terms and conditions relating to "the Order" and we shall not be relieved from our liability by reason of any such variation or extension being granted to "the Corporation" or for any forbearance, act or omission of "the Supplier/Contractor" or any such matter of things, whatsoever which under the law relating to sureties would, but for these provisions, have the effect of relieving us.
7. We, _____ Bank, hereby lastly undertake not to revoke this guarantee during its currency except with the previous consent of "the Corporation" in writing.
8. Notwithstanding anything contained herein above :
- i) Our liability under this guarantee shall not exceed ₹
 - ii) This Bank Guarantee shall be valid upto and including; and
 - iii) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or *# before the expiry of 30 days from the date of expiry of this guarantee.*
9. This guarantee shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of "the Supplier/Contractor", but shall in all respects and/or for all purposes be binding and operative on "the Bank" until payment of all moneys payable by "the Supplier/Contractor" in terms thereof.
10. "The Bank" has power to issue this guarantor in favour of "the Corporation" in terms of the documents and/or the agreement/contract or MOU entered into between "the Supplier/Contractor" and "the Bank" in this regard.

IN WITNESS whereof, Bank of _____, has executed this document at
_____ on _____ 2012

(FOR _____ BANK)
(by its constituted attorney)
(signature of a person authorized
to sign on behalf of "the Bank")

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(SPECIMEN)
BANK GUARANTEE FOR ADVANCES
(on non-judicial stamp paper of appropriate value)

To,
Hindustan Petroleum Corporation Ltd.,
(Address as applicable)

In CONSIDERATION OF MESSRS. HINDUSTAN PETROLEUM CORPORATION LIMITED, a Government of India Company registered under the Companies Act 1956, having its registered office at 17, Jamshedji Tata Road, Bombay - 400 020 (hereinafter called "the Corporation" which expression shall include its successors in business and assigns) having placed an order on Messrs _____ a partnership firm/sole proprietor business/ a company registered under the Companies Act, 1956 having its office at _____ (hereinafter called "the Supplier" which expression shall include its successors and assigns) vide Order No. _____ dated _____ (hereinafter called "the Order" which expression shall include any amendments/alterations thereto as issued by "the Corporation") for the supply of goods/to the execution of Service for "the Corporation" and having agreed to pay the supplier as and by way of advance upto a sum of ₹ _____ (Rupees _____ only) being _____ % of the value of the order in terms of "the Order" on production of an acceptable Bank Guarantee for an amount of ₹ _____ (Rupees _____ only).

1. We, _____ Bank having office at _____ (hereafter referred to as "the Bank") do at the request and on behalf of "the Supplier's" hereby agree to pay "the Corporation" without any demur on first demand an amount not exceeding ₹ _____ (Rupees _____ only) against any loss or damage, costs, charges and expenses caused to or suffered or would be caused to or suffered by "the Corporation" by reason of any breach on the part of "the Supplier" of any of the terms and conditions of the said order.

2. We, _____ Bank further agree that "the Corporation" shall be sole judge whether the said "Supplier" has committed breach of any of the terms and conditions of "the Order" and the extent of loss, damage, cost charges and expenses suffered or incurred or would be suffered or incurred by "the Corporation" on account thereof and we waive in favour of "the Corporation" all the rights and defences to which we as guarantors and/or "the Supplier" may be entitled to.

3. We, _____ Bank further agree that the amount demanded by "the Corporation" as such shall be final and binding on "the Bank" as to "the Bank's" liability to pay and amount demanded and "the Bank" undertake to pay "the Corporation" the amount so demanded on first demand and without any demur notwithstanding any dispute raised by "the Supplier" or any suit or other legal proceedings including arbitration pending before any court tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional. (We _____ Bank further agree that the guarantee herein contained shall remain in full force and continue to have full effect so long as the said amount remains unadjusted, provided, however, the value of the guarantee shall progressively reduce upon any

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

adjustments being made by "the Corporation" against the said advance and "the Corporation" rights shall extend only to the value of the unadjusted amount.

4. We, _____ Bank further agree with "the Corporation" that "the Corporation" shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said "order"/or to extend time of performance by "the Supplier" from time to time or to postpone for any time or from time to time any of the powers exercisable by "the Corporation" against "the Supplier" and to forbear to enforce any of the terms and conditions relating to "the Order" and we shall not be relieved from our liability by reason of any such variation or extension being granted to "the Supplier" or for any forbearance, act or omission on "the Supplier" or by any such matter or things whatsoever which under the law relating to sureties would be for this provisions have the effect of relieving us.

5. Notwithstanding anything contained herein above :

- i) Our liability under this guarantee shall not exceed ₹.....
- ii) This Bank Guarantee shall be valid upto and including; and
- iii) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or # *before the expiry of 30 days from the date of expiry of this guarantee*

6. We, _____ Bank further undertake not to revoke this guarantee during its currency except with the previous consent of "the Corporation" in writing.

7. We, _____ Bank lastly agree that "the Bank" liability under this guarantee shall not be affected by any change in the constitution of "the Supplier".

8. We, _____ Bank has power to issue this guarantee in favour of "the Corporation" in terms of the documents and/or the agreement/contract or MOU entered into between "the supplier" and "the Bank" in this regard.

IN WITNESS WHEREOF the Bank has executed this document on this _____ day of _____

(FOR _____ BANK)
(by its constituted attorney)
(signature of a person authorized to sign on behalf of "the Bank")

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

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(SPECIMEN)

**BANK GUARANTEE FOR PERFORMANCE OF THE OBLIGATIONS OF SUPPLIER /
CONTRACTOR**

(on non-judicial stamp paper of appropriate value)

To,
Hindustan Petroleum Corporation Ltd.,
(Address as applicable)

IN CONSIDERATION OF THE HINDUSTAN PETROLEUM CORPORATION LTD. A Government of India Company registered under the Companies Act, 1956, having its registered office at 17, Jamshedji Tata Road, Bombay - 400 020 (hereinafter called "the Corporation" which expression shall include its successors and assigns) having awarded to M/s _____ a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at _____ (hereinafter referred to as "the Supplier" which expression shall wherever the subject or context so permits includes its successors and assigns) a supply contract in terms inter alia, of "the Corporation's" Order No. _____ dated _____ and the General purchase conditions of "the Corporation" and upon the condition of "supplier's" furnishing security for the performance of "the Supplier's" obligations and/or discharge of "the supplier's" liability under and/or in connection with the said supply contract upto a sum of ₹ _____ (Rupees _____) amounting to 10% (ten percent) of the total contract value.

We, _____ (hereinafter called "the Bank" which expression shall include its successors and assigns) hereby jointly and severally undertake and guarantee to pay to "the Corporation" in rupees forthwith on demand in writing and without protest or demur of any and all moneys anyway payable by "the Supplier" to "the Corporation" under, in respect of or in connection with the said supply contract inclusive of all the Corporation's losses and damage and costs, (inclusive between attorney and client) charges, and expenses and other moneys anyway payable in respect of the above as specified in any notice of demand made by "the Corporation" to the Bank with reference to this Guarantee upto and aggregate limit of ₹ _____ (Rupees _____) and "the Bank" hereby agrees with "the Corporation" that:

1. This Guarantee/Undertaking shall be a continuing Guarantee / Undertaking and shall remain valid and irrecoverable for all claims of "the Corporation" and liabilities of "the Supplier" arising upto and until midnight of _____
2. This Guarantee/Undertaking shall be in addition to any other guarantee or security whatsoever that "the Corporation" may now or any time anyway have in relation to "the Supplier's" obligation/liabilities under and/or connection with the said supply contract, and "the Corporation" shall have full authority to take recourse to or enforce this security in preference to the other security(ies) at its sole discretion and no failure on the part of "the Corporation" to enforcing or requiring enforcement to any other security shall have the effect of releasing "the Bank" from its full liability hereunder.

HINDUSTAN PETROLEUM CORPORATION LIMITED
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3. "The Corporation" shall be at liberty without reference to "the Bank" and without affecting the full liability of "the Bank" hereunder to take any other security in respect of "the Supplier's" obligation and/or liabilities under or in connection with the said supply contract and to vary the term vis-a-vis "the supplier" of the said supply contract or to grant time and/or indulgence to "the Supplier" or to reduce or to increase or otherwise vary the prices of the total contract value or to release or to forebear from enforcement of all or any of the obligations of "the supplier" under the said supply contract and/or the remedies of "the Corporation" under any other security(ies) now or hereafter held by "the Corporation" and no such dealing(s), variation(s) or other indulgence(s) or agreement(s) with "the supplier" or release of forbearance whatsoever shall have the effect of releasing "the Bank" from its full liability to "the Corporation" hereunder or of prejudicing rights of "the Corporation" against "the Bank".
4. This Guarantee/Undertaking shall not be determined or affected by the liquidation or winding up, dissolution or change of constitution or insolvency of "the supplier" but shall in all respects and for all purposes be binding and operative until payment of all moneys payable to "the Corporation" in terms hereof.
5. "The Bank" hereby waives all rights at any time inconsistent with the terms of this Guarantee/Undertaking and the obligations of "the Bank" in terms hereof shall not be anyway affected or suspended by reason of any dispute having been raised by "the suppliers" (whether or not pending before any arbitrator, officer, tribunal or court) or any denial of liability by "the supplier" or any other order of communication whatsoever by "the supplier" stopping or preventing or purporting to stop or prevent any payment by "the Bank" to "the Corporation" in terms hereof.
6. The amount stated in any notice of demand addressed by "the Corporation" to "the Bank" as liable to be paid to "the Corporation" by "the supplier" or as suffered or incurred by "the Corporation" on account of any losses or damages or costs, charges/and/or expenses shall be as between "the Bank" and "the Corporation" be conclusive of the amount so liable to be paid to "the Corporation" or suffered or incurred by "the Corporation", as the case may be, and payable by "the Bank" to "the Corporation", in terms hereof.
7. Notwithstanding anything contained herein above :
- i) Our liability under this guarantee shall not exceed ₹.....
- ii) This Bank Guarantee shall be valid upto and including; and
- iii) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or # *before the expiry of 30 days from the date of expiry of this guarantee.*
8. "The Bank" has power to issue this guarantee in favour of "the Corporation" in terms of the documents and/or the agreement/contract or MOU entered into between "the supplier" and "the Bank" in this regard.

IN WITNESS Where of _____ Bank, has executed this document at _____ on _____ 2012 .

_____ Bank

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

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(by its constituted attorney)
(signature of a person authorized to
sign on behalf of "the Bank")

(SPECIMEN)

**COMPOSITE BANK GUARANTEE FOR MOBILISATION ADVANCE, SECURITY
DEPOSIT/RETENTION MONEY/PERFORMANCE GUARANTEE**
(On Non-Judicial stamp paper of appropriate value)

TO : Hindustan Petroleum Corporation Limited
(Address as applicable)

IN CONSIDERATION OF MESSRS. HINDUSTAN PETROLEUM CORPORATION LIMITED, a Government of India Company registered under the Companies Act, 1956, having its registered office at 17, Jamshedji Tata Road, Bombay-20 (hereinafter called "The Corporation" (which expression shall include its successor in business and assigns) having placed an order on Messers a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at (hereinafter called "the supplier" (which expression shall include executors, administrators and assigns) vide order No.....dated..... (hereinafter called "the order" which expression shall include any amendments/alterations to "the order" issued by "the Corporation") for the supply of goods to/execution of services for "the Corporation" and "the Corporation" having agreed :

- a) not to insist upon immediate payment of Security deposit for the fulfilment and performance of the said order
- b) to pay "the supplier" as and by way of advance upto a sum of Rupees_____ (Rupees _____ only) being ____% of the value of "the order";
- c) that "the supplier" shall furnish a security for the performance of "the supplier's" obligations and/or discharge of "the supplier's" liability in connection with the said "order"; and "the Corporation" having agreed with "the supplier" to accept a composite Bank Guarantee for the mobilisation advance, security deposit, retention money and performance guarantee.

We, Bank having office at (hereinafter referred to as "the Bank" which expression shall include its successors and assigns) at the request and on behalf of "the supplier" hereby agree to pay to "the Corporation" without any demur on first demand an amount not exceeding ₹..... (Rupees.....only) against any loss or damage, costs, charges and expenses caused to or suffered by "the Corporation" by reason of non performance and fulfilment or for any breach on the part of "the supplier" of any of the terms and conditions of the said "order".

2. We, Bank further agree that "the Corporation" shall be sole judge whether the said "Supplier" has failed to perform or fulfill the said "order" in terms thereof or committed breach of any terms and conditions of "the order" and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by "the Corporation" on account thereof and we waive in the favour of "the Corporation" all the rights and defences to which we as guarantors and/or "the Supplier" may be entitled to.

3. We, Bank further agree that the amount demanded by "the Corporation" as such shall be final and binding on "the Bank" as to "the Bank" 's liability to pay and the amount demanded and "the Bank" undertake to pay "the Corporation" the amount so demanded on first demand and without any demur notwithstanding any dispute raised by "the Supplier" or any suit or other

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

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legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional.

4. We, Bank further agree with "the Corporation" that "the Corporation" shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said "order"/or to extend time of performance by "the Supplier" from time to time or to postpone for any time to time any of the powers exercisable by "the Corporation" against "the Supplier" and to forbear to enforce any of the terms and conditions relating to "the order" and we shall not be relieved from our liability by reason of any such variation or extension being granted to "the Supplier" or for any forbearance, act or omission on the part of "the Corporation" or any indulgence by "the Corporation" to "the Supplier" or by any such matter or things whatsoever which under the law relating to sureties would but for this provision have the effect of relieving us.

5. However, it has been agreed between "the Supplier" and "the Corporation" that there shall be only one Composite Bank Guarantee for both the advance and security deposit performance guarantee/Retention Money @ of ____% valid till the end of the defects liability period as per the terms of the P.O. No. _____ dated _____ and that in proportion with the recovery of advance @ _____% per bill the same amount/value automatically stands credited to the defects liability account/security deposit or retention money as the case may be and will continue to be credited/treated till the entire advance of ₹_____ is fully recovered from the running bills and from the date of full recovery of the advance of ₹_____ this guarantee automatically, shall stand valid towards the ____% retention money/defects liability, fully valid in all ® respects unto a further period of **3 (three)** months, as

6. Not withstanding anything contained herein above :

i) Our liability under this guarantee shall not exceed ₹.....
ii) This Bank Guarantee shall be valid upto and including; and
iii) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or **before the expiry of 30 days from the date of expiry of this guarantee.**

7. We, Bank further undertake not to revoke this guarantee during its currency except with the previous consent of "the Corporation" in writing.

8. We, Bank lastly agree that "the Bank"'s liability under this guarantee shall not be affected by any change in the constitution of "the Supplier".

9. "The Bank" has power to issue this guarantee in favour of "the Corporation" in terms of the documents and/or the Agreement/Contract or MOU entered into between "the Supplier" and "the Bank" in this regard.

IN WITNESS WHEREOF the Bank has executed this document on this day of

For Bank
(by its constituted attorney)

Page No.148 of 156 Tender No.11000138-HD-12001/GBK (14222) Signed & Stamp of the bidder

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

(Signature of a person authorised
to sign on behalf of "the Bank")*

(SPECIMEN)
(INDEMNITY BOND)
(TO BE NOTORISED AND ON STAMP PAPER OF APPROPRIATE VALUE)

TO,
HINDUSTAN PETROLEUM CORPN. LTD.

(Address as applicable)

Dear Sirs,

WHEREAS Hindustan Petroleum Corporation Limited, a Government of India Company, registered under the Companies Act, 1956, having its Registered Office at 17, Jamshedji Tata Road, Bombay - 400020 (hereinafter called "the Indemnified" which expression shall include its successors and assigns) has awarded to M/s. a Partnership Firm/Sole Proprietor Business/a company having its Registered Office at (hereinafter called "the Indemnifier", which expression shall include its successors and assigns) a contract for conditions set out, inter-alia, in "the Indemnified" 's Purchase Order No. dated (hereinafter referred to as "The Said Contract") to "the Indemnifier".

AND WHEREAS "the Indemnified" has agreed to supply to "the Indemnifier" raw material/components to the value of ₹..... (Rupees only) for incorporation in fabrication by "the Indemnifier" in terms of "the said contract", the components/raw material to be supplied by "the Indemnified" to "the Indemnifier" for the said fabrication, (hereinafter, for the sake of brevity, referred to as "the said material") and pending fabrication and delivery at job-site of the completed fabricated work(s) incorporating "the said material" and accounting for "the said material" shall be under the sole custody and charge of "the Indemnifier" and shall be kept, stored, altered, worked upon and/or fabricated at the sole risk and expenses of "the Indemnifier" ;

As a Pre-condition to the supply of "the said material" by "the Indemnified" to "the Indemnifier", the Indemnified" has required "the Indemnifier" to furnish to "the Indemnified" security in the manner and upon terms and conditions hereinafter indicated :

NOW THEREFORE, in consideration of the premises aforesaid "the Indemnifier" Shri, Shri all directors/partners/sole proprietor of "the Indemnifier" in consideration of aforesaid "contract" hereby irrevocably and unconditionally and jointly and severally undertake to indemnify and always keep "the Indemnified" from and against all loss, damage and destruction (inclusive but not limited to any or all loss or damage or destruction to or of "the said material" or any item or part thereof) by theft, fire, flood, storm, tempest, lightning, explosion, storage, chemical or physical action or reaction, bending, wrapping, exposure, rusting, faulty workmanship, faulty fabrication or faulty

Page No.149 of 156 Tender No.11000138-HD-12001/GBK (14222) Signed & Stamp of the bidder

HINDUSTAN PETROLEUM CORPORATION LIMITED
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method of technique of fabrication, riot, civil commotion or other act of omission or commission whatsoever within or beyond the control of "the Indemnifier", misuse and misappropriation by "the Indemnifier's" servants and/or agents whatsoever to, of or in "the said material" or any part or item thereof between the date that the same or relative part or item thereof was supplied to "the Indemnifier" upto and until the return to "the Indemnified" on due dates of "the said material" or relative part or item thereof or completed fabricated work(s) incorporating the said material AND jointly and severally undertake to pay to "the Indemnified" forthwith on first demand in writing without protest or demur the value of "the said material" or item part thereof lost, damaged, destroyed, misused and/or misappropriated, as the case may be, inclusive of "the Indemnified" 's cost and expenses (inclusive but not limited to handling, transportation, cartage, insurance, freight, packing and inspection costs and/or expenses) as specified in the said demand.

AND "the Indemnifier" hereby agree with "the Indemnified" that :

1. This Indemnity shall remain valid and irrevocable until the settlement of all claims of "the Indemnified" arising hereunder :

2. This Indemnity shall be in addition to any other Indemnity, Guarantee or Security whatsoever that "the Indemnified" may now or any time anywise have in relation to "the Indemnifier" 's obligations/liabilities under and/or in connection with the said contract inclusive of "the said material" and "the Indemnified" shall have full authority to take recourse to or enforce this security in preference to the other security (ies) at its sole discretion, and no failure on the part of "the Indemnified" in enforcing or requiring enforcement of any other security shall have the effect of releasing "the Indemnifier" from its full liability hereunder :

3. "The Indemnified" shall be at liberty without reference to "the Indemnifier" and without affecting the full liability of "the Indemnifier" hereunder to take any other such security in respect of "the Indemnifier" 's obligations and/or liabilities under or in connection with the "said contract" inclusive of "the said material" and to vary the terms vis-avis "the Indemnifier" of "the said contract" or to grant time and/or indulgence to "the Indemnifier" or to reduce or to increase or otherwise vary the prices or the total contract value or the quantity, quality, description or value of the said material or to release or to forbear from endorsement of

all or any of the obligations of "the Indemnifier" under the said contract (inclusive of anything in respect of "the said material") and/or the remedies of "the Indemnified" under any other security(ies) now or hereinafter held by "the Indemnified" and no such dealing(s), variations(s), reduction(s), increase(s) or other indulgence(s) or arrangement(s) with "the Indemnifier" or release or forbearance whatsoever shall have the effect of releasing "the Indemnifier" from their full liability to "the Indemnified" hereunder or of anywise prejudicing rights of "the Indemnified" against "the Indemnifier" and "the Indemnifier" hereby waive all rights, if any, at any time, inconsistent with the terms of this Indemnity.

4. This Indemnity shall not be determined or affected by the liquidation or winding up, dissolution, or change of constitution or insolvency of "the Indemnifier" and the obligations of "the Indemnifier" in terms hereof shall not be anywise affected or suspended by reason of any dispute or disputes having been raised by "the Indemnifier" (whether now pending before any Arbitrator, Officer, Tribunal or Court) or any denial of liability by "the Indemnifier" or any other order or communication whatsoever by "the

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

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Indemnifier" stopping or preventing or purporting to stop or prevent any payment by "the Indemnifier" to "the Indemnified" in terms hereof :

5. The mere statement made by or on behalf of "the Indemnified" in any notice or demand or other writing addressed to "the Indemnifier" as to any of "the said material" or item or part thereof supplied to "the Indemnifier" having been lost, damaged, destroyed, misused or misappropriated while in the custody of "the Indemnifier" before or after completion of the completed fabricated work(s) incorporating "the said material" and delivery at job site thereof shall as between "the Indemnifier" and "the Indemnified" be conclusive of the factum of "the said material" or item or part thereof having been supplied to "the Indemnifier" and/or the loss, damage, destruction, misuse or misappropriation thereof, as the case may be, while in the custody of "the Indemnifier" and/or prior to the completion of the completed fabricated work(s) and delivery to job site thereof without necessity on the part of "the Indemnified" to produce any documentary proof or other evidence whatsoever in support of this;

6. The amount stated in any notice of demand addressed by "the Indemnified" to "the Indemnifier" as the value of any of "the said material", lost, damaged, destroyed or misused or misappropriated, inclusive relative to the cost and expenses incurred by "the Indemnified" in connection therewith shall as between "the Indemnifier" and "the Indemnified" be conclusive of the value of such "said material" and the said costs and expenses as also of the amount liable to be paid by "the Indemnifier" to "the Indemnified" in terms and for the purpose of, without necessity for "the Indemnified" to produce any voucher, bill or other documentation or evidence whatsoever in support thereof.

In witness whereof "the Indemnifier" have hereunto set and subscribed his hand this day and year first hereinabove written in the presence of witnesses.

Yours faithfully,

- 1)
- 2)
- 3)

WITNESSES

- 1.
- 2.

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

(SPECIMEN)

BANK GUARANTEE IN LIEU OF EARNEST MONEY

(On Non-Judicial stamp paper of appropriate value)

TO : Hindustan Petroleum Corporation Limited
LPG Department, Marketing Division,
8 Shoorji Vallabhdas Marg,
Ballard Estate, Mumbai-400001

IN CONSIDERATION OF MESSRS. HINDUSTAN PETROLEUM CORPORATION LIMITED a Government of India Company registered under the Companies Act, 1956, having its registered office at 17, Jamshedji Tata Road, Bombay-20 (hereinafter called "The Corporation" which expression shall include its successor in business and assigns) issued a tender on Messrs. a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at (hereinafter called "the Tenderer" which expression shall include its executors, administrators and assigns) against Tender no..... dated (hereinafter called "the tender" which expression shall include any amendments/ alterations to "the tender" issued by "the Corporation") for the supply of goods to/execution of services for "the Corporation" and "the Corporation" having agreed not to insist upon immediate payment of Earnest Money for the fulfilment of the said tender in terms thereof on production of an acceptable Bank Guarantee for an amount of ₹..... (Rupeesonly).

We, Bank having office at Bombay (hereinafter referred to as "the Bank" which expression shall include its successors and assigns) at the request and on behalf of "the Tenderer" hereby agree to pay to the Corporation without any demur on first demand an amount not exceeding ₹..... (Rupees only) against any loss or damage, costs, charges and expenses caused to or suffered by "the Corporation" by reason of non performance and fulfilment for any breach on the part of "the Tenderer" of any of the terms and conditions of the said "tender".

2. We, Bank further agree that "the Corporation" shall be sole Judge whether the said "Tenderer" has failed to perform or fulfill the said "tender" in terms thereof or committed breach of any of the terms and conditions of "the order" and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by "the Corporation" on account thereof and we waive in favour of "the Corporation" all the rights and defences to which we as guarantors and/or "the Tenderer" may be entitled to.

3. We, Bank further agree that the amount demanded by "the Corporation" as such shall be final and binding on "the Bank" as to "the Bank" 's liability to pay and the amount demanded and "the Bank" to undertake to pay "the Corporation" the amount so demanded on first demand and without any demur notwithstanding any dispute raised by "the

Page No.152 of 156 Tender No.11000138-HD-12001/GBK (14222) Signed & Stamp of the bidder

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

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Tenderer" or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional.

4. We, Bank further agree with "the Corporation" that "the Corporation" shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said "tender"/or to extend time of performance by "the Tenderer" from time to time or to postpone for any time to time any of the powers exercisable by "the Corporation" against "the Tenderer" and to forbear to enforce any of the terms and conditions relating to "the tender" and we shall not be relieved from our liability by reason of any such variation or extension being granted to "the Tenderer" or for any forbearance, act or omission on the part of "the Corporation" or any indulgence by "the Corporation" to "the tenderer" or by any such matter or things whatsoever which under the law relating to sureties would but for this provision have the effect of relieving us.

5. NOTWITHSTANDING anything hereinbefore contained, our liability under this Guarantee is restricted to ₹(Rupees.....only). Our liability under this guarantee shall remain in force until expiration of six months from the due date of opening of the said "tender". Unless a demand or claim under this guarantee is made on us in writing within said period, that is, on or before all rights of "the Corporation" under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities thereunder.

6. We, Bank further undertake not to revoke this guarantee during its currency except with the previous consent of "the Corporation" in Writing.

7. We, Bank lastly agree that "the Bank" 's liability under this guarantee shall not be affected by any change in the constitution of "the Tenderer".

8. "The Bank" has power to issue this guarantee in favour of "the Corporation" in terms of the documents and/or the Agreement/Contract or MOU entered into between "the Tenderer" and "the Bank" in this regard.

IN WITNESS WHEREOF the Bank has executed this document on this day of

For Bank
(by its constituted attorney)
(Signature of a person authorised
to sign on behalf of "the Bank")

HINDUSTAN PETROLEUM CORPORATION LIMITED
HINDUSTAN BHAVAN - LPG PROJECTS DEPARTMENT

Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

(SPECIMEN)

BANK GUARANTEE IN LIEU OF LIQUIDATED DAMAGES
(On Non-Judicial stamp paper of appropriate value) (Clause B.11.1 of Chapter IV)

To: Hindustan Petroleum Corporation Limited

(Address as applicable)

IN CONSIDERATION OF MESS. HINDUSTAN PETROLEUM CORPORATION LIMITED a Government of India Company registered under the Companies Act, 1956, having its registered office at 17, Jamshedji Tata Road, Churchgate, Mumbai – 400 020 (hereinafter called "The Corporation" which expression shall include its successor in business and assigns) agreeing to grant a provisional extension of time in respect of the contract entered into with Mess. a sole proprietorship business/ partnership firm/ a company registered under the Companies Act, 1956 having its office at (hereinafter called "the Contractor", which expression shall include its executor, administrator and assigns) against Purchase Order No..... dated (hereinafter called "the Contract" which expression shall include any amendments/ alterations to "the contract" issued by "the Corporation") for(state the purpose of the Contract), and the Contractor having requested for extension of time without deduction of any Liquidated Damages from the bills in terms of the Contract and "the Corporation" having agreed to grant provisional extension of time pending a decision on the request for extension of time and not to insist upon immediate deduction/payment of Liquidated Damages upon receipt of this unconditional irrevocable Bank Guarantee for an amount of(Rupeesonly).

1. We, Bank having our office atBombay (hereinafter referred to as "the Bank" which expression shall include its successor and assigns) at the request and on behalf of "the Contractor" hereby agree to pay to the Corporation without any demur and on first demand an amount not exceeding (Rupees only) against any loss or damage, costs, charges and expenses caused to or suffered by or likely to be caused to or suffered by "the Corporation" by reason of the delay in performance of work or the Corporation agreeing to grant such provisional extension of time without insisting on deduction of Liquidated Damages.

2. We, Bank further agree that "the Corporation" shall be sole Judge whether the said "Contractor" has failed to perform or fulfill the said "Contract" in terms thereof or committed breach of any of the terms and conditions of "the purchase order/Contract" or was not entitled to any extension of time and also the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by "the Corporation" on account thereof and we waive in favour of "the Corporation" all the rights and defences to which we as guarantor and/or "the Contractor" may be entitled to.

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Tender for Construction of 3 x 650 MT capacity Mounded LPG Storage Vessels at Dharwad LPG Plant

3. We, Bank further agree that the amount demanded by "the Corporation" as such shall be final and binding on "the Bank" as to "the Bank" 's liability to pay the amount demanded and "the Bank" undertakes to pay to "the Corporation" the amount so demanded on fit demand without further proof or conditions and without any demur, reservation, contest, recoupe or protest and without any enquiry of you or the Contractor, forthwith and in full without any deductions or set-offs or counterclaim whatsoever, the sum claimed by you in such Demand, notwithstanding any dispute raised by "the Contractor" or the pendency of any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional. We further agree that the Corporation shall not be bound to disclose any reasons while demanding any amount under the Bank Guarantee.

4. We, Bank further agree with "the Corporation" that "the Corporation" shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said "Contract"/or to extend time of performance by "the Contractor" from time to time or to postpone for any time or from time to time any of the powers exercisable by "the Corporation" against "the Contractor" and to forbear to enforce any of the terms and conditions relating to "the Contract" and we shall not be relieved from our liability by reason of any such variation or extension being granted to "the Contractor" or for any forbearance, act or omission on the part of "the Corporation" or any indulgence by "the Corporation" to "the Contractor" or by any such matter or things whatsoever which under the law relating to sureties would, but for this provision, have the effect of relieving us. Any waiver or other forbearance given or variations required under the Contract or any invalidity, unenforceability or illegality of the whole or any part of the Contract or rights of any party thereto, or amendment or other modification of the Contract or any other fact, circumstance, provision of statute or law which might, were our liability to be secondary and not primary, entitle us to be released in whole or in part from our undertaking, shall not in any way release us from our obligations under this Guarantee. Our obligations hereunder in respect of the sum or sums demanded by the Corporation under this Guarantee are primary, independent and absolute and not by way of surety only. The Corporation may make an unlimited number of Demands under this Guarantee provided that the aggregate of all sums paid shall not exceed the entire Guarantee Amount.

5. Notwithstanding anything hereinbefore contained, our liability under this Guarantee is restricted to (Rupees..... only). Our liability under this guarantee shall remain in force until expiration of six months from the expiry of the said "Contract". Unless a demand or claim under this guarantee is made on us in writing within said period, that is, on or before all rights of "the Corporation" under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities thereunder.

6. We, Bank further undertake not to revoke this guarantee during its currency except with the previous consent of "the Corporation" in Writing.

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7. We, Bank lastly agree that "the Bank" 's liability under this guarantee shall not be affected by any change in the constitution of "the Contractor" or its insolvency winding up, reorganisation, amalgamation or liquidation (including any appointment of a receiver, administrator, administrative receiver or supervisor of the Contractor or any of its assets) nor in case of any dispute or disagreement whatsoever under the Agreement. We shall indemnify you immediately on demand against any cost, loss or liability suffered by you as a result of our this obligation being or becoming unenforceable, invalid or contrary to the laws of India (except in the case of a fraud by you).

8. "The Bank" has power to issue this guarantee in favour of "the Corporation" in terms of the documents and/or the Agreement/Contract or MOU entered into between "the Contractor" and "the Bank" in this regard. This Guarantee shall be governed by and construed in accordance with the laws of the Republic of India.

9. Any demand, notice or other communication given in connection with or required by this Guarantee shall be made in writing in English be delivered by hand to, or sent by pre-paid registered post, or facsimile transmission to:

IN WITNESS WHEREOF the Bank has executed this document on this
day of

For Bank (by its constituted
attorney) Signature of a peon authorised to
sign on behalf of the bank")