



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

**DELHI AVIATION FUEL FACILITY PRIVATE LIMITED
AVIATION FUELLING STATION
SHAHBHAD MOHAMMADPUR
IGI AIRPORT
NEW DELHI-110061**



TENDER NO: DAFFPL/MOD/FF/2016-17/13

MECHANICAL & PIPING WORKS

BID DUE DATE & TIME: 1500 Hrs. IST on 29th November, 2016

OPENING OF TECHNICAL BIDS: 1100 Hrs. IST on 30th November, 2016



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PRICE BID FORMAT

NOTE: BIDDERS ARE REQUESTED TO SIGN AND STAMP ALL THE PAGES OF THE TENDER DOCUMENT AND SEND THE SAME BACK IN THEIR OFFER AS A TOKEN OF UNCONDITIONAL ACCEPTANCE OF TENDER FIRMS.

THE DEVIATIONS, IF ANY, SHOULD BE MENTIONED SEPARATELY ON BIDDER'S LETTER HEAD IN TECHNICAL BID. THE DEVIATIONS MENTIONED ANYWHERE ELSE SHALL NOT BE CONSIDERED. IN ABSENCE OF DEVIATION SHEET IT WOULD BE CONCLUDED THAT BIDDER HAS ACCEPTED THE TENDER TERMS WITHOUT ANY DEVIATIONS. CORRECTIONS IN TENDER DOCUMENT WILL NOT BE ACCEPTED.



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TENDER NOTICE DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

MECHANICAL & PIPING WORKS AS PER SPECIFICATIONS AS REQUIRED

TENDER NO: DAFFPL/MOD/FF/2016-17/13

Delhi Aviation Fuel Facility (P) Ltd (DAFFPL) invites sealed bids under single stage two bid system from eligible bidders for Mechanical and Piping Works.

Brief Scope of work:

We intends to upgrade Mechanical and Piping works of Fuel Hydrant System of the facility as per specification as required at our DAFFPL office.

Bid Security (EMD):	As mentioned in the Tender document
Date, Time & Venue for Voluntary Pre-bid Meeting:	11 th November, 2016; 1500 HRS (IST) at DAFFPL, Aviation Fuelling Station, Shahabad Mohammadpur, New Delhi-110061
Bid Due Date, Time & Place of Submission:	Upto 15:00 HRS (IST) on 29 th November, 2016 at the office of Chief Executive Officer, DAFFPL, Aviation Fuelling Station, Shahabad Mohammadpur,

Detailed Invitation for Bids (IFB) along with Pre-qualification Criteria, Bid Document Corrigenda can be viewed and downloaded from DAFFPL's website: <http://www.daffpl.in>

Chief Executive Officer

DAFFPL, New Delhi
8826120066



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CHAPTER 1: INTRODUCTION (COVERING NOTE)

Delhi Aviation Fuel Facility Private Limited (DAFFPL) is a Joint Venture comprising Indian Oil Corporation Ltd. (IOCL), Bharat Petroleum Corporation Ltd. (BPCL), and Delhi International Airport (P.) Ltd. (DIAL). We provides the infrastructure aimed at ensuring an uninterrupted flow of Aviation Turbine Fuel (ATF) to all type of aircrafts at the Indira Gandhi International Airport, New Delhi (IGI Airport) as per international benchmarking.

The bidder/contractor shall refer to various sections of this tender document for detailed scope of work. It is contractor's responsibility to execute the job in all respects as per detailed drawings, documents / specification furnished by consultant / owner and as per applicable codes, standards & in line of statutory requirements.

The field circumstances shall also be taken into consideration and methods suitable to the site conditions shall be adopted with concurrence of the Engineer-in-charge and in line with manuals, instructions of respective equipment and specified codes and standards. The successful accomplishment of the project is greatly influenced by the team work, workmanship of the workers and supervisors.

The Contractor shall employ only such workers and supervisors who have considerable experience of similar work and who can work, temperamentally in good harmony and co-operation.

Delhi Aviation Fuel Facility Private Limited (DAFFPL) invites sealed tenders in prescribed tender form under two-bid system. For viewing details including EMD, BID QUALIFICATION CRITERIA etc. please visit our web site www.daffpl.in and go to tender section by clicking the link "Tenders". Tender documents are available on our website.

The bid documents can also be collected from our office and the bids are to be submitted in Physical form in the Tender Box kept at the office of the **Delhi Aviation Fuel Facility Private Limited (DAFFPL)** at Shahabad Mohammadpur, New Delhi-110061, India.



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1. The Tender is floated in Two Bid system consisting of Technical Bids (Bid Qualification Criteria - BQC, Technical plus Commercial) and Price Bids.

Part-I : Bid Security / EMD in accordance with tender document.
Part-II : BQC (Bid qualification criteria), Technical & commercial Bid, duly filled in & along with all supporting as requested to be submitted in Physical form in the Tender Box.
Part -III : Price Bid.

2. The bidder should be able to construct the entire size/type/quantity bid by them. Bidders cannot bid for part items or part quantity.
3. Firstly the Technical bid (BQC & Techno commercial bids) shall be opened. The Bids shall be initially scrutinized by a team as per tender requirements of BQC (Bid qualification criteria). Technical cum commercial bids of only those vendors who qualify the BQC will be processed further. The price bids of only techno-commercially qualified bidders will be opened, evaluated and shortlisted for Placement of Work Order.
4. Each page of bid documents is to be duly signed & stamped by the bidder before submitting the Tender.
5. The bids submitted should be valid for **four months** from the due date of bid submission for Owners acceptance. Once accepted it will remain firm till completion of contracts/orders.
6. We request the bidder to carefully go through all tender documents before submitting the offer. Please note that any exceptions or deviations to the tender document are necessarily to be recorded in the attached deviation statement only. Any exceptions/deviations brought out elsewhere in the bid shall not be considered.
7. The bidders may be invited for a presentation to DAFFPL during Techno-commercial evaluation before price bid opening.
8. The bidders to provide their bank details/ PAN / Sales Tax /WCT Registration numbers/Service Tax Registration No. / VAT registration No., as applicable for updating vendor master file. You are also requested to keep us informed of any change in address / status of your business / contact details including email address etc.
9. Party can quote with the deviations as referred in Point No.6 above. Please refer query end date / time in tender calendar after which no query posted by bidder shall be considered. However DAFFPL reserves the right to respond the queries



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after cutoff date / time mentioned in tender calendar.

10. Please note that queries related to scope of job, tender specifications, terms & conditions etc., should be submitted by means of letter/E mail to reach the owner's office not later than one week before the meeting .It may not be practicable to answer queries received late, but queries and responses/clarifications will be posted in the form letter, E-mail within one week from the date of Pre Bid Meeting. Any modification in the bid document that may become necessary as a result of the Pre Bid meeting shall be made by the owner exclusively through the issues of corrigendum/ addendum posted at web site and not through the minutes of the pre bid meeting.
11. **UNSOLICITED POST BID MODIFICATION**
Bidders are advised to quote strictly as per terms and conditions of the Bidding Document. After tender submission due date & time/ extended due date & time (as the case may be) the bidders shall not make any subsequent price changes, whether resulting or arising out of any technical / commercial clarifications sought/allowed on any deviations or exceptions mentioned in the bid unless discussed and agreed by DAFFPL in writing.
12. EMD & Techno Commercial bid shall be opened on **30th November, 2016 at 11:00 Hrs (IST)** in the presence of authorized representative of bidders (Restricted to one [1] person per bidder only) at the office of DAFFPL. Price Bid of only those bidders whose offer is found meeting both PQC & techno-commercially acceptable, shall be opened on a later date as per convenience of DAFFPL after intimation to the qualified bidders.
13. DAFFPL reserves the right to accept any tender in whole or in part or reject any or all tenders without assigning any reason. DAFFPL reserves right to accept any or more tenders in part. Decision of DAFFPL in this regard shall be final and binding on the bidder.

QUERIES AND CLARIFICATIONS: Any query or clarification with regard to this tender may please be referred to below address & phone nos. on any working day during office working hours

Mr M Vishnu Vardhan / Manish Kumar Project Officer Vishnu.vardhan@daffpl.in , bksingh@daffpl.in , consultant@daffpl.in 8826000228 / 9810640818	Mr V S Thakur (Consultant) Project Manager Virender.Thakur@mottmac.com 91-120-3992308
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14. **GOVERNING LAWS:** The laws of Union of India shall govern all matters concerning the tender. Any issue arising related to the tender or the selection process shall be adjudged by the courts in Delhi alone.



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15. A Pre-bid meeting is scheduled for **11th November, 2016 at 1500 Hrs IST** at the office of DAFFPL, New Delhi. All prospective bidders can participate in the same. Any clarification with regard to tender shall be sorted out during the pre-bid meeting.
- The purpose of the pre-bid meeting is to clarify any doubts of the BIDDER on the interpretation of the provisions of tender.
 - Bidder(s) are requested to submit their queries, mentioning form name, clause no. & clause, by a letter / e-mail to our office as per schedule in order to have fruitful discussions during the meeting.
 - All the Bidder(s) are requested to attend the pre-bid meeting to be held at DAFFPL Office as per schedule.
16. **Tender document can be purchased from our office located at Shahabad Mohammadpur at a cost of Rs 1000/- and also can be downloaded from our website www.daffpl.in.**
- A bidder who downloads the document from website has to submit a separate DD for an amount of Rs.1000/- along with the EMD document.**
 - Bidders who purchase the document from our office have to submit a DD for an amount of Rs.1000/- at the time of purchase.**
17. **Earnest Money Deposit (EMD) (also referred to as Bid Security):** Bidder shall be required to submit the Earnest Money Deposit (EMD), either in the form of Bank guarantee as per format (provided as Annexure) or PAY ORDER or BANK DRAFT (in favour of Delhi Aviation Fuel Facility Private Limited, payable at New Delhi) at our office. The EMD in either form has to be submitted on or before the due date & due time of bid submission of this tender with a covering note mentioning the tender no.
- The bidders not submitting EMD by due time & date shall be rejected & their bids shall not be evaluated further.
 - The EMD amount shall be Rs. 30000.00**
 - Firms registered with National Small scale Industries (NSIC)/MSME of India are exempted from submission of bid security .Central Public Sector Enterprises of India and Firms registered with Nation Small Scale Industries Corporation (NSIC) of India are exempted from submission of Bid Security. Central Public Sector Enterprises are requested to give a self-declaration on their letter head to this effect. Bidders registered with NSIC of India are also requested to submit self-declaration on their letter head to this effect along with a copy of their Valid Registration certificate, specifying limit of volume and other details which should be submitted.
18. **Site Restriction:** The job has to be done in licensed area which is inside the premises of DAFFPL Fuel Facility. Successful bidder will have to follow all the security norms and procedures for entry and exit to the facility. The job timings will have to change as per the permissions obtained from Operation Dept. All the entry



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procedures for labours / machinery / raw materials as per the rules of the DAFFPL will have to be followed by the vendor. Contractor shall visit the site and ensure familiarity with the working condition / limitation at the site. Also the entire works are to be carried out in an operating Location. The contractor may have to follow the timings of the facility and have to work under restricted conditions. The normal working hours of plant is 0930 Hrs to 1800 Hrs on Monday to Saturday except holidays. Working beyond above normal working hours / holidays/ Sundays are to be with prior permission of Engineer in charge and relevant facility officers. Contractor is required to plan his work within the normal working hours and days and accordingly he has to mobilize the resources to complete the job within the scheduled time. However all efforts will be made by DAFFPL to give extended working time beyond normal working time in order to help the contractor for early completion of the job. No additional payment / charges shall be payable for such works. Not getting permission for working on holidays/ Sundays or beyond normal working hours will not be considered as reason for delay in work. The contractor and his personnel have to obey all rules and regulations of the plant. Trained and experienced supervisor/ engineer are required to be present at the work spot always.

All hot work like welding, cutting, grinding etc. needs to be done in the closed booth of asbestos cloth. No extra claim on account of the same will be considered. Also the shutdown jobs may get delayed due to operational requirement. Any extra claims on account of the same will not be entertained. **It is suggested that the Tenderer must visit the site in order to have a better idea of site conditions and factors.**

19. **Completion Time:** The time period of contract is **24 (Twenty Four) months** from the date of Letter of Intent including monsoon period. The time includes necessary time required for mobilizations and demobilizations after the execution of work and includes monsoon period.
20. The work is required to be done in a working/operating location, the party has to get necessary Hot/cold work permits from the concerned officer in plant as per OISD standards and all workmen should be provided with necessary safety helmet, safety belts, safety shoes and other standard safety equipment's. Any delay on account of non-adherence to safety norms, rules and regulations of plant as well as obtaining work permits from the plant shall not be accounted for the delay in completion of job.
21. **Receipt & storage of material at Site:** Contractor is required to make his own arrangement for unloading and storage of materials at site.
22. The successful vendor has to arrange and submit to fuel facility the proper **POLICE VERIFICATION DOCUMENTS** of all the labours, site in charges, supervisors,



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welders, grinders and all associated workmen who will be coming inside the terminal for carrying out related jobs.

23. For carrying out the jobs inside the depot the vendor has to arrange for working water, associated tools, tackles, manpower, machinery of his own and no extra payment will be made to vendor on account of the same.
24. All the debris, scrap, cut pieces, etc coming out of fabricated plates, excavated earth, area cleaning will have to be shifted by the vendor to a location inside or outside the terminal premises as per the instruction of DAFFPL site in-charge and no extra payment will be done for the same.

THE FORMS /ATTACHMENTS TO THIS TENDER ARE AS UNDER:

1. Covering Note – CHAPTER: 1
2. Instructions To Bidders - CHAPTER: 2
3. Bid-Qualification Criteria - CHAPTER: 3
4. Performance of Work – CHAPTER: 4
5. General Purchase Conditions- CHAPTER: 5
6. Technical Specification Documents - **(Attached separately as Annexure I)**
7. Annexure attached are as follows:
 - Annexure II – DEVIATION SHEET
 - Annexure III – DECLARATION SHEET
 - Annexure IV – FORMAT FOR DRAFT BANK GUARANTEE IN LIEU OF BID SECURITY (EMD)
 - Annexure V - FORMAT DRAFT COMPOSITE BANK GUARANTEE FOR SECURITY DEPOSIT/PERFORMANCE GUARANTEE
 - Annexure VI – FORM OF LETTER OF UNDERTAKING
 - Annexure VII – DECLARATION TO BE SUBMITTED ALONGWITH Technical BID
 - Price Bid

Thanking you,
Yours faithfully,
For DELHI AVIATION FUEL FACILITY (P) LTD.

Chief Executive Officer
DAFFPL, New Delhi



CHAPTER 2: INSTRUCTIONS TO BIDDERS

1. The bidder shall bear all costs associated with the preparation and submission of the bid and Owner will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.
2. Vendor is requested to submit their bids taking full notice of all the technical specifications, terms and conditions, forms & attachments to this tender. Bids must be submitted in Physical form only.
3. Owner reserves the right to accept / reject any or all bid qualification documents at their sole discretion without assigning any reason whatsoever.
4. Owner is not responsible for any delays from bidder end.
5. Owner reserves the right to make any changes in terms and conditions of purchase before due date of bid submission and to reject any or all bids received incomplete.
6. Undertaking by the bidder:
 - a. I/we hereby undertake that the statements made herein/information given in the bids through Physical Tendering system/annexure/forms referred are true in all respects and that in the event of any such statement or information being found to be incorrect in any particular, the same may be construed to be a misrepresentation entitling DAFFPL to avoid any resultant contract.
 - b. I/we further undertake as and when called upon by DAFFPL to produce, for its inspection, original(s) of the document(s) of which copies have been annexed hereto.
7. Owner, at its discretion reserves the right to verify information submitted by the bidders.
8. Bidder to submit documents/information to satisfy the bid qualification criteria. Bidders should also be in a position to produce further information as and when required by DAFFPL with in a time limit of 15 days.
9. DAFFPL reserves their right to negotiate the quoted prices with lowest bidder.
10. Bidders would be qualified based on data and documents submitted by them.
11. Owner's decision on any matter regarding short listing of vendors shall be final and no corresponding in this regards will be entertained.
12. The vendors who are on IOCL/BPCL/DIAL holiday list or delisted will not be



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considered.

13. The bidder is expected to examine all instructions, forms, attachments, terms and specifications in the tender document. The entire tender document together with all its attachments thereto, shall be considered to be read, understood and accepted by the bidder, unless deviations are specifically stated seriatim by the bidder. Failure to furnish all information required in the tender document or submission of a bid not substantially responsive to the tender documents in every respect will be at bidder risk and may result in the rejection of his bid. The bidder scope of supplies as specified in the material requisition shall be in strict compliance with the scope detailed therein and in the bid document.
14. Bidders in their own interest shall ensure that they submit their bid, complete in all respects, well within the specified bid due date and time. No relaxation shall be given for delay due to any unforeseen event in submission of bid.
15. At any time prior to the bid due date, we may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bid document. The amendment will be notified through our portal www.daffpl.in to all prospective bidders and will be binding on them. In order to afford prospective bidder, reasonable time in which to take the amendment into account in preparing their bids, we may, at our discretion, extend the bid due date.
16. The bid prepared by the bidder and all correspondence/ drawings and documents relating to the bid exchanged by bidder and the owner shall be written in ENGLISH language, provided that any printed literature furnished by the bidder may be written in another language so long as accompanied by an ENGLISH translation, in which case, for the purpose of interpretation of the bid, the ENGLISH translation shall govern.
17. Declaration with the bid qualification criteria that bidder has not been banned or delisted by any Government or quasi Government agencies or Public Sector Undertaking (PSU) as per declaration format (provided as annexure) of the tender document should be submitted along with the bid.
18. Bidders are advised to submit bids based strictly on the terms & conditions and specifications contained in the tender document and not to stipulate any deviations. Each Bidder shall submit only one bid. A Bidder who submits more than one bid will be rejected. Alternative bids will not be accepted.
19. The Owner may, at its discretion, extend the bid due date, in which case all rights and obligations of the Owner and the Bidders, previously subject to the bid due date, shall thereafter be subject to the new bid due date as extended. The same will be hosted in the web site.



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20. Bids shall be kept valid for 4 months from the bid due date. A bid valid for a shorter period shall be considered as non-responsive and rejected by the Owner. Notwithstanding above, the Owner may solicit the Bidder consent to an extension of the period of bid validity. The request and the responses thereto shall be made in writing. The EMD (bid security) shall also be accordingly extended.
21. Telex/ Telegraphic/ Telefax / E-mail offers will not be considered and shall be rejected.
22. No bid shall be modified subsequent to the due date & time or extension, if any, for submission of bids. Bidder(s) to note that Price changes after submission of bid shall not be allowed. In case any bidder gives revised prices/price implication, his bid shall be rejected. No bid shall be allowed to be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder. Withdrawal of a bid during this interval shall result in the forfeiture of Bidder s EMD.
23. Bids that do not meet the Bid qualification criteria as specified in the bid document shall be rejected. A bid with incomplete scope of work and/or which does not meet the technical requirements as specified in the bid document, shall be considered as non-responsive and rejected. Conditional bids will be liable for rejection.
24. The Owner will examine the bids to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed and whether the bids are generally in order.
25. The bids without requisite EMD and/or not in the prescribed Performa and the time limit will not be considered and bids of such bidder(s) shall be rejected.
26. PRICE EVALUATION CRITERIA: As award is on overall landed lowest basis, part offers will be rejected. Bidder has to quote for all items in a lot for us to consider them.
27. Prior to the expiration of period of bid validity, the owner will notify the successful bidder in writing or by e-mail, that his bid has been accepted. The Notification of Award will constitute the formation of the Contract. Delivery Period shall be counted from the date of notification of award (Letter/Fax/e-mail of Intent).
28. Any efforts by a bidder to influence the owner/ in the owner bid evaluation, bid comparison or contract award decisions may result in the rejection of their bid.
29. ISSUE OF CONTRACT/ PURCHASE ORDER: After the successful bidder has been notified that his bid has been accepted, DAFFPL will send to such bidder a detailed contract/purchase order incorporating all the terms and conditions agreed



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between the parties. Within 15 days of receipt of the detailed purchase order, the bidder shall sign and return to the owner the duplicate copy of the order as a token of their acknowledgement.

30. Vigil Mechanism: DAFFPL has developed the Vigil Mechanism to deal with references/ grievances, if any, that is received from bidders who participated / intends to participate in the tender. The details of the same are available on our website www.daffpl.in
31. VERIFICATION BY OWNER: All statements submitted by bidder regarding experience, manpower availability, equipment and machinery availability etc., are subject to verification by the owner either before placement of order or after placement of order. If any data submitted by the bidder at the bid stage is found to be incorrect, the offer is liable to be rejected or the contract/order is liable to be terminated.
32. SEALING & MARKING OF BIDS
- A. Bids shall be submitted separately in THREE SECTIONS in sealed envelopes superscribed with the Bid Document number, bid due date and time, item and nature of bid as under:
- **SECTION - I (Envelope No. 1): Bid Security / EMD:**
Bid security in accordance with tender document.
 - **SECTION - II (Envelope No. 2): Technical Bid:**
 - a. Information and documentary evidence establishing bidder's claim for meeting qualification criteria as stipulated in IFB. This section/envelope should necessarily contain all the required back-up documents for Bid Qualification.
 - b. Technical bid complete with all technical and commercial details, covering letter and un-priced copy of price Schedule with prices substituted with 'QUOTED' or 'NOT QUOTED' or 'NOT APPLICABLE'. **Deviation sheet duly filled with deviations, if any, shall form part of technical bid.**
 - **SECTION - III (Envelope No. 3): Price Bid:**
 - a. PRICE BID WITH FULL PRICE DETAILS. The price bid shall contain prices only in the prescribed price schedule formats, without any technical and commercial details. Technical specifications or commercial terms given in unpriced schedule will only be evaluated and the same will be binding on the Bidder. The bids shall be sealed and kept in a single envelope with marking as Section - III (Price Bid) /



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Envelope No. 3 : "Original"

- b. The bidder shall quote the final prices (including taxes, Cess, duties and other levies etc) in the 'PRICE SCHEDULE FORMAT' of bid document ONLY. Prices quoted in any other format shall not be considered for evaluation.
 - c. The Price bid shall be kept in a larger envelope duly sealed and shall bear the name and address of the bidder.
- B. The envelopes containing Section -I, Section -II, Section -III of bid shall be enclosed in a larger envelope duly sealed and pasted and shall bear the name and address of the bidder.
- C. Bidder to note that if bid security / EMD (in the Proforma attached with these documents) in original and/or bid document fee (if the bid document is downloaded) is kept in any other envelope and not found in envelope no. 1, the offer of the bidder(s) will be REJECTED during opening.
- D. Bidder to note that prices are to be quoted in the format provided in the price schedule formats provided along with the tender without any conditions. Price bids submitted in any other format and conditional price bids will be liable to be rejected. Price bids received in open condition (not in sealed envelope) or kept in any other Section of the bid (i. e, Section - I or II) will also be liable for rejection.
- E. If the outer envelope is not sealed and not marked as required, then DAFFPL will assume no responsibility for the bid's misplacement or premature opening.
- F. Bidders in their own interest shall ensure that they send their bid complete in all respects well in time to reach the specified office within the specified bid due date and time. No relaxation shall be given for delay due to any unforeseen event in submission of bid.
- G. Central Public Sector Enterprises and Firms registered with NSIC are exempted from submission of Bid Security. Central Public Sector Enterprises are requested to give a self declaration on their letter head to this effect, which should be submitted in a sealed envelope marked as Bid Security.
- H. Bidders registered with NSIC are also requested to submit self declaration on their letter head to this effect along with a copy of their Valid Registration certificate, specifying limit of volume and other details which should be submitted in a separate sealed envelope no. 1 marked as Bid security.
- I. Bid Security strictly in the Proforma attached with these documents shall be submitted in Original along with the Bid. Bids received without original bid security, shall not be opened for evaluation.
- J. Tender document complete in all respects must be submitted in the tender box provided at the DAFFPL office before due date and time



33. DOCUMENTS COMPRISING THE BIDS

The bid prepared by the Bidder shall comprise the following components:

- I. **ORIGINAL BID SECURITY (Section - I):** Bidders are advised to instruct their banks not to post Bid Security directly to Owner as the same has to accompany with the bid.
- II. **TECHNICAL BID (Section -II):**
 - Documentary evidence establishing Bidder's claim for meeting qualification criteria as stipulated in the Bid Document.
 - Notarized Audited Annual Report of previous three financial years.
 - Documentary evidence establishing Bidder's eligibility to bid and that the offered Goods conform to the Bid Document.
 - Price Schedule (with Price figures blanked) completed in accordance with the requirements specified in the bid document.
 - Agreed Terms & Conditions duly filled-in.
 - Deviation Sheet, if any.
 - Declaration with the bid qualification criteria that bidder has not been banned or delisted by any Government or quasi Government agencies or PSU's.
 - Any other information/details/documents/data required as per Bid Document.
 - Parent Company Guarantee, if applicable
- III. **PRICE BID (Section -III):** Bid Form and Price Schedule (Both given along with tender) duly filled in.

34. BID FORM & PRICE SCHEDULE

The bidders shall complete the Bid Form and appropriate Price schedule furnished of Bid Document, indicating the required information for all quoted items.

35. FORMAT AND SIGNING OF BID

- a. The Bidder shall prepare required number of copies of the bid, clearly marking each 'Original Bid' and 'Copy of Bid' as appropriate. In the event of any discrepancy between them, the 'Original Bid' shall govern.
- b. The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the bidder on all pages of the bid. Such authorization shall be indicated by written Power of Attorney accompanying the bid. The name and position held by each person signing must be typed or printed below the signature. The person or persons signing the bid shall initial all pages of the bid, except for unamended printed literature.
- c. The complete bid shall be without alterations, interlineations or erasures,



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except as may be necessary to correct errors made by the Bidder, in which case such corrections shall be rewritten & initialed by the person or persons signing the bid.

- d. All the pages of the price bid shall be signed by the authorized signatory. In case all the pages of the price bid are not signed, the bid shall be rejected.

36. OPENING OF BIDS

Bids will be opened by Owner at DAFFPL Office, New Delhi, in the presence of bidders/bidders authorized representatives available on the opening date and time (duly authorized by a competent person and having the letter of authority).

a. **BID SECURITY / EMD (SECTION-I) AND TECHNICAL BID (SECTION-II):**

- I. On the day and time of bid opening, Bid security (Envelope 1) and Technical Bid (Envelope 2) shall be opened in presence of bidders.
- II. The Bidder's representatives, who are present, shall sign a register/attendance sheet evidencing their attendance.
- III. The Bidder(s) names, presence or absence of requisite bid security will be announced at the opening.
- IV. Bidder (s), whose bids are not opened for any reason, including non receipt of original bid security, will not be allowed to be present during bid opening.

b. **PRICE BID OPENING (SECTION -III):**

- I. Only those bidders whose bids meet the qualification criteria and are technically/commercially acceptable shall be called for opening of Price bid (Envelope 3) at a later date, informed in advance.
- II. The Bidder's representatives, who are present, shall sign a register/attendance sheet evidencing their attendance.
- III. Bidder(s), whose bids are not opened for any reason, will not be allowed to be present during bid opening.

37. EVALUATION OF BIDS

- a. Qualification of Bidder: The experience details and financial & technical capabilities of the bidder(s) shall be examined to determine whether the bidder(s) meet the Bid Qualification Criteria mentioned in the INVITATION FOR BIDS (IFB).
- b. The Owner will examine the bids to determine whether they are complete, any computational errors have been made, whether the documents have been properly signed and whether the bids are generally in order.
- c. The bids without requisite Bid Security and/or not in the prescribed proforma will not be considered and bids of such bidder Bidder(s) shall be rejected.
- d. To assist in the examination, evaluation and comparison of technical bids,



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the owner/ may, at its discretion, ask the Bidder clarifications on the bid. The request for such clarifications and the response thereto shall be in writing.

- e. Prior to the evaluation and comparison of the bid, the owner will determine the substantial responsiveness of each bid to the bidding documents. For the purpose of this Article, a substantially responsive bid is one, which conforms to all the terms and conditions of the bidding document without material deviations or reservations. A material deviation or reservation is one which affects in any substantial way the scope, quality, or performance of the works or which limits in any substantial way, inconsistent with the bidding document, the DAFFPL's rights or Bidder's obligation under the contract and retention of which deviation or reservation would affect unfairly the competitive position of other bidders presenting substantially responsive bids. The owner's determination of bid responsiveness is to be based on the contents of the bid itself without recourse to the extrinsic evidence.
- f. A bid determined as substantially non-responsive will be rejected by the Owner and shall not subsequently be allowed by the Owner to be made responsive by the Bidder by correction of the non-conformity.

Note:

- 1) **The Bid Shall be submitted in English Language Only**
- 2) **For any Document submitted in any language other than English, the translation copy in English language shall be submitted.**



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CHAPTER 3: BID-QUALIFICATION CRITERIA:

Bidders need to meet following pre-qualification criteria to qualify for short-listing as a successful vendor, who would be considered for tendering process for the job of **“Mechanical & Piping Works at DAFFPL”**

➤ **Technical Criteria:-**

- **Past Experience:** Bidder shall have experience of having successfully completed 03 similar works during last 5 years ending last day of month previous to the one in which applications are invited for either of the following:
 - ✓ **Three completed similar works of total value not less than 9.0 Lakh**
 - Or
 - ✓ **Two completed similar works of total value not less than 11.0 lakh**
 - Or
 - ✓ **One completed similar works of value not less than 17.0 lakh**
- Bidder shall submit the following documents in support of full filling the above criteria:
 - ✓ PO copy for the works done in the past, indicating value of work.
 - ✓ Completion Certificate indicating P.O No & Date from User.

➤ **Financial criteria for job :-**

- Bidder shall have minimum average annual turnover of Rs. 20 lakh as per audited financial results in the preceding three financial/calendar years. “Turnover shall mean Consolidated Turnover in case of a Bidder having wholly owned subsidiaries”

OTHER INFORMATION OF PQC

1. 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 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



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- 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.
2. Bids may be submitted by:
 - 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.
3. Fulfillment 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:
 - I. Each member in a consortium may only be a legal entity and not an individual person;
 - II. The Bid shall specifically identify and describe each member of the consortium;
 - III. 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);
 - IV. One participant member of the consortium shall be identified as the "Prime member" and contracting entity for the consortium;



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- V. 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;
 - VI. The prime member shall fulfill each eligibility criteria;
 - VII. 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
 - VIII. Prime/lead member of the Consortium and a commitment not to withdraw from the consortium;
 - IX. 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.
 - X. 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;
 - XI. No consortium member shall hold less than 25% stake in a consortium;
 - XII. Entities which are affiliates of one another are allowed to bid either as a sole bidder or as a consortium only;
 - XIII. 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 full fill 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.



CHAPTER 4: PERFORMANCE OF WORK

1. EXECUTION OF WORKS:

- a. All the works shall be executed in strict conformity with the provisions of the contract documents and with such explanatory detailed drawings, specifications, and instructions as may be furnished from time to time to the contractor by the Engineer-in-Charge whether mentioned in the contract or not. The contractor shall be responsible for ensuring that works throughout are executed in the most substantial, proper and workman like manner with the quality of material and workmanship in strict accordance with the specifications following all safety requirements of DAFFPL and as stipulated in work permits as per the directions and to the entire satisfaction of the Engineer-in-Charge.
- b. Wherever it is mentioned in the specifications that the Contractor shall perform certain work or provide certain facilities/materials, it is understood that the contractor shall do, so at his cost unless otherwise specified.
- c. The materials, design and workmanship shall satisfy the relevant Indian Standards, the Job specification contained herein and codes referred to. Where the job specification stipulate requirements in addition to those contained in the standards codes and specifications, these additional requirements shall also be satisfied.

2. COORDINATION AND INSPECTION OF WORK:

The written instructions regarding any particular job will be normally be passed by the Engineer-in-Charge or his authorized representative. A work order book / logbook will be maintained by the Contractor for each job in which the aforesaid written instructions will be entered. These will be signed by the contractor or his authorized representative by way of acknowledgment within 12 hours. The non-maintaining of the order book or non-signing by the contractor shall not preclude the contractor from complying with the instructions.

3. WORK IN MONSOON AND DEWATERING:

- a. The completion of the work may entail working in the monsoon also. The contractor must maintain a minimum labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No extra rate will be considered for such work in monsoon.
- b. During monsoon and other period, it shall be the responsibility of the contractor to keep the construction work site free from water at his own cost.

4. WORK ON SUNDAYS AND HOLIDAYS:

For carrying out work on Sundays and Holidays if needed, the contractor will approach the Engineer-in-Charge or his representative at least two days in advance



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and obtain permission in writing. No special compensation on this account will be payable.

5. GENERAL CONDITIONS FOR CONSTRUCTION AND ERECTION WORK:

- a. Place of Work: The work has to be executed at specified premises as per the tender. Contractor should apprise himself of all the conditions prevailing in such location and the restrictions placed on movement of personnel and equipment, types of equipment and tools permitted, working methods allowed etc. in the light of security and safety regulations operative in the area. The safety regulations to be complied with, by the contractor will also be provided along with the tender. No idle time wages or compensation for temporary stoppage of work or restrictions would be paid, and the rate quoted for the various items of work should cover the cost of all such contingencies and eventualities. Substantial structures and utilities exist both above ground and underground, adjacent to the work site. (The construction activity gets restrained by the existence of such structures and utilities). Special care is necessary in transportation, storage, working on equipment's and other construction activities to protect the existing features and prevent damage to any facility. Necessary protective structures barricades etc. have to be erected at various places as directed by Engineer-in-Charge. No extra payment of such protective works will be made unless specially provided in the tender.
- b. The working time or the time of work is 48 hours per week normally. Overtime work is permitted in cases of need and the Owner will not compensate the same. Shift working at 2 or 3 shifts per day may become necessary and the contractor should take this aspect into consideration for formulating his rates for quotation. No extra claims will be entertained by the Owner on this account.
- c. The contractor must arrange for the placement of workers in such a way that the delayed completing of the work or any part thereof for any reasons whatsoever will not affect their proper employment. The Owner will not entertain any claim for idle time payment whatsoever.
- d. The contractor shall submit to the Owner reports at regular intervals regarding the state and progress of work. The details and Performa of the report will mutually be agreed after the award of contract.

6. DRAWINGS TO BE SUPPLIED BY THE OWNER:

- a. Where drawings are attached with tender, these shall be for the general guidance of the contractor to enable him to visualize the type of work contemplated and scope of work involved. The contractor will be deemed to have studied the drawings and formed an idea about the work involved.
- b. Detailed working drawings on the basis of which actual execution of the work is to proceed will be furnished from time to time during the progress of the work. The contractor shall be deemed to have gone through the drawings



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supplied to him thoroughly and carefully and in conjunction with all other connected drawings and bring to the notice of the Engineer-in-Charge, discrepancies, if any, therein before actually carrying out the work.

- c. Copies of all detailed working drawings relating to the works shall be kept at the contractor's office of the site and shall be made available to the Engineer-in-Charge at any time during the contract. The drawings and other documents issued by the Owner shall be returned to the Owner on completion of the works.

7. SETTING OUT WORKS:

- a. The Engineer-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 efficient staff for the purpose and shall be solely responsible for the accuracy of such setting out.
- b. The contractor shall provide, fix and be responsible for the maintenance of all stacks, templates, level marks, profiles and other similar things and shall take all necessary precaution to prevent their removal or disturbance and shall be responsible for the consequence of such removal or disturbance should the same take place and for their efficient and timely reinstatement. The contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, distance marks and centre line marks, either existing or supplied and fixed by the contractor. The work shall be set out to the satisfaction of the Engineer-in-Charge. The approval thereof or joining in setting out the work shall not relieve the contractor of any of his responsibilities.
- c. 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. 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 in writing but such approval shall not relieve the contractor of any of his responsibilities. The contractor shall also provide all labour, material and other facilities, as necessary, for the proper checking of layout and inspection of the points during construction.

8. RESPONSIBILITY FOR LEVEL AND ALIGNMENT:

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 effectually any errors or imperfections therein. Such rectifications shall be carried out by the contractor, at his own cost, when instructions are issued to that effect by the Engineer-in-Charge.



9. MATERIALS TO BE SUPPLIED BY CONTRACTOR:

- a. 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 which will be issued by Owner and shall make his own arrangement for procuring such materials and for the transport thereof. The materials procured by the contractor shall be DAFFPL approved/specified quality.
- b. 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 material procured. Before procuring, the contractor should get the approval of Engineer-in-Charge for any material to be used for the works.
- c. Manufacturer's certificate shall be submitted for all materials supplied by the contractor. If, however, in the opinion of the Engineer-in-Charge any tests are required to be conducted on the materials supplied by the contractor, these will be arranged by the contractor promptly at his own cost.

10. MATERIALS SUPPLIED BY OWNER:

- a. If the specifications of the work provides for the use of any materials of special description to be supplied from the Owner's stores, price for such material to be charged therefore as herein after mentioned being so far as practicable for the convenience of the contractor but not so as in any way to control the meaning or effect of the contract. The contractor shall be bound to purchase and shall be supplied such materials as are from time to time required to be used by him for the purpose of the contract only. The sums due from the contractor for the value of the actual materials supplied by the Owner will be recovered from the running account bill on the basis of the actual consumption of materials in the work covered and for which the running account bill has been prepared. After the completion of the works, however, the contractor has to account for the full quantity of materials supplied to him as per relevant clauses in this document.
- b. The value of the materials as may be supplied to the contractor by the Owner will be debited to the contractor's account at the rates shown in the schedule of chargeable materials and if they are not entered in the schedule, they will be debited at cost price, which for the purpose of the contract shall include the cost of carriage and all other expenses whatsoever such as normal storage supervision charges which shall have been incurred in obtaining the same at the Owner's stores. All materials so supplied to the contractor shall remain the absolute property of the Owner and shall not be removed on any account from the site of the work, and shall be at all times open for inspection to the Engineer-in-Charge. Any such materials remaining unused at the time of completion or termination of the contract shall be returned to the Owner's



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stores or at a place as directed by the Engineer-in- Charge in perfectly good condition, at contractor's cost.

11. CONDITIONS FOR ISSUE OF MATERIALS:

- a. Materials specified to be issued by the Owner will be supplied to the contractor by the Owner from his stores/location. It shall be the responsibility of the contractor to take delivery of the materials and arrange for its loading, transport and unloading at the site of work at his own cost. The materials shall be issued between the working hours and as per the rules of the Owner framed from time to time.
- b. The contractor shall bear all incidental charges for the storage and safe custody of materials at site after these have been issued to him.
- c. Materials specified to be issued by the Owner shall be issued in standard sizes as obtained from the manufacturer.
- d. The contractor shall construct suitable godown at the site of work for storing the materials safe against damage by rain, dampness, fire, theft etc. He shall also employ necessary watch and ward establishment for the purpose.
- e. It shall be duty of the contractor to inspect the material supplied to him at the time of taking delivery and satisfy himself that they are in good condition. After the materials have been delivered by the Owner, it shall be the responsibility of the contractor to keep them in good condition and if the materials are damaged or lost, at any time, they shall be repaired and/ or replaced by him at his own cost, according to the directions of the Engineer-in-Charge.
- f. The Owner shall not be liable for delay in supply or non-supply of any materials which the Owner has undertaken to supply where such failure or delay is due to natural calamities, act of enemies, transport and procurement difficulties and any circumstances beyond the control of the Owner. In no case, the contractor shall be entitled to claim any compensation or loss suffered by him on this account.
- g. It shall be the responsibility of the contractor to arrange in time all materials required for the works other than those to be supplied by the Owner. If, however, in the opinion of the Engineer-in-Charge the execution of the work is likely to be delayed due to the contractor's inability to make arrangements for supply of materials which normally he has to arrange for, the Engineer-in-Charge shall have the right, at his own discretion, to Issue such materials If available with the Owner or procure the materials from the market or elsewhere and the contractor will be bound to take such materials at the rates decided by the Engineer-in-Charge. This, however, does not in any way absolve the contractor from responsibility of making arrangements for the supply of such materials in part or in full, should such a situation occur, nor shall this, constitute a reason for the delay in the execution of the work.



- h. None of the materials supplied to the contractor will be utilized by the contractor for manufacturing item, which can be obtained from standard manufacturer in finished form.
- i. The contractor shall, if desired by the Engineer-in-Charge, be required to execute an indemnity bond for safe custody and accounting of all materials issued by the Owner.
- j. The contractor shall furnish to the Engineer-in-Charge sufficiently in advance a statement showing his requirements of the quantities of the materials to be supplied by the Owner and the time when the same will be required by him for the works, so as to enable the Engineer-in-Charge to make necessary arrangement for procurement and supply of the material.
- k. A daily account of the materials issued by the Owner shall be maintained by the contractor indicating the daily receipt, consumption and balance in hand. This account shall be maintained in a manner prescribed by the Engineer-in-Charge along with all connected papers viz. requisition, issues etc. and shall be always available for inspection in the contractor's office at site.
- l. The contractor should see that only the required quantities of materials are got issued. The contractor shall not be entitled to cartage and incidental charges for returning the surplus materials, if any, to the stores/location where from they were issued or to the place as directed by the Engineer-in-Charge.
- m. Materials/ Equipment supplied by Owner shall not be utilized for any other purpose(s) than issued for.

12. MATERIALS OBTAINED FROM DISMANTLING:

If the contractor in the course of execution of the work is called upon to dismantle any part for reasons, the materials obtained in the work of dismantling etc. will be considered as the Owner's property and will be disposed off to the best advantage of the Owner.

13. ARTICLES OF VALUE FOUND:

All gold, silver and other materials, of any description and all precious stones, coins, treasure relics, antiquities and other similar things which shall be found in, under or upon the site, shall be property of the Owner and the contractor shall duly preserve the same to the satisfaction of the Engineer-in-Charge and shall from time to time deliver the same to such person or person indicated by the Owner.

14. DISCREPANCIES BETWEEN INSTRUCTIONS:

Should any discrepancy occur between the various instructions furnished to the contractor, his agents or staff or any doubt, arise as to the meaning of any such instructions or should there be any misunderstanding between the contractor's staff and the Engineer-in-Charge's staff, the contractor shall refer the matter immediately in writing to the Engineer-in-Charge whose decision thereon shall be final and conclusive and no claim for losses alleged to have been caused by such discrepancies



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between instructions, or doubts, or misunderstanding shall in any event be admissible.

15. ACTION WHERE NO SPECIFICATIONS ISSUED:

In case of any class of work for which there is no such specification given by the Owner 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.

16. ABNORMAL RATES:

The contractor is expected to quote rate for each item after analysis of cost involved for the completion of item/work, considering all specifications and conditions of contract. This will avoid loss of profit or gain, in case of curtailment or change of specification for any item. In case it is noticed that the rates for any item, quoted by the tenderer unusually are high or unusually low it will be sufficient cause for the rejection of the tender unless the Owner is convinced about the reasonableness of the rates on scrutiny of the analysis for such rate to be furnished by the tenderer on demand.

17. INSPECTION OF WORK:

- a. The Engineer-in-Charge / Project Management Consultant 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 / workshop where situated premises /workshops of any person, firm or corporation where work in connect with the contract may be in hand or where materials are being or are to be supplied, and the contractor shall afford or procure for the Engineer-in-Charge every facility and assistance to carry out such Inspection. The contractor shall at all time during the usual working hours and at all other time for which reasonable notice of the intention of the Engineer in-Charge or his representative to visit the works have been given to the contractor, either himself be present to receive order and instructions or post a responsible agent duly accredited in writing 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 before covering up or placing any work 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 carrying out such measurement or inspection.
- b. No materials shall be dispatched by the contractor before obtaining the approval of Engineer-in-Charge in writing. 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



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move and adopt as directed for inspection or measurement of the works by the Engine in-Charge.

18. ASSISTANCE TO THE ENGINEERS:

The contractor shall make available to the Engineer-in-Charge, free of cost necessary instruments and assistance in checking of setting out of works and taking measurement of work.

19. TESTS FOR QUALITY OF WORKS:

- a. All workmanship shall be of the respective kinds described in the contract documents and in accordance with the instructions of the Engineer-in-Charge and shall be subjected from time to time to such test at contractor's cost as the Engineer-in-Charge may direct at 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 the Engineer-in-Charge.
- b. All the tests necessary in connection with the execution of the work as decided by Engineer-in-Charge shall be carried out at the field testing laboratory of the Owner by paying the charges as decided by the Owner from time to time. In case of non-availability of test facility with the Owner, the required test shall be carried out at the cost of contractor at government or any other testing laboratory as directed by Engineer-in-Charge.
- c. If any tests are required to be carried out in connection with the work or materials workmanship not supplied by the contractor, such tests shall be carried out by the contractor as per the instructions of Engineer-in-Charge and cost of such tests shall be reimbursed by the Owner.

20. ACTION AND COMPENSATION IN CASE OF BAD WORK:

If it shall appear to the Engineer-in-Charge that any work has been executed with unsound, imperfect or unskilled workmanship or with materials of any inferior description, or that any materials or articles provided by the contractor for the execution of the work are unsound or of a quality inferior to that contracted for, or otherwise not in accordance with the contract, the contractor shall on demand in writing from the Engineer-in-Charge or his authorized representative, specifying the work, materials or articles complained of, notwithstanding that the same have been inadvertently passed, certified and paid for forthwith shall rectify or remove and reconstruct the works specified and provide other proper and suitable materials or articles at his own charge and cost, and in the event of failure to do so within a period to be specified by the Engineer-in-Charge in his demand aforesaid, the contractor shall be liable to pay compensation at the rate of 0.5% of the estimated cost of the whole work, for every week limited to a maximum of 10% of the estimated cost of the whole work, while his failure to do so shall continue and in the case of any such failure the Engineer-in-Charge may on expiry of notice period



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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 of the contractors in all respects. The decision of the Engineer-in-Charge as to any question arising under this clause shall be final and conclusive.

21. SUSPENSION OF WORKS:

The contractor shall, if ordered in writing by the Engineer-in-Charge or his representative, temporarily suspend the works or any part thereof for such period and such time as so ordered and shall not, after receiving such written order, proceed with the work therein ordered to be suspended, until he shall have received a written order to proceed therewith. The contractor shall not be entitled to claim/compensation for any loss or damage sustained by him by reason of temporary suspension of the works aforesaid. An extension of time for completion, corresponding with the delay caused by any such suspension of the works as aforesaid will be granted to the contractor, should he apply for the same, provided that suspension was not consequent to any default or failure on the part of the contractor.

22. OWNER MAY DO PART OF WORK:

Upon failure of the contractor to comply with any instructions given in accordance with the provisions of the contract, the owner has the alternative right, instead of assuming charge for entire work to place additional labour force, tools, equipments and materials on such parts of the work, as the owner may designate or also engage another contractor to carry out the work. In such cases, the owner shall deduct from the amount which otherwise might become due to the contractor, the cost of such work and materials with ten percent added to cover all departmental charges and should the total amount thereof exceed the amount due to the contractor, the contractor shall pay the difference to the owner.



CHAPTER 5: GENERAL TERMS & CONDITIONS:

1. General:

The materials and workmanship shall satisfy the relevant Indian Standards, the job specifications contained herein & codes referred to. Where the job specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.

In the absence of any standard / specification / codes of practice for detailed specifications covering any part of the work covered in this tender document, the instruction / direction of consultant engineer will be binding on the contractor.

Wherever it is stated in this tender document that a particular supply is to be effected or that a particular work is to be carried out, it shall be understood that the same shall be effected / carried out by the contractor at his cost, unless a different intention is specifically and expressly stated herein or otherwise explicit from the context.

2. Construction Program:

Monthly / weekly construction programme shall be made by the contractor. The contractor shall scrupulously adhere to these targets / programme by deploying adequate personal and construction tools and tackles. He shall also supply all materials in his scope of supply in time to achieve the targets set out in the weekly and the monthly programme.

The contractor shall give every day, a report on labour and equipment deployed along with the progress of the work done on previous day, for each category of work.

3. Construction Water and Electricity:

- Electricity will be provided by DAFFPL @ Rs. 14.50 per unit. Bidder has to make own arrangement for sub meter.
- Water for construction will not be provided by DAFFPL.

4. Safety Rules and Regulations:

All Safety rules and regulations of the terminal operator have to be followed by the contractor without fail. If any damage occurs due to negligence of safety, contractor will be held responsible for the same.

5. Tests and Inspection:

The contractor shall carry out the various tests as enumerated in the technical specifications of this tender document and the technical documents that will be furnished to him during the performance of the work. No separate payment shall be made.



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The contractor shall carry out at his cost, all the tests either on the field or through external institutions / laboratories, concerning the execution of the work and supply of materials by the contractor.

Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the contractor shall carry out the rectification at this own cost. Results of all inspection & tests shall be recorded in the inspection reports, test reports, etc., which will be approved by the Engineer-in-charge. These reports shall form part of the completion documents.

Inspection & Acceptance of works shall not relieve the contractor from any of his responsibilities under this contract.

6. **Site Cleaning:**

The contractor shall take care to clean the working site from time to time for easy access to work site and for safety. Working site should be always kept cleared to the entire satisfaction of DAFFPL.

Before handing over any work to the owner, the contractor in addition to other formalities to be observed as detailed in the document shall clear the site to the entire satisfaction of DAFFPL.

7. **Coordination with other Agencies:**

Work shall be carried out in such a manner that the work of other agencies operating at the site is not hampered due to any action of the contractor. Proper coordination with other agencies will be the responsibility of the contractor. In case of any dispute, the decision of Engineer-in-charge shall be final and binding on the contractor.

8. **DAFFPL reserves the right to accept any tender in whole and reject any or all tenders without assigning any reason. DAFFPL also reserves the right to allow public enterprises (Central/State) Price / purchase /contract / service preference as admissible under the Indian Government Policy.**

9. **BID PRICES:**

- a) Prices shall be furnished strictly in the Price Bid format of the tender document.
- b) Bidder should quote their lowest and best offered price. Prices so quoted will remain firm till satisfactory completion of order. The price will not be subjected to escalation for any reason whatsoever.
- c) Bidders quoted prices shall be deemed to include entire Specification of item and all obligations and responsibilities to be carried out / executed by



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the Bidder as per terms of tender document. It is clearly understood by the Vendor that it is for the Vendor to ascertain and assess the applicable Acts/ Regulations/ Laws etc., entirely of their own. It is also for the Vendor to ascertain and assess the applicability of taxes, duties, levies etc. In case of any difference of opinion between Vendors proposal and interpretation by any tax/assessing (or similar) authorities, on the rate or terms and conditions related to taxes and duties etc., owners liability shall be strictly as per terms/provisions of the contract based on tender document and Vendors offer.

- d) No other charges accept those mentioned in the tender document will be payable to vendor.

10. The materials should be properly packed so as to withstand all transit hazards. Materials are required to be dispatched by the vendor to the locations, on freight paid DOOR- DELIVERY CONSIGNEE COPY ATTACHED basis along with copies of Inspection release note & internal test certificates & other documents as mentioned elsewhere in this tender document.

11. TAXES & DUTIES:

- a) Bidder(s) quoted prices shall be inclusive of all taxes, duties, cess, levies etc.,
- b) The invoice should clearly mentioned that applicable Excise Duty, Education Cess or any other taxes charged and paid / payable on quoted item to enable the owner to claim MODVAT / Input credit.
- c) The statutory variation in Excise duty, Education Cess and Sales tax / VAT on finished goods and introduction of new tax, from bid due date till the contractual completion period shall be to owner account against submission of the documentary evidence. However, any increase in the rate of these taxes and duties beyond the contractual delivery period shall be to Seller account. Any decrease in the rate of these taxes and duties shall be passed on to the owner. Any additional excise duty due to increase in turn-over would be to seller account.
- d) It is for the Bidder to assess and ascertain the rate of excise duty, education Cess and sales tax/VAT applicable on quoted items. It is clearly understood that Owner will not have any additional liability towards payment of Excise Duty, Education Cess and Sales Tax/VAT which is based on Bidders wrong assessment / interpretation of applicability of such Excise Duty and/or education cess and / or Sales Tax/VAT.
- e) Successful bidder shall carry out its obligations towards services at site as mentioned in technical specifications without any extra charges.
- f) Octroi/Entry tax, if any, in the any state of India shall be directly paid by the vendor, if applicable.
- g) DAFFPL shall not be liable, in case the tax authorities assess the tax elements in a different way on account of any reason, whatsoever.
- h) Taxes and duties other than those specified in this document, if any, shall be



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included in the quoted prices and no separate reimbursement shall be made by DAFFPL.

12. Income Tax / Corporate Tax :

- a) As regards Income Tax, Surcharge on Income Tax or any other Corporate Tax payable by the Bidder for reason of the contract awarded, and / or on their expatriate personal, the Owner shall not bear any Tax liability whatsoever, irrespective of the mode of construction of contract / order. The Bidder shall be liable and responsible for payment of such tax, if attracted under the provision of Indian Income Tax Act.
- b) Bidder may note that if any tax is deductible at source as per Indian Income Tax Law, the same will be so deducted before releasing any payment to the Bidder and a TDS (Tax deducted at source) certificate will be furnished to the Bidder.
- c) Accordingly, Bidder shall have the responsibility to check and include such provision of taxes in the prices.
- d) In case of delay in delivery due to reasons attributable to Bidder, any new or additional taxes or duties levied by Statutory authorities during this period shall be borne by the Bidder.

13. EMD / BID SECURITY

- a) The bidder shall furnish, as part of his bid, a bid security in original for the amount specified in the tender document by way of pay order, bank guarantee on Rs.100/-value non-judicial stamp paper or demand draft.
- b) The bid security is required to protect the Owner against the risk of Bidders conduct, which would warrant the security forfeiture.
- c) If bid Security / EMD is in the form of bank guarantee, it shall be in the form of irrevocable bank guarantee (in the format attached) issued by any Indian Scheduled Bank (other than Co-operative Bank) will be accepted.
- d) Bid Security / EMD shall be issued in favour of M/s Delhi Aviation Fuel Facility (P) Limited, New Delhi. .
- e) Unsuccessful bidders bid security without any interest will be discharged/ returned as promptly as possible, but not later than 60 days after the expiry of the period of bid validity prescribed by the Owner.
- f) The successful bidder bid security without any interest will be discharged, upon the Bidder accepting the Contract/ Purchase Order and furnishing the Contract performance bank guarantee to DAFFPL.
- g) The bid security may be forfeited:
 - i. If a bidder withdraws his bid during the period of bid validity or
 - ii. In the case of a successful bidder, if the bidder fails or refuses to:
 - Accept the Purchase Order in accordance with agreed terms and conditions.
 - Furnish Contract performance bank guarantee as per bid document/ Purchase Order.



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- iii. Detection of submission of false / forged documents and fraud.
- h) Bid Security / EMD should be in favour of “Delhi Aviation Fuel Facility Private Limited”, payable at New Delhi and submitted to the relevant office of DAFFPL as mentioned in covering note of the tender document. Covering letter to bid Security / EMD must indicate the tender number. This is essential to have proper co-relation at a later date. The bid security / EMD shall be strictly in the form provided in the bid document before the due date & time of bid submission.
- i) Central Public Sector Undertaking of Govt. Of India are exempted from furnishing the bid security. Firms registered with NSIC/ MSME are also exempted from furnishing bid security, provided they are registered for the tendered items and up to the monetary limit they intend to quote. Provided further that they submit a copy of the current and valid registration certificate for the quoted item and monetary value along with their bid(s). Owner reserves right to verify the registration certificate provided, with relevant authorities.

14. CONTRACT PERFORMANCE BANK GUARANTEE [CPBG]

- a) As a Performance security, the successful Bidder, to whom the work is awarded by, shall be required to furnish within 30 days of notification of award of contract (Letter/ Fax/e-mail of Intent) a Performance Bank Guarantee on RS.100/- VALUE non-judicial stamp paper in favour of the Owner (M/S DAFFPL).
- b) The Bank Guarantee amount shall be equal to TEN PERCENT (10%) of the Total Order Value and it shall guarantee the faithful performance of the Order in accordance with the Terms and conditions specified in the documents and specifications.
- c) CPBG shall be in the form of an irrevocable Bank Guarantee (in the format attached) issued by any Indian Scheduled Bank (other than Co-operative Bank).
- d) The Bank Guarantee shall be valid for the entire period of the Contract, namely, till the end of the guarantee / warranty period. The guarantee amount shall be payable on demand to the Owner.
- e) In case, the Contract Performance Bank Guarantee stated above gets reduced/ deducted for reasons of non-fulfillment of any Contractual obligations upto the completion of guarantee period, the bidder shall immediately take action to increase the value of Bank Guarantee to TEN PERCENT (10%) of the Contract price, to cover his guarantee/warranty obligations.
- f) The Performance Guarantee will be returned to the bidder without any interest at the end of the warranty / guarantee period subject to fulfillment of



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all contractual obligations by the Bidder. The bank guarantee shall have a claim period of 3 months beyond the contractual guarantee period.

- g) The proceeds of performance security shall be appropriated by the owner as compensation for any loss resulting from vendor's failure to complete his obligations under the contract to the prejudice to any of the rights or remedies the owner may be entitled to as per terms and conditions of contract. The proceeds of this performance security shall also govern the successful performance of goods and services and vendors all obligations during the entire period of contractual warrantee / guarantee.

15. PRICE REDUCTION FOR DELAY IN DELIVERY:

- a) The completion period quoted must be realistic & specific. The inability of successful bidder to execute orders in accordance with the agreed completion schedule will entitle DAFFPL, at its options, to:
- b) Accept delayed delivery at prices reduced by a sum equivalent to half percent (0.5%) of the value of any goods not delivered for every week of delay or part thereof, limited to a maximum of 10% of the total order value. Date of completion of work shall be considered for calculation of price reduction
- c) The price reduction clause shall become applicable for works done beyond the schedule completion period of six months.

16. INSURANCE

Supplier shall carry and maintain any and all statutory insurance(s) required under Indian Laws and Regulations, including Workmen compensation Act/ESI/Third party liabilities etc. and insurances for their personnel engaged in performance of the work at their own cost.

17. INSPECTION:

- a) Material / construction shall be inspected by owner or its representative. Charges other than third party inspection, is entirely vendor responsibility and in no way should affect the completion schedule.
- b) OWNER may, at its own expense, witness any test or inspection. In order to enable OWNER to witness the tests/inspections OWNER will advise the bidder in advance whether it intends to be present at any of the inspections.
- c) Even if the inspection and tests are fully carried out, the Vendor shall not be absolved from its responsibilities to ensure that the Material(s), raw materials, components and other inputs are supplied strictly to conform and comply with all the requirements of the Contract at all stages, whether during manufacture and fabrication, or at the time of Delivery as on arrival at site and after its erection or start up or consumption, and during the defect liability period. The inspections and tests are merely intended to prima-facie satisfy OWNER that the Material(s) and the parts and components comply with the requirements of the Contract. The Vendor s responsibility shall also



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not be anywise reduced or discharged because OWNER or OWNER s representative(s) or Inspector(s) shall have examined, commented on the Vendor s drawings or specifications or shall have witnessed the tests or required any chemical or physical or other tests or shall have stamped or approved or certified any Material(s).

- d) Although material approved by the Inspector(s), if on testing and inspection after receipt of the Material(s) at the location, any Material(s) are found not to be in strict conformity with the contractual requirements or specifications, OWNER shall have the right to reject the same and hold the Vendor liable for non-performance of the Contract.

18. GUARANTEE/WARRANTY:

- a) Materials shall be guaranteed against manufacturing defects, materials, workmanship and design for a period of 12 months from the date of commissioning. Warranty for replacement of material / accessories should be provided free of charges at our premises. The above guarantee/warranty will be without prejudice to the certificate of inspection or material receipt note issued by us in respect of the materials.
- b) All the materials including components and sub contracted items should be guaranteed by the vendor within the warranty period mentioned above. In the event of any defect in the material, the vendor will replace / repair the material at DAFFPL concerned location at vendor risk and cost on due notice.
- c) Alternatively, DAFFPL reserves the right to have the material repaired / replaced at the locations concerned, at the vendors risk, cost and responsibility, in case, vendor does not replace / repair the material.
- d) The Vendor shall provide similar warrantee on the parts, components, fittings, accessories etc. so repaired and / or replaced.
- e) Vendor shall guarantee that the performance of the EQUIPMENT supplied under the CONTRACT shall be strictly in conformity with the specifications and shall perform the duties specified under the CONTRACT.
- f) **RISK PURCHASE CLAUSE:** We reserve the right to curtail or cancel the order either in full or part thereof if bidder fails to comply with delivery schedule and other terms & conditions of the order. DAFFPL also reserves the right to procure same or similar materials/equipment through other sources at vendor's entire risk, cost and consequences.

19. TEST & PERFORMANCE CERTIFICATES: Bidder shall furnish Material test and Performance Certificates for the materials along with the challans and invoice.

20. PAYMENT TERMS: The payment terms given below are subjected to the following conditions:



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- Monthly progressive payments shall be made towards the work completed as per the payment terms and as per agreed rates, against running account bills submitted by the contractors.
 - Payment will be released within 30 Days from the date of receipt of Invoice.
 - There will be a deduction of 10% towards retention amount from every running account bill which may be released against equivalent performance bank guarantee on completion of jobs.
- **CIVIL & Miscellaneous**
- **90% on completed individual item of work.**
 - **10% on completion of all and final acceptance by site-in-charge**
- **Mechanical**
- **Structural Steel Works**
 - ✓ **60% after supply, inspection, acceptance of material and fabrication**
 - ✓ **20% after erection and welding**
 - ✓ **20% on completion of all works and final acceptance by site-in-charge**
 - **Fittings**
 - ✓ **60% after supply, installation and acceptance by site-in-charge**
 - ✓ **20% after erection and welding**
 - ✓ **20% on completion of all works and final acceptance by site-in-charge**
 - **Piping**
 - ✓ **50% after completion of fabrication**
 - ✓ **30% on completion of erection including provision of supports, vents, drains etc., alignment and welding including completion of radiography and other examinations as specified.**
 - ✓ **20% after lines are pressure tested and finally accepted in all respects by site-in-charge**

21. Only in the event of causes of Force Majeure occurring within the contractual delivery period and if they impede the performance of contract, the delivery dates shall be extended on receipt of application from the bidder / Owner without imposition of penalty. Only those causes which depend on natural calamities, civil wars, fire and national strikes which have duration of more than seven consecutive calendar days are considered the causes of force Majeure. The decision of Owner shall be final and binding on vendor.

22. The Vendor must advise the Owner by a registered letter duly certified by Local Chamber of Commerce or statutory authorities and Owner must advise the Vendor by a letter, the beginning and the end of the delay immediately, but in no case later than within 10 days of the beginning and end of such causes of Force Majeure



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- condition as defined above. Provided further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any such event for period exceeding 60 days either party may at its option terminate the contract.
23. Repeat Order: DAFFPL reserves the right to place repeat order up to the order quantity within SIX MONTHS from the date of original order on mutual agreement basis.
24. Any reference to the Govt. Acts /Regulations etc. in the Bid Document is only indicative, and it is entirely for the bidder to ascertain the applicable Acts/Regulations.
25. Rejected material lying in Owner premises must be replaced within 60 days from date of final report on rejection of material.
26. RECOVERY OF SUMS DUE: Whenever, any claim against bidder for payment of a sum of money arises out of or under the contract or in any other form, the owner shall be entitled to recover such sums from any sum then due or when at any time thereafter may become due from the vendor under this or any other form and should this sum be not sufficient to cover the recoverable amount of claim(s), the vendor shall pay to DAFFPL on demand the balance remaining due.
27. PATENTS & ROYALTIES: The vendor shall fully indemnify owner and users of materials specified herein/supplied at all times, against any action, claim or demand, costs and expenses, arising from or incurred by reasons of any infringement or alleged infringement of any patent, registered design, trademark or name, copy right or any other protected rights in respect of any materials supplied or any arrangement, system or method of using, fixing or working used by the vendor. In the event of any claim or demand being made or action sought against Owner in respect of any of the aforesaid matter, the vendor shall be notified thereof immediately and the vendor shall at his/its own expense with (if necessary) the assistance of Owner (whose all expense shall be reimbursed by the vendor) conduct all negotiations for the settlement of the same and/or litigation which may arise thereof.
28. LIABILITY CLAUSE: In case where it is necessary for employees or representatives of the Vendor to go upon the premises of owner, vendor agrees to assume the responsibility for the proper conduct of such employees/representatives while on said premises and to comply with all applicable Workmen s Compensation Law and other applicable Government Regulations and Ordinances and all plant rules and regulations particularly in regard to safety precautions and fire hazards. If this order



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requires vendor to furnish labour at site, such vendors workmen or employees shall under NO circumstances be deemed to be in owner s employment and vendor shall hold himself responsible for any claim or claims which they or their heirs, dependent or personal representatives, may have or make, for damages or compensation for anything done or committed to be done, in the course of carrying out the work covered by the purchase order, whether arising at owner s premises or elsewhere and agrees to indemnify the owner against any such claims, if made against the owner and all costs of proceedings, suit or actions which owner may incur or sustain in respect of the same.

29. **COMPLIANCE OF REGULATIONS:** Vendor warrants that all goods/Materials covered by this order have been produced, sold, dispatched, delivered and furnished in strict compliance with all applicable laws, regulations, labour agreement, working condition and technical codes and statutory requirements as applicable from time to time. The vendor shall ensure compliance with the above and shall indemnify owner against any actions, damages, costs and expenses of any failure to comply as aforesaid.
30. **REJECTION, REMOVAL OF REJECTED GOODS AND REPLACEMENT:** In case the testing and inspection at any stage by inspectors reveal that the equipment, materials and workmanship do not comply with specification and requirements, the same shall be removed by the vendor at his/its own expense and risk, within the time allowed by the owner. The owner shall be at liberty to dispose off such rejected goods in such manner as he may think appropriate. In the event the vendor fails to remove the rejected goods within the period as aforesaid, all expenses incurred by the owner for such disposal shall be to the account of the vendor. The freight paid by the owner, if any, on the inward journey of the rejected materials shall be reimbursed by the vendor to the owner before the rejected materials are removed by the vendor. The vendor will have to proceed with the replacement of the equipment or part of equipment without claiming any extra payment if so required by the owner. The time taken for replacement in such event will not be added to the contractual delivery period.
31. **NON-WAIVER :** Failure of the Owner to insist upon any of the terms or conditions incorporated in the Purchase Order or failure or delay to exercise any rights or remedies herein, or by law or failure to properly notify Vendor in the event of breach, or the acceptance of or payment of any goods hereunder or approval of design shall not release the Vendor and shall not be deemed a waiver of any right of the Owner to insist upon the strict performance thereof or of any of its or their rights or remedies as to any such goods regardless of when such goods are shipped, received or accepted nor shall any purported oral modification or revision of the order by DAFFPL act as waiver of the terms hereof. Any waiver to be effective must be in writing. Any lone incident of waiver of the any condition of this agreement by DAFFPL shall not be considered as a continuous waiver or waiver for other condition by DAFFPL.



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32. NEW & UNUSED MATERIAL: All the material supplied by the vendor shall be branded new, unused and of recent manufacture.

33. CANCELLATION:

- a) DAFFPL reserves the right to cancel the contract/purchase order or any part thereof through a written notice to the vendor if –
 - i. The vendor fails to comply with the terms of this purchase order/contract.
 - ii. The vendor becomes bankrupt or goes into liquidation.
 - iii. The vendor fails to deliver the goods on time and/or replace the rejected goods promptly.
 - iv. The vendor makes a general assignment for the benefit of creditors.
 - v. A receiver is appointed for any of the property owned by the vendor.
 - vi. Any other conditions where owners commercial interest get affected.
- b) Upon receipt of the said cancellation notice, the vendor shall discontinue all work on the purchase order matters connected with it. DAFFPL in that event will be entitled to procure the requirement in the open market and recover excess payment over the vendor s agreed price if any, from the vendor and also reserving to itself the right to forfeit the security deposit if any, made by the vendor against the contract. The vendor is aware that the said goods are required by DAFFPL for the ultimate purpose of materials production and that non-delivery may cause loss of production and consequently loss of profit to the DAFFPL. In this-event of DAFFPL exercising the option to claim damages for non-delivery other than by way of difference between the market price and the contract price, the vendor shall pay to DAFFPL, fair compensation to be agreed upon between DAFFPL and the vendor. The provision of this clause shall not prejudice the right of DAFFPL from invoking the provisions of price reduction clause mentioned aforesaid.

34. ANTI –COMPETITIVE AGREEMENTS/ABUSE OF DOMINANT POSITION : The Competition Act, 2002 as amended by the Competition (Amendment) Act, 2007 (the Act), prohibits anti- competitive laws and aims at fostering competition and at protecting Indian markets against anti- competitive practices by enterprises. The Act prohibits anti- competitive agreements, abuse of dominant position by enterprises, and regulates combinations (consisting of acquisition, acquiring of control and M&A) wherever such agreements, abuse or combination causes, or is likely to cause, appreciable adverse effect on competition in markets in India. DAFFPL reserves the right to approach the Competition Commission established under the Act of Parliament and file information relating to anti-competitive agreements and abuse of dominant position. If such a situation arises, then Vendors are bound by the decision of the Competitive Commission and also subject to penalty and other provisions of the Competition Act.



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35. **ASSIGNMENT:** The Vendor can / does not have any right to assign his rights and obligations under these general purchase conditions without the prior written approval of DAFFPL.
36. **GOVERNING LAW:** These General Purchase Conditions shall be governed by the Laws of India.
37. **AMENDMENT:** Any amendment to these General Purchase Conditions can be made only in writing and with the mutual consent of the parties to these conditions.
38. The following expressions used in these terms and conditions and in the purchase order shall have the meaning indicated against each of these:
- OWNER,** Client, Purchaser, buyer : means DAFFPL
 - VENDOR,** tenderer, Bidder, Contractor, Seller, Supplier, manufacturer stated anywhere in the tender document carry the same meaning: It means the person, firm or the Company / Corporation to bidding and shall include its successors and assigns.
 - INSPECTOR/ TPIA:** Person/agency deputed by Owner for carrying out inspection, checking/testing of items ordered and for certifying the items conforming to the purchase order specifications..
 - GOODS / MATERIALS:** means any of the articles, materials, machinery, equipments, supplies, drawing, data and other property and all services including but not limited to design, delivery, installation, inspection, testing and commissioning specified or required to complete the order.
 - SITE / LOCATION:** means any Site where DAFFPL desires to receive materials anywhere in India as mentioned in tender
 - CONTRACT,** Order or Purchase Order/CALL-OFF means the agreement for supply of goods/ materials for required quantity between Owner and Vendor, for a fixed period of time on mutually agreed terms and conditions.
 - The term MR means Material Requisition containing technical requirements and scope of work (technical), GPC means General Purchase Conditions containing commercial terms & conditions, PO means Purchase order issued after award of contract incorporating agreed deviations in MR, ATC means Agreed Terms & Conditions , RFQ means Request For Quotation.
 - For the purpose of contract, the trade terms FOB, CFR and CIF, DAP shall have the meanings as assigned to them by INCOTERMS 2010 published by ICC, Paris.

39. REFERENCE FOR DOCUMENTATION :

The number and date of Collective Request for Quotation (CRFQ) must appear on all correspondence before finalization of Contract / Purchase Order.

After finalization of Contract / Purchase Order: The number and date of Contract /Purchase Order must appear on all correspondence, drawings, invoices, dispatch



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advices, (including shipping documents if applicable) packing list and on any documents or papers connected with this order.

40. ARBITRATION

- a) Any 'dispute or difference of any nature whatsoever, any claim, cross-claim, counterclaim or set off of the Owner against the Consultant or regarding any right, liability, act, omission or account of any of the parties hereto arising out of or in relation to this agreement shall be referred to the Sole Arbitration of the nominated Director of the Owner or of some Officer of the Owner who may be nominated by the nominated Director. The consultant will not be entitled to raise any objection to any such arbitrator on the ground that the arbitrator is an officer of the Owner or that he has dealt with the matters to which the contract relates or that in the course of his duties as an Officer of the Owner, he had expressed view on all or any other matters in dispute or difference. In the event of the arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, the nominated Director as aforesaid at the time of such transfer, vacation of office or inability to act may in the discretion of the nominated Director designate another person to act as arbitrator in accordance with the terms of the agreement to the end and intent that the original Arbitrator shall be entitled to continue the arbitration proceedings notwithstanding his transfer or vacation of office as an officer of the Owner if the nominated Director does not designate another person to act as arbitrator on such transfer, vacation of office or inability of original arbitrator. Such person shall be entitled to proceed with the reference from the point at which it was left by his predecessor. It is also a term of this contract that no person other than the nominated Director of the Owner or a person nominated by such nominated Director as aforesaid shall act as arbitrator hereunder. The award of the arbitrator so appointed shall be final, conclusive and binding on all parties to the agreement subject to the provisions of the Arbitration & Conciliation Act, 1996 or any statutory modification or reenactment thereof and the rules made there under for the time being in force shall apply to the arbitration proceedings under this clause.
- b) The arbitrator shall have power to order and direct either of the parties to abide by, observe and perform all such directions as the arbitrator may think fit having regard to the matters in difference i.e. dispute, before him. The arbitrator shall have all summary powers and may take such evidence oral and/or documentary, as the arbitrator in his absolute discretion thinks fit and shall be entitled to exercise all powers under the Indian Arbitration & Conciliation Act 1996 including admission of any affidavit as evidence concerning the matter in difference i.e. dispute before him.



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- c) The parties against whom the arbitration proceedings have been initiated, that is to say, the Respondents in the proceeding, shall be entitled to prefer a cross claim, counter claim or set off before the Arbitrator in respect of any matter in issue arising out of or in relation to the Agreement without seeking a formal reference of arbitration to the nominated Director/officer for such counter-claim, or set off and the Arbitrator shall be entitled to consider and deal with the same as if the matters arising therefore has been referred to him originally and deemed to form part of the reference made by the nominated Director/officer.
- d) The arbitrator shall be at liberty to appoint, if necessary any accountant or engineering or other technical person to assist him, and to act by the opinion so taken.
- e) The arbitrator shall have power to make one or more awards whether interim or otherwise in respect of the dispute and difference and in particular will be entitled to make separate awards in respect of claims of cross claims of the parties.
- f) The arbitrator shall be entitled to direct any one of parties to pay the costs to the other party in such manner and to such extent as the arbitrator may in his discretion determine and shall also be entitled to require one or both the parties to deposit funds in such proportion to meet the arbitrators expenses whenever called upon to do so.
- g) The parties hereby agree that the courts in the city of Delhi alone shall have jurisdiction to entertain any application or other proceedings in respect of anything arising under this agreement and any award or awards made by the Sole Arbitration hereunder shall be filed (if so required) in the concerned courts in the city of Delhi only.



Tender for Mechanical & Piping Work

Modernization of existing Fuel farm facility

October 2015

Delhi Aviation Fuel Facility Pvt. Ltd.



Tender for Mechanical & Piping Work

Modernization of existing Fuel farm facility

October 2015

Delhi Aviation Fuel Facility Pvt. Ltd.

Aviation Fuelling Station, Shabad, Muhammad Pur, IGI-Airport, New Delhi-110061

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
P1	29/07/2015	DEM/Nirav	VNP/SG	VST	For Approval
A	06/08/2015	DEM/Nirav	VNP/SG	VST	For Tender
B	22/09/2015	DEM/Nirav	VNP/SG	VST	For Tender
C	16/10/2015	DEM/Nirav	VNP/SG	VST	For Tender

Information class: Standard

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1 General

1.1 General

Existing Fuel Farm, of Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL) for refueling the aircrafts at IGI Airport, New Delhi, is slated for modernization and up-gradation so as to conform to International Standards for receipt, storage and dispensing of Jet A1 fuel.

At DAFFPL fuel farm, Jet A1 fuel is brought through aboveground/underground pipe from Oil Terminals of IOCL and BPCL and also by road tanker. This fuel is stored in the Cone Roof Vertical Tanks installed in the fuel farm. Presently, the aircrafts are being refueled by hydrant pumps through fuel underground Jet A1 fuel hydrant pipe line.

This document specifies the minimum acceptable requirements set by the Owner for design, engineering, procurement, fabrication, assembly, inspection, testing, commissioning and delivery to site of piping materials, valves, Jet A1 Sampling equipment (free issue), electric motor duly coupled to Centrifugal Pumps for its installation and modification of Jet A1 fuel piping network within the Fuel Farm of DAFFPL, IGI Airport, New Delhi.

1.2 Summary

This specification for the items as per Sub-Para Para 1.1 'General' describes the minimum acceptable parameters for factory and field installed equipment. It should be the aim not to deviate from good engineering practice, and, in the absence of specifications, good engineering practices will prevail, utilising first quality materials and workmanship.

1.3 Qualification Criteria

- Bidder in the last five years should have engineered/ constructed/ fabricated/ erected, tested, commissioned the similar work as mentioned in tender.
- Bidder shall be required to submit the documentation and proof for above requirements and purchasers may at his discretion make additional checks for the same.
- Bidder shall employ only such workers and supervisors who have considerable experience of similar work and who can work, temperamentally in good harmony and co-operation.

1.4 Definitions

- | | |
|------------------|---|
| ▪ Owner | Delhi Aviation Fuel Facility Limited, (DAFFPL) |
| ▪ Consultant | Mott MacDonald Pvt. Ltd., NOIDA, UP |
| ▪ Contractor | Party selected for supply, fabrication and commissioning of above work. |
| ▪ "Must / Shall" | Indicates a mandatory requirement. |
| ▪ "Should" | Indicates a preferred course of action. |
| ▪ "May" | Indicates one acceptable course of action. |

1.5 Compliance

Compliance by the Contractor with this specification shall not relieve him of his responsibilities to supply the Package to meet the specified requirements of mandatory codes and standards.

Where there is a conflict between the Owner's/Consultant's supplied documents and referenced / mandatory specifications, the more onerous shall apply.

The Contractor shall notify the Owner/Consultant in writing, of any proposed deviation from these specifications or associated data sheets. The Owner's/Consultant's decision in respect of concession requests will be final.

1.6 Quality Assurance

It is mandatory that the Vendor shall demonstrate to the entire satisfaction of the Purchaser that his activities within the scope of this document are in accordance with the relevant section of BS EN ISO 9001. The Vendor shall submit to the Purchaser for review and approval, a Quality Plan and procedural specifications prior to commencement of work. The Quality Plan shall define all sub – Vendor's involvement in the work. The review in this Specification shall only indicate a general requirement and shall not relieve the Vendor of his obligations to comply with the requirements of the Contract.

1.7 Safety

All work shall be performed in accordance with the safety requirements listed in the contract documentation and any mandatory standards and legislation.

1.8 Codes & Standards

A reference invokes the latest published issue or amendment unless stated otherwise.

Referenced standards may be replaced by equivalent internationally or otherwise recognised Standards provided that it can be shown to the satisfaction of the Owner/Consultant that they meet or exceed the requirements of the latest edition of the referenced standards.

All standards, Codes or Specifications proposed by the Contractor shall be the latest issue of internationally recognised, and agreed with the Owner/Consultant before implementation.

- API 6D Specifications for Pipe Line Valves
- API 6FA, 6FB & 6 FC Specification For Fire Test of Valves.
- API Std. 607 Fire Test for Soft-Seated Quarter Turn Valves.
- API Std. 598 Valve Inspection & Testing.
- ANSI B16.104 Shut Off Leakage For Valves.
- MSS SP -110 Ball Valves Threaded, Socket - Welding, Solder Joint, Grooved.
- MSS SP – 72 Ball Valves with Flange or Butt-Welding Ends For General Service

- | | |
|---------------------------------|---|
| ▪ ASME B31.3 | Process piping. |
| ▪ ASME B16.34 | Valves – Flanged, Threaded and Weld Ended. |
| ▪ ASME B16.5 | Steel Pipe Flanges and Flange Fittings. |
| ▪ ASME B16.11 | Forged Steel Fittings, Socket-Welding and Threaded. |
| ▪ ASME B16.20 | Metallic Gaskets for Pipe Flanges, Ring-Joint, Spiral Wound. |
| ▪ ASTM A193 | Standard Specification for Alloy-Steel and Stainless Steel Bolting. |
| ▪ ASTM A194 | Standard Specification for Carbon and Alloy Steel Nuts for Bolts . |
| ▪ ISO 9001 | Quality management system. |
| ▪ BS 5352 | Forged Small Size Check Valves. |
| ▪ MSS SP-42 | Class 150 Corrosion Resistant Check Valves Flanged & Butt-Weld |
| ▪ API 5L | Specifications for Line Pipe. |
| ▪ IEC 60034 | Rotating Electrical Machines |
| ▪ IEC 60072 | Dimensions and Output Series For Rotating Electrical Machines |
| ▪ NFPA | National Electrical Code |
| ▪ NEMA MG-1 | Motors and Generators |
| ▪ UL 1004 | Electric Motors |
| ▪ NETA ATS-99 | International Electrical Testing Association |
| ▪ IEC 60079 | Electrical apparatus for explosive gas atmospheres |
| ▪ ATEX | Directive 94/9/EC |
| ▪ Low Voltage Directive | 73/23/EEC & 93/68/EEC |
| ▪ Machinery Directive | 89/392/EEC, 91/368/EEC, 93/44/EEC & 93/68/EEC |
| ▪ Electromagnetic Compatibility | 89/336/EEC, 92/31/EEC & 93/68/EEC |
| ▪ API 1104 | Welding of Pipe Line & Related Facilities. |
| ▪ ASME Section IX | Welding Procedure and Welder Qualification |

1.9 Environmental Conditions

1.9.1 Location

The site is located at Shahbad Mohammadpur adjoining to Indira Gandhi International Airport, New Delhi. The site is approachable by road.

1.9.2 Topography

The whole Site is levelled surface, with a nominal gradual slope.

1.9.3 Climatic Conditions

DAFFPL Fuel Farm, IGI Airport, New Delhi (Palam) has a tropical desert climate with high humidity. The highest maximum humidity (up to 100%) occurs during July - August. The highest temperature occurs between May and June. At the time of maximum temperature, the maximum relative humidity is 40%.

1.9.4 Environmental Design Parameters

The weather conditions are extreme at the location. IGI Airport is situated on the co-ordinates 28.6139° N and 77.2089° E. The following meteorological information is set out here for general guidance:

1.9.4.1 Temperature & Pressure:

- | | |
|---------------------------------|---------------------------------|
| ▪ Altitude | - 237 m |
| ▪ Operating Maximum Temperature | - 48.4° C |
| ▪ Operating Minimum Temperature | - (-) 2.2° C |
| ▪ Humidity Maximum | - 100 % |
| ▪ Humidity Minimum | - 25 % |
| ▪ Maximum Rainfall | - 20-30 mm in one hour duration |
| ▪ Design Wind Velocity | - 47 m/s |
| ▪ Barometric Pressure | - 0.98 bar |
| ▪ Seismic Zone | - Zone IV as per IS: 1893 |

1.9.5 Design Temperature

The Maximum Design is considered as 60°C. This is an appropriate margin above the Maximum Operating Temperature of 48.4° C.

1.9.6 Site Visit by Contractor

The Contractor shall visit the site, before quoting for this work, so as to get himself acquainted with site conditions, logistics, approach etc. No delay whatsoever shall be entertained on this account. Any approval by the Consultant/Owner shall not relieve the Contractor of his responsibilities to meet the requirements of the tender.

2 Scope of Work

2.1 GENERAL

The bidder/ contractor shall refer to this tender document for detailed scope of work. It is contractor's responsibility to execute the job in all respects as per detailed drawings, documents / specification furnished by consultant / owner and as per applicable codes, standards & in line of statutory requirements.

The field circumstances shall also be taken into consideration and methods suitable to the site conditions shall be adopted with concurrence of the Engineer-in-charge and in line with manuals, instructions of respective equipment and specified codes and standards. The successful accomplishment of the project is greatly influenced by the team work, workmanship of the workers and supervisors.

The Contractor shall employ only such workers and supervisors who have considerable experience of similar work and who can work, temperamentally in good harmony and co-operation.

For satisfactory completion of the job, the contractor need to supply and include cost of all other materials not Limited to tools & tackles and consumables like "welding electrodes wire, flux, gases, gaskets, hardware, material handling equipment, pipe, flanges, structural material, venting devices, paints, erection materials, scaffolding, bending and cutting machine, girth welding machines, oxygen, acetylene, grease, oils, tools, tackles, hoist/crane, jacks, instruments, etc."

The scope of work of the bidder is in general and shall include not limited to following that mentioned in this document. The bidder shall also be required to carry out the jobs that are not listed here but required for completion of the job in all respects as per the specifications, standards, drawings, As built drawings, O&M manuals, erection, commissioning and testing methodology encodes, quality assurance plan and instructions of Engineer-in Charge and Quality Control- in-Charge, whether specifically mentioned in the drawing or not.

Loading, handling and transportation of all materials Including Free Issue materials from supply point / store of work site / Contractor's store. Removal of vegetation, levelling of the ground, providing hard standing on the ground for fabrication yard at Site is in Contractor's scope and at his scope. Proper shed for welding, surface preparation and painting is also in Contractor scope and at his cost.

The scope of work not Limited to the following includes execution of work within the boundaries DAFFPL's Fuel Farm:

2.1.1 Tank Farm Area

- a. Presently, different size and type of valves are fitted on the inlet and outlet nozzle of Jet A1 fuel storage vertical cylindrical tanks. These valves should be replaced with DAFFPL's supplied (Free Issue Material – FIM). These valves are Remote Operated Shut Off Valve (ROSOV), Triple Off Set Butterfly Valves will be as tank body valves.
- b. Dismantling, service, maintenance, overhauling, inspection & performance checking and re fitting of existing Motorized Butter Fly Valves (24" 6 Nos. & 10" 6 Nos., MOC: CS). Changing of existing Sealing material and parts if any during maintenance of valves. Rate for replacement of parts shall be calculated as actual.

- c. Dismantling of existing metallic bellows, fabricate and fix spool piece to bridge the gap created in piping system due to removal of metallic bellow.
- d. Jet A1 fuel piping work, includes opening the existing valve/flange joints, collecting the Jet A1 fuel, degassing the pipes to eliminate fuel vapours, re-fabricating aligning, welding, testing and painting all complete.
- e. To install Closed Circuit Fast Flusher & Sampling System (Free Issued Material – FIM) for each tank including supply, fabrication, aligning, welding of SS 316 piping. After observation of the ATF samples, ATF to be transferred by gravity into product recovery tank.
- f. Modification in existing nozzles / fabrication and testing of new nozzles in existing tanks.
- g. Supply, fabrication, aligning, welding, erection, clamping, testing of SS 316 piping for drawing/taking ATF Sample from Top, Middle & Bottom Fuel Levels in Storage Tanks. These pipe lines will be manifolded and connected to Product Recovery UG tank through Aljac Sample Testing Equipment.
- h. Supply, installation & erection of miscellaneous items like valves, hoses, clamps, fittings, etc shall be as per site requirement.
- i. To provide piping of oily water/strom water transfer from collection pit to drain trench (OWS / Strom Water Line) through pumps as per data provided by Consultant/Owner. Supply & installation of all accessory pipes, pumps, valves etc. are in the scope of piping contractor.
- j. The Contractor should ensure technical feasibility of their tender offer, after inspecting the site. It must be understood that the Contractor shall be required to Supply & execute/s every such items of work which is considered necessary for satisfactory performance of the pump sets, though such items is required are not specified in the tender documents.

2.1.2 ATF Hydrant Pump

- a. Installation of 6 Nos. ATF Hydrant Pump (Free issued Material-FIM) including supply, fabrication, aligning, welding, testing of piping and to be connected to existing discharge & suction pipe line.
- b. Necessary civil foundation work shall be in the scope of other contractor.

2.2 PIPING

2.2.1 Category-I (Pump Erection)

It includes installation / erection & Commissioning of pump on foundation, positioning, levelling, and aligning as per required specifications.

It shall be contractor's responsibility for dynamic balancing (alignment) of rotating Equipment.

It also comprises Testing, inspection, commissioning and handing over of complete work as per Drawings & Documents such as Equipment Layout, Piping drawings, P & I Diagrams, Specifications, As built drawings etc.

2.2.2 Category-II (Piping - CS / SS / HDPE)

It includes Design, Engineering, Procurement/Supply, Construction/ installation / erection / Fabrication, Flushing, Blowing, carbon blasting, inspection & Testing, Painting, insulation (if required) and commissioning, etc. of all piping work & Installation of valves including MOV's and all field instruments, special items like installation of strainers, Tee's, filter etc. as per drawings, Documents & specifications furnished by owner / consultant or as required at site.

The piping work also includes supply of materials apart from FIM (Free Issue Material) and any other components to complete the work in all respects.

The work also comprised of Installation of structural Pipe Rack if required, pipe support fabrication and erection including fixing of supports to concrete surfaces by anchor fasteners etc. as per piping drawings, support details and civil / structural details furnished by consultant / owner. In case of unavailability of any details or site construction, the contractor shall furnish the drawings / documents for approval before erection.

In addition to above mentioned but not limited to the scope of work also includes

- Supply and Transportation of all material from owners / contractor's storage to site, unloading at site, storage /safe custody at site.
- Flushing, Blowing, Drying and Testing of Piping Systems.
- Hydro test **Not Permitted** for Jet A1 pipes. DP test, Radiography & pneumatic test permitted.
- Fabrication, testing and erection of any special from pipe required at site including reducers & branch connections from plates / pipes & pipe supports as per drawings and specifications.
- The contractor shall carry out all modifications and provide additional cleats, if required.
- Any additional test like radiography, DP test etc. shall also be carried out, if required by Engineer in charge / tender specifications.
- The contractor shall make provision of labour, tools and tackles for preparation of equipment for trial runs and to assist during commissioning.
- Contractor shall bear cost of repair, changes, replacement etc. caused due to noncompliance with Standards / Codes / instructions given by Engineer in charge / tender specifications.
- Jet A1 Piping 1/2" to 4" NB shall be SS 316L. 6" NB & above shall be CS API 5L, Gr B (PSL 2).
- Due to inadequacy of facility for internal epoxy lining of CS pipes upto 4" NB, Jet A1 fuel CS piping & pipe fittings of 6" NB & above, shall be bought internally Epoxy coated (Refer Table: 4.1 of Clause No. 4.2.3 for details of internal epoxy coating).

2.3 DEVIATION

All deviation in the specification shall be categorically stated and the same shall be taken to be a complying case and no deviation whatsoever shall be accepted at a later date. Hence it is in the interest of the "Contractor's" that they highlight the deviations in a separate document titled "Deviations to Specifications".

Any offer which does not highlight deviations and if deviations are detected during the course of evaluation is liable to be summarily rejected.

2.4 CHANGES IN SCOPE OF WORK

Owner shall be free to alter, add to or delete any part of the job without any compensation to the Contractor, in case the Contractor fails to provide sufficient labour / materials under his scope for the execution and completion of the work on schedule as per Owner's assessment.

3 Scope of Supply

3.1 CENTRIFUGAL PUMP (OWS in Tank Farm Area)

Supply of Centrifugal Pump as per Data Sheet No.: **DAFFPL-MMD-322538-RSD-03**
& Technical Specification No.: **322538-RSD-103**

3.2 PIPING

3.2.1 List of materials to be supplied by contractor

Unless otherwise specified in above categories, the scope of work includes supply of items Not Limited to following. It is contractor's responsibility to execute the job in all respect as per the detailed piping drawings supplied progressively and to the satisfaction of Engineer-in-Charge. Quoted amount, thereof, shall be deemed to have included in above categories only.

- Supply of all equipment, tools & tackles, various types of Welding electrodes, filler wires, flux, etc., consumables, all types of industrial gases such as Oxygen, Acetylene, inert gases with purity 99.999 PPM.
- All type of fittings like flanges, tee, reducer, elbow, stub end, nipple, half coupling, weldolet, nipple, reducing coupling, any special fittings etc. as per Piping specification and MTO (Material take off) List.
- All types of Gaskets for the flange joints.
- Supply and Fixing of Pipe Supports, Bolts, U-Bolts, studs, nuts, washers, Clips, clamps, foundation bolts, shoes, guides, stops / anchors, cradle, hangers, supporting fixture, brackets, cantilever, structural tee post, fixing, load setting of spring supports etc. and any other components to complete the piping and supporting work in all respects
- Supply and fitting of Shims, wedges and packing plates (wherever required)
- Supply of all materials such as metallic blinds, temporary gaskets etc. and arrangements required for the pressure testing and flushing and pipelines. No blinds shall have thickness less than 10 mm.
- Supply of all materials and arrangements required for all types of tests such as radiography. DP test etc.
- Supply and application of all sealing and protective materials required for protecting equipment.
- Supply of all other materials, consumables, testing appliances tools and tackles etc. required for carrying out the work in all respect.
- Supply and application of primer, paint for pipes, fitting & piping items, etc.
- Package Items: If any

Items other than those mentioned above and which may be required during execution of work, will also be provided and installed by contractor for completion of work. However, rates for such extra items shall be paid to the Contractor after verifying the Rate Analysis for such items.

Electric Power & water for construction and other activities shall be provided by Owner at a decided point. . However, the contractor shall make all arrangement to tap the same at the point and lay pipe line and cables to site of work at his cost.

3.2.2 Deviations

In case any item of work is not covered by drawings, specifications, standards and codes referred to above or where a deviations from provision of such drawings, specifications standards and codes, is deemed advantageous or essential then the matter shall be brought to the notice of Engineer in Charge and the work shall be carried out only after obtaining written approval from client in each or any case.

4 General Mechanical and Piping Specifications and Requirements

4.1 SPECIFICATION FOR ERECTION OF PUMPS

4.1.1 Erection

- Casting of concrete foundations of the pump sets is in the Scope of Work of the Contractor. Before erection, Contractor shall inspect the foundation for dimensions, locating size and condition of anchor bolts. He shall properly carry out chipping, fixing, cleaning of foundation, place liners, place base plate on the liner and set anchor bolts, align provisionally base plates and fix anchor bolts by cement concrete / mortar into anchor boxes.
- After grouting recheck the alignment of the unit and couple the shaft after connecting piping as per the detailed engineering drawings. The installation of base plate and the unit shall be carried out in such a manner that the requirement of tolerance on height, position, level as specified on the Manufacturer's drawings/instruction manual are fully met with.
- Levelling shall be carried out on four corners of the base plate ends for both directions of shaft and right angle to the shaft.
- The alignment of the unit shall be carried out on the basis of the finished surfaces which are as nearest as possible to the centre of the shaft with the help of dial gauge.
- Where an adjustment between shaft and coupling is required for their fitting, the adjustments shall be carried out to the coupling and not to the shaft.
- The alignment of the unit shall be carried out until complete alignment of driving and driven shaft is obtained. While aligning, the deflection and face deviation of the driving and driven shaft shall individually be measured with the help of dial gauge and should conform to the allowable limits specified by manufacturer.
- After completion of alignment it shall be confirmed that the shaft can be rotated smoothly and freely by hand.
- After connection of piping, the alignment of the pump shall be rechecked. Any misalignment induced by the piping connections shall be corrected by adjusting piping.
- Running test of motor etc. shall be performed with no load and it shall be confirmed that vibrations, sound and temperature of motor are not abnormal.
- After running test of motor, the surface of motor and the driven unit shall be coupled with confirmation of rotating direction of unit and motor.
- Trial running of assembled unit shall be performed and it should be confirmed that vibration, sound and temperature readings are within the acceptable limits specified by the supplier.

4.1.2 Testing

- The contractor shall follow good engineering practice and / or the testing manuals supplied by the pump manufacturer for the testing.
- All pumps shall be tested hydrostatically by running on water.
- No load running tests shall be carried out, where required.
- The mechanical testing of pumps shall be carried out to the satisfaction of Engineer-in-Charge and their signature shall be obtained on the test certificates. Client engineer instruction shall be strictly followed.

4.1.3 Miscellaneous steel

All bolts, anchor bolts, nuts, lock washers, supports and other miscellaneous items shall be supplied by the Contractor. Before installing the pump, the Contractor shall verify location of bolts. M.S fasteners up to 8.8 grade shall be hot dip galvanized with coating 80-100 micron with painted after installation and torque tightening. Painting shall be as per client specification.

4.2 SPECIFICATION FOR FABRICATION, LAYING, WELDING, ERECTION & TESTING OF PIPING

4.2.1 General

The complete piping work shall be carried out in accordance with “Approved for construction” drawings and sketches issued by contractor to Owner / Consultant such as:

- Piping and Instrumentation diagrams
- Equipment layout drawings
- Foundation details of the equipment
- Piping layouts plans
- Piping material specifications
- Pipe support details
- Datasheets
- Orientations.
- Isometric drawings etc.

4.2.2 Fabrication

4.2.2.1 Piping material

Pipe, pipe fittings, flanges, valves, gaskets, studs bolts, etc. used in piping system shall be strictly as per the 'Piping Material Specification' for the 'pipe class' specified for that system. To ensure the above requirements, all piping material supplied shall have proper identification marks as per relevant standards / certificates. Contractor shall provide identification marks on left over pipe length wherever marked up pipe length have been fabricated / erected.

4.2.2.2 Dimensional tolerances

Dimensional tolerances for piping fabrication should be as per the relevant piping code. The contractor is responsible for working to the dimensions shown on the drawings. However, the Contractor shall bear in mind that there may be variations in the location of equipment, inserts, etc. To take care of these variations, field welds shall be provided during piping fabrication. An extra pipe length of 100 mm over and above the dimensions indicate in the drawing may be left on the side of the pipe at each of the field welds. During erection, the pipe end with extra length of each field weld shall be cut to obtain the actual dimension occurring at site. In any case, no extra claims will be entertained on this account. Wherever

errors/omissions occur in drawings and Bills of Materials, it shall be the contractor's responsibility to notify the Engineer in charge prior to fabrication or erection.

4.2.2.3 Pipe joints

The piping class of each line specifies the type of pipe joints to be adopted. However, in piping 1.5" and below where socket welding/threaded joints are specified, but butt welds may be used with approval of Engineer in charge for pipe to pipe joining in long runs of piping. This is applicable for non-galvanized piping and piping without lining and Fit up by clamp.

4.2.2.4 Screwed piping

Galvanized piping shall have threads as per IS: 554 or ANSI B 2.1 NPT as required matching threads on fittings, etc. All other piping shall have tapered threads unless otherwise specified.

Threads shall be clean cut without any burn or stripping and shall have reamed ends. Threading of pipes shall be done preferably after bending, forging or heat treatment operations. If this is not possible, threads shall be gauge checked after welding heat treatment etc. During assembly of threaded joints, all threads of pipes and fittings shall be thoroughly cleaned of cuttings, dirt, oil or any other foreign matter. The male threads shall be coated with thread sealant or Teflon tape as directed by Engineer -in-charge, and the joint lightened sufficiently for the threads to seize and give a leak proof joint.

4.2.2.5 Flange connections

All flange facings shall be true and perpendicular to the axis of pipe to which they are attached. Flange bolt holes shall straddle the normal centre lines unless different orientation is shown in the drawing.

Wherever a spectacle blind is to be provided, drilling and tapping for the jack screws in the flange, shall be done before welding it to the pipe. Pipe should be 5 mm inside from flange for proper welding with flange from inside.

4.2.2.6 Branch connections

Branch connections should be as indicated in the piping material specifications, For end preparation, alignment, spacing, fit up and welding of branch connections (refer welding specifications) Templates shall be used wherever required to ensure accurate cutting and proper fit up.

For all branch connections accomplished by either pipe to pipe connections or by using forged tees, the rates quoted for piping shall be inclusive of this work.

Reinforcement pads shall be provided as indicated in drawing / specifications, In case if pipe to pipe joints Equal or non-Equal size "T" shall be used. No fabricated fittings shall be used .

4.2.2.7 Bending

Bending shall be as per ANSI B 31.3 except that corrugated or creased bends shall not be used.

Cold bends for lines 40mm and above, with a bend radius of 5 times the nominal diameter shall be used as required in place of elbows wherever allowed in accordance to piping specifications.

The completed bend shall have a smooth surface, free from cracks, buckles, wrinkles, bulges, flat spots and other serious defects. They shall be true to dimensions. The flattening of a bend, as measured by the difference between the maximum and minimum diameters at any cross sections, shall not exceed 8% and 3% of the nominal outside diameter, for internal and external pressures respectively.

4.2.2.8 Cutting and trimming of standard fittings

Fittings like elbows, couplings, half coupling etc. shall be cut trimmed wherever required to meet fabrication and erection requirements as per drawings or as instructed by Engineer in Charge.

4.2.2.9 Shop fabrication / pre- fabrication

The purpose of shop fabrication or pre fabrication is to minimise the work during erection to the extent possible. Piping spools, after fabrication, shall be stacked with proper identification marks, so as to facilitate their withdrawal at any time during erection. During this period all flange faces (gaskets contact surfaces) and threads shall be adequately protected by coating with removable rust preventive. Care shall also be taken to avoid any physical damage to flange faces and threads.

Contractor shall fabricate miscellaneous elements like flash pots, seal pots, supporting elements including, and extension of spindles and inter locking arrangement of valves, operating platforms as required by Engineer in Charge to make the piping work to complete. In case of field joint edges shall be bevelled and covered by mask tape min 100 mm both sides to avoid paint. In yard or shop up to one coat of paint shall be applied.

4.2.3 Details of internal Epoxy coating for CS piping

Table 4.1: Coating material and systems

Sr. No	Description	Operating Temp °C	Activity	Specification of paint Material	No. Of Coats	Dry film thickness as per coat	Over coating Interval (Hours)	DFT Required (µ)	Total DFT Min(µ)
1	Internal Surface-CS MOC Pipe with fitting	60	Surface Preparation	Sa 2 ½	-	-	-	-	325
			Prime coat	Epoxy zinc phosphate primer	1	75	12	75	
			Final Coat	Epoxy-high build finish paint	2	125	12	250	

Notes for epoxy coating:

- The internal lining needs the approval of the employer prior to being purchased. The lining must have been tested and approved by a major supplier of aviation fuel as being suitable for use with JET A-1.

- The use of copper slag is prohibited.
- Defects revealed by blasting shall be removed by grinding. If not accessible the pipe must be cut to remove the defect.
- Paint application shall be by airless spray. Paint shall not be applied when the temperature of the prepared surface is below the dew point, or when the atmospheric temperature is below 10° C, or when the relative humidity is above 85% or when airborne dust may be deposited on the painted surface.
- The finished paint film shall be smooth and glossy and free from drips and runs. It shall be fully cured before the ends are sealed.
- A weld margin of 35 mm shall be left at the ends of each pipe and fitting (by masking with masking tape) so that (a) the weld is not contaminated and (b) the lining does not burn back excessively and out of control. The welding bevels shall also be covered with masking tape.
- Prior to dispatch from the coating works, the lining shall be tested for cure by the MEK (methyl ethyl ketone test). The surface rubbed by the cloth, for one minute, that has been soaked in MEK shall show no (or only scant) sign of discolouration. The surface that has been rubbed by MEK shall be scratched and pressed by a fingernail to see if any softening has occurred. Scratching with a knife, though will be able to remove some of the coating will indicate general toughness and absence of softening, flaking and cracking.
- The adhesion of each coat shall be tested separately.
- Pipe shall be externally marked with paint marker, so that it is traceable.
- The end of each pipe shall be sealed with plastic caps.

4.2.4 Welding specifications

This specification shall be adapted to all welded pipe joints of stainless steel & carbon steel piping system under contractor's scope. The welded pipe joints are defined as under:

- All line joints of the longitudinal and circumferential butt welded and socket welded type.
- Attachments of castings, forgings, flanges and other supporting attachments pipes.
- Welded branch connections with or without reinforcing pads.
- Manufacture of welded / fabricated pipes & piping components.
- The attachments of smaller connections for vents, drains, drips and other instrument toppings.

4.2.4.1 Filler materials

- Filler materials, supplied by contractor shall be of the approved class and make.
- The electrodes supplied by contractor, for welding shall conform to the class specified in welding chart and as approved by Owner's/ Consultant's site engineers.
- The electrodes shall be suitable for the welding process recommended and base metal used. The physical properties of the weld produced shall not be lower than those of the base metal and shall correspond to the physical properties of the class of electrodes adopted. The choice of suitable electrodes shall be made after conducting tests on electrodes as per relevant standards and shall be the sole prerogative of the Engineer in Charge.
- The contractor shall submit batch test certificates from the Electrodes manufacturer giving details of physical and chemical tests carried out by them for each batch of electrodes supplied by the contractor.

- All electrodes shall be purchased in sealed containers/packets and stored properly to prevent moisture absorption. The electrodes removed from containers/packets shall be used in the job within 4 hours. If this is not practicable then they shall be charged in the storage ovens kept at temperature recommended by the electrodes manufacturer. The electrodes shall be handled with care to avoid damage to the flux coating.
- All low Hydrogen type electrodes shall be completely dry when used. These shall be pre-dried in suitable heaters at controlled temperature. Re drying temperature of low hydrogen electrodes shall be 340°C for 3 hours duration or as per recommendations of manufacturer and subsequently held at 100°C unless otherwise specified by the electrode manufacturer.
- Electrodes wires and flux when used shall be free from rust, oil, grease, dust and other foreign matter which affect the quality of welding.
- For joints between carbon steel of different types or for heavy joints under restraint, low hydrogen electrodes shall be used. ARGON GAS PURITY 99.999 PPM, GAS FLOW FOR PURGING 18-20 LPM AND FOR SHIELDING 14-16 LPM.

4.2.4.2 Weather conditions

No welding shall be performed during rain or strong winds unless suitable protection is provided by the contractor for the parts to be welded and the welding personnel. Where this is not applicable, no welding shall be done during that time.

4.2.4.3 Welding process

Welding under this specification shall be done with the following processes subject to the approval of the Engineer in Charge and as per welding chart.

- Automatic or semi-automatic welding shall be done only with the specific approval of the Engineer in Charge.
- The procedure and materials applied for the same shall also meet the consent of the Engineer in Charge.
- Socket weld joints shall be done with low hydrogen type covered electrodes with manual shielded metal arc process.
- Downward technique is not allowed in welding pipes in horizontal position, unless permitted by the Engineer in Charge for particular cases not concerning process lines.
- Combination of welding processes or usage of electrodes of different classes or makes in a particular joint shall be done only after the welding procedure has been duly qualified and approved by the Engineer in Charge.
- GTAW process shall be used for piping.

4.2.4.4 End preparation

Procedure Not Limited to following shall be adopted by the Contractor for 'End Preparation':

- End preparation and welding fit up shall be as per standard / code. The contractor should prepare the joint in such a way to ensure full penetration.

- End preparation shall be done as per Owner's approved drawings, detail joint configuration shall be mentioned in drawing.
- Gas cutting, machining or grinding method shall be used. After gas cutting, machining / grinding shall be carried out on the cut surface to remove oxides.
- Pug machine shall be used for edge preparation and profile shall be cut by profile machine

- **Cleaning**
The ends to be welded shall be properly cleaned to remove paint, oil grease, rust oxides, sand, dust and other foreign matter with help of buffing machine and hand wire brushes. The ends shall be completely dry before commencing the welding.

- **Alignment and spacing**
 - Pieces to be welded shall be aligned and spaced in a suitable manner, so as to hold the ends during welding at a distance to ensure full penetration. Root opening shall not be more than as specified. Internal misalignment shall not exceed 1.5 mm.
 - For pipe with thickness 4mm or larger, the pieces to be butt welded shall be coupled by means of pipe couplers or by yokes or bridge "C" Clamps.
 - Owner's inspector shall check and approve the joint fit up and alignment prior to the commencement of welding.

4.2.4.5 Welding techniques for root pass

Technique Not Limited to the following shall be adopted by the Contractor:

- For Butt joints
 - The maximum electrodes size shall be For piping—root and other pass by 1.6/2.4 mm or as per WPS, The electrodes holder shall be connected, having due regard for the polarity requirements of the electrodes approved for the use of pipe in horizontal position. Upward technique shall be used with the recommended values of current.
 - The root pass of butt joints, regardless of the technique used, shall be such as to achieve full penetration. However, projection of weld metal into the pipe bore shall not exceed more than 3 mm. Inside reinforcement max 0.75 mm
 - Root grooves and defective restart of the welding shall be carefully avoided.
 - At each interruption of welding and on completion of each run, craters, weld irregularities and slag shall be removed by grinding or chiselling.
 - After the welding is started and until the joint has been completed, displacements, shocks vibrations or stresses shall be avoided in order to prevent cracks or breaks in the weld.
 - For root run of Alloy Steel piping or Carbon Steel of high pressure with 100% radiography shall be done through TIG welding method however no purging is required.
- For fillet welds
 - The max. Electrode size shall be 3mm max or (1/8") (10 SWG.)
 - On completion of the root pass, any visual defect or irregularities shall be ground off to avoid defects or irregularities in the next pass. Argon gas in SS purity 99.999 with 18-20 LPM flow, Shielding 14-16 LPM, Supplier certificate shall be submitted for review.
 - Welding to be carried out as per ASME B 31.3

4.2.4.6 Joint completion

Electrode size of more than 8 SWG (3 mm or 5/32") shall not be allowed for filling of the weld. Upward technique shall generally be used for pipe in horizontal and vertical position.

At each interruption of welding, and after each run of welding is completed, chipping and slag removal shall be done with rotary wire brush.

When the welding is complete, butt joints shall have a capping pass. It shall be slightly convex and fuse into the surface of the base metal in such a manner as to have a gradual notch free finish a good fusion at the joint edges. Welds shall have a regular appearance and shall be free from defects.

Welder number shall be stamped along each side of the weld, whenever required by the engineer in charge.

When welding is completed, the butt joints of piping regardless of welding methods used, shall have a weld reinforcement referred to the outside of the pipe, not more than 2mm, for pipes not thicker than 12 mm.

4.2.4.7 Welder's qualification

a. Qualification procedure

- Welder's Qualification shall be in accordance with the relevant code ASME Sec. IX latest edition. Owner's Inspector shall witness the test and certify the qualification of each welder. Only welders approved by the Owner's Inspector shall be employed. Contractor shall submit the welder's qualification report as per **Appendix-B** before the commencement of work. It shall be the responsibility of the contractor to carry out qualification tests of welders.
- The welders shall always have in their possession the identification card as per **Appendix-C** and shall produce it whenever demanded by Owner's Inspector. It shall be the responsibility of the Contractor to issue the identity cards only after it is certified by the Inspector.
- No welder shall be permitted to work without the possession of identity card.
- If a welder is found to perform a type of welding or in a position for which, he is not qualified, he shall be debarred from doing any further work. All such welding so performed shall be cut and redone at the expense of the Contractor. If qualified welder perform found not satisfactory then welder shall be disqualified.

b. Weld Inspection

- Inspection of all welds shall be carried out as per API 1104 or ASME B 31.3 or equivalent latest edition. All finished welds shall be visually inspected for parallel and axial misalignment of the work, excessive reinforcement, for a concavity of welds, shrinkage cracks, inadequate penetration, unrepaired burn through under cuts, dimensions of the weld, surface and root porosity and other surface defects. LOP, LOF, CRACKES SHALL NOT BE ACCEPTED

c. Radiographic examination of Welds

- Radiographic requirements shall be as given below for process and utility systems with exception of steam piping falling under IBR where radiographic requirements of IBR should be compiled with.

Table 4.2: Radiographic examination

No	Piping Material for	Extent of Radiographic Examination (%)
1	Process lines in off-sites	As per specifications
2	Utility Pipeline	As per specifications
3	IBR Piping (if applicable)	As per specifications
4	Process Vapour (if applicable)	As per specifications

- The radiographic procedure shall be approved by the Owner's Inspector, as per **Appendix-D** The procedure and quality of radiographic examination, limits of acceptability, require and removal of defects shall be checked as per API Code 1104, ASTM E 94, ASTM E 142 AND ASME B 31.3.
- The contractor shall be responsible for carrying out radiography, rectification of defects and re radiograph of welds repaired and rectified. He shall make necessary arrangements for providing all the equipment as well as radiographic film for the satisfactory and timely completion of the job.
- For welds between dissimilar materials, the radiographic examination shall be to the extent required for the material which calls for more stringent examination.
- Radiographic inspection of the welds shall be preferably made with X rays. Iridium isotope or any other X ray source may be used with the approval of the Engineer in Charge.
- The contractor shall fulfil all the statutory safety requirements for handling all the X ray and gamma ray equipment.
- The joints for radiography shall be selected by the Owner's Inspector and the radiography shall be performed in his presence. The contractor shall furnish all the radiographs to the Owner's Inspector immediately after processing them.
- The details of the radiography shall be duly entered and signed by him in a register and shall be submitted to the Owner's Inspector for approval.
- The contractor shall afford all the necessary facilities to the Inspector at site such as darkroom with controlled temperature, viewer, etc. for the examination of the radiographic film.
- Interpretation of radiographs shall be done as per acceptable standards.

d. Magnetic particle or Liquid Penetration Examination

- The contractor shall arrange for all the equipment / materials required for carrying out dye Penetration / magnetic particle tests, as per the instruction of Engineer in charge.

e. Proof test

- Soundness of the welds shall be tested by means of hydrostatic and pneumatic tests as per part **Appendix-E** of this specification. The test shall be conducted only after fulfilling the requirements of visual inspection, radiography, etc. and when the entire work is certified by the Engineer in Charge for the performance of such tests.

1. Penalty of Joints Against Weld Defects:

Double Penalty Welder, Spool, Line Wise, Approved QAP shall be referred.

- **For CS Piping:** 20% of weld joints.
- **For SS Piping:** 30% of weld joints, welding to be done Full TIG, Filler Wire SS 316.

2. The code of piping will be ANSI B 31.3, fluid category as per application. Normal, unless specified. In any case LF, LP and Crack are not permitted.

Note 1: In case of defect in any joint, there will be penalty joints. The penalty joints will be 2 against 1 defective joint.

Note 2: In case of both the piping the defects % has to be less than 2%.

Note 3: SS Piping, the welding defects will be less than 2% (quality level). In case of defects % exceed 2%, the RT will be 50%. If defect % during the RT@ 50% is found more than 3% (quality level), RT will be 100%.

Note 4: - The sampling will at random welder wise & size wise.

f. Repairs of welds

Defects ascertained through the inspection methods, which are not under permissible limits shall be removed from the joint completed by the process of chipping or grinding and following procedure:

- When the entire joint is unacceptable, the weld shall be cut completely and the pipe ends shall be restored for re-welding. After re-weld the joint shall be again checked.
- No repair of welds shall be done without prior permission of the Engineer in Charge.
- When random radiography is specified the first weld of each welder shall be completely radiograph except in pipe size 100 mm and below wherein the first two welds shall be taken for radiography.
- For each weld found unacceptable due to welder's fault such as lack of fusion and penetration, two additional checks should be carried out on welds performed by the same welder whose weld joint was judged unacceptable originally, the operation is progressive and the procedure of radiography of two additional welds for each weld deemed unsatisfactory shall be followed till such time two consecutive satisfactory welds are obtained.
- The contractor shall carry out these additional radiographs at his own expenses.
- To avoid the possibility of too many defective welds by a single welder going undetected over a period of time, the contractor shall arrange for radiography promptly so that there is no backing in radiography.
- Repairs and / or work of defective welds shall be done in time to avoid delays in the construction programme.
- Repair procedure of weld should be carried out as per relevant pipe code and instruction of Engineer in charge.

Note: Welding of the pipe joints shall be done through welding generator or welding rectifiers only.

Machine Range: 400 Amps

4.2.5 Erection

4.2.5.1 Cleaning of piping before erection

Before erection all pre-fabricated spool pieces, pipes fittings etc. shall be cleaned from inside and outside by suitable means. The cleaning process shall include removal of all foreign matter such as scale, sand, weld spatter, cutting chips, etc. by wire brushes, cleaning tools etc. and blowing out with compressed air. Special cleaning is required for Stainless steel prior to commissioning as specified in preceding chapter.

4.2.5.2 Piping routing

No deviations from the piping route, indicated on drawings shall be permitted without the consent of Engineer in Charge.

Pipe to pipe, pipe to structures, equipment distances/clearances as shown in the drawings shall be strictly followed as these clearances may be required for the free expansion of piping, operation & maintenance of equipment. No deviations from these clearances shall be permissible without the approval of Engineer in Charge.

In case of fouling of a line with other piping, structure, equipment etc. the matter shall be brought to the notice of Engineer in Charge and corrective action shall be taken as per his instructions.

4.2.5.3 Slopes

Slopes specified for various lines in the drawings, shall be maintained by the Contractor. Corrective actions shall be taken by the Contractor in consultation with Engineer in Charge wherever the Contractor is not able to maintain the specified slope.

4.2.5.4 Flange connections

While fitting up mating flanges, care shall be exercised to properly align the pipes and to check the flanges for trueness, so that faces of the flanges can be pulled together, without inducing any stresses in the pipes and the equipment nozzles. Extra care shall be taken for flange connections to pumps & all rotating equipment. The flange connections to these equipments shall be checked for misalignment, excessive gap etc. After the final alignment of the equipment is over, the joint shall be made up after obtaining approval of Engineer in Charge. Also axial & radial alignment shall be checked & corrected before the hook up.

Temporary protective covers shall be retained on all flange connections of pumps, and other similar equipments, until the piping is finally connected so as to avoid any foreign material from entering these equipments.

The assembly of a flange joint shall be done in such a way that the gasket between the flange faces is uniformly compressed. To achieve this, the bolts shall be tightened in a proper sequence. All bolts shall extend completely through their nuts but not more than 1/2".

Steel to C.I flange joints shall be made up with extreme care. Uniform tightening of the bolts shall be done only after accurately parallel and lateral alignment of flanges and its gaskets.

In case of pipe and flange joints, pipe shall be 5 mm down from flange end to achieve Weld Reinforcement

4.2.5.5 Vents and drains

High point vents and low point drains shall be provided as per the instructions of Engineer in Charge, even if these are not shown in the drawings. The details of vents and drains shall be as per the piping material specifications/job standards.

4.2.5.6 Valves

Valves shall be installed with spindle/actuators orientation/position as shown in the layout drawings. In case of any difficulty in doing this or if the spindle orientation/position is not shown in the drawings, the Engineer in Charge shall be consulted and work done as per his instructions. Care shall be exercised to ensure that globe valves, check valves and other uni-directional valves are installed with the 'flow direction arrow' on the valve body pointing on the right direction. If the directional arrow is not marked on such valves, this shall be done in the presence of Engineer in Charge before installation. Orientation of valve spindle shall be reconfirmed with the Engineer-in-Charge for the ease of operation & safety of operators.

Valves shall be in 'Open' condition during pressure Test of the piping system.

4.2.5.7 Pipe supports

- Pipe supports are designed and located to effectively sustain the weight and thermal effects of the piping system and to prevent its vibrations. Pipe on shoe / saddle (with suitable material frictional pad between supports and shoe) are provided to accommodate insulation, jacket, tracing, slope etc. supports Location and design of pipe supports will be shown in drawings. However, any extra supports, shoe, saddle etc. desired by Engineer in Charge shall also be installed at free of cost.
- Fabrication shall be done in accordance with IS 800 Section V AND ASME B 31.3
- All supports shall be strictly as per drawings/instructions of Engineer in Charge. Extra care shall be taken in the correct installation of supports of pumps, etc., according to the specific detailed drawings and supplier's erection instruction/drawings.
- No pipe shall be offset unless specifically shown in the drawings.
- Inspection of pipe supports shall be as per IS 800 , ASME B 31.3,
- **No pipe shall be directly welded with the shoe or support.**

4.2.6 Flushing

- Cleaning of all lines shall be done before pressure testing in the presence and as per the approval of the representatives of the owner/ consultant & Engineer in Charge.
- Water shall not be used for flushing of pipelines. Flushing/cleaning shall be done by dry compressed air, wherever water flushing is not desirable, to clean the pipe of all dirt, debris or loose foreign materials.
- It will be contractor's responsibility to provide pumping equipment, compressors, air hoses with accessories, temporary carbon steel piping with valves, specials, fittings, etc. wherever required, instruments such as pressure gauges, safety valves etc. spool pieces, temporary gaskets, tools and tackles and all other arrangements, equipment, materials and consumable etc. required as aids for completing the flushing as per the directions of the Engineer in Charge.
- During flushing, care shall be taken for 'In line instruments'.
- The contractor shall carry out all the activities (with no extra cost to the owner) required before, during and after the flushing operation arising of the flushing requirements such as but not limited to the followings.
 - Dropping of valves, specials, distance pieces in line instruments and only piping part before flushing. The flanges to be blinded for this purpose should be envisaged by the contractor approved by the Engineer in Charge and should be provided with temporary gaskets at the time of initial erection.

- After flushing is completed and approved, the valves, distance pieces, piping specials etc. shall be reinstalled by the contractor with permanent gaskets. However, flanges at equipment nozzles and other pieces where isolation is required during testing, only temporary gaskets will be provided.
- From all permanent strainers the screens/ mesh shall be removed before flushing is done. During flushing temporary strainers shall be retained. After flushing temporary strainers shall be removed, cleaned and reinstalled before testing.
- Full bore flushing shall be ensured and will be continued till the inside of the pipe is fully cleaned to the satisfaction of the Engineer in Charge.
- For air flushing the line/system will be pressurized by compressed air at the required pressure which shall be 3.5 Kg/cm² (g) maximum. The pressure will be released by the opening of a valve already in line or installed temporarily for the purpose. This procedure will be repeated as many times as required till inside of the pipe is fully cleaned. The arrangement for raising and releasing the air pressure will be made by the contractor as per the approval of the Engineer-in-charge.
- During flushing dirty water/air shall be discharged to the place directed by the Engineer in Charge. Care shall be taken during flushing, so as not to damage/spoil other agencies' work'. As desired by the Engineer in Charge, proper temporary drainage for flushing water shall be provided by contractor. Precautions shall also be taken to prevent entry of water/foreign particles into equipment, electric meters, instruments, electrical installations etc. in the vicinity of lines being flushed.
- In case where fluid inlet into the pipeline through connected equipment such as vessels, etc. is unavoidable, this shall be done after having approval of Engineer in Charge.
- However, equipment thus included in the circuit for flushing shall be completely drained and dried with compressed air after flushing is completed.
- Records in triplicate shall be prepared and submitted by the contractor for each piping system (line wise), for the flushing done in the proforma in **Appendix-E**
- After water flushing is over, lines should be completely dried by dry compressed air.

4.2.7 Testing and inspection of piping

4.2.7.1 General requirements of testing

The intent of this specification is to provide a basis and guide for carrying out field testing of piping to assure leak tightness. This covers the general requirements for testing of piping after erection in accordance to the piping code ANSI B 31.6 Chapter VI. Clearance shall be taken before starting the tests from Engineer in Charge. **Test Pressure Holding Time is 4 (Four) hours.**

Upon completion of installation, the piping system shall be inspected to ascertain that each of the following points has been adhered to:

- Proper use of materials
- Correct erection of line (in accordance with the approved drawings)
- Correct installation of guides and supports.
- Proper installation of (temporary) blind discs to be employed during testing.
- The correct application of pre-established pressure and temperature.
- Sectioning of line in according to the materials and/or equipment which are not a part of test.

- Radiography of weld joints as per specifications.

With the exclusion of instrumentation, piping systems fabricated or assembled in the field shall be tested in the field, irrespective of whether or not they have been pressure tested prior to site welding or fabrication (Processing and utility piping system). Prior to testing all lines shall be flushed as per procedure mentioned. All tests shall be completed to the satisfaction of the Engineer in Charge.

On completion of test, the system shall be drained, dried with compressed air at the pressure decided by the Engineer in Charge and made ready for operation.

After completion of flushing and testing, draining and drying of lines, the permanent strainers screens shall be cleaned and reinstalled. After joints remaining untested during hydro testing shall be tested pneumatically after the hydro testing is over.

Pneumatic test pressure will be indicated by Engineer in Charge and contractor shall ensure that this test pressure is not exceeding any time during this test.

All tests shall be conducted as per the procedure outlined in this specification. Lines required by welding subsequent to the pressure test shall be retested after the repair at the same test pressure originally applied. However, Engineer in Charge may waive such retest in case of minor addition or alteration by taking same precautionary measures to assure sound construction.

Systems/lines may be tested in sections to facilitate completion of work in that area or areas however; such sections so tested shall be capped out, tagged suitably. Such weld joints untested may be exempted from hydraulic testing by the Engineer in Charge subject to radiographic approval of these joints.

Lines which are directly open to atmosphere such as vents, drains, safety valve discharges shall not be hydrostatically tested but all joints shall be visual inspected however, necessary as decided by continuous flow of fluid to eliminate the possibility of blockage.

Instrumentation pressure impulse piping shall start beyond first block valve located in the pressure line. During the pressure test this isolation valve must be kept closed to prevent dirt or any foreign matter entering into the instrument piping. Temperature impulse connections shall be closed off by a blind flange and for threaded joints plug to be provided by the contractor.

The Engineer in Charge shall be notified in advance by the contractor of the testing sequence/programme to enable him to be present for witnessing the test.

4.2.7.2 Test field

In general all pressure tests shall be pneumatic.

Air shall be used for testing as testing of Jet A1 Fuel System with water is prohibited.

Where air / water tests are undesirable, substitute fluids such as gas oil, kerosene, methanol etc. shall be used as the testing medium, with due consideration to the hazards involved. These test fluids shall be specified in the line list given to the contractor.

4.2.7.3 Test preparation

Test preparation shall include Not Limited to following:

- All equipment, materials consumable and services mentioned below but not limited to, required for carrying out pressure testing of piping shall be provided by the contractor at his own cost.
 - Pump sets for pressurization, air compressor etc.
 - Hoses for water, air or other test fluid with accessories and adapter flanges.
 - Supply, fabrication and erection of temporary carbon steel piping with valves, fittings, specials etc.
 - Minimum Two nos. calibrated digital pressure gauges with range 1.5 times to 4 times of Testing Pressure shall be used with Safety Valves & all such instruments
 - Temporary gaskets wherever required as per specification and instructions of the engineer in charge.
 - Soap, solution, grease, graphite, white lead, paint etc. all consumable materials.
 - Tools, tackles, pipe wrenches, spanners etc.
 - All aids are not specified here but only those required for carrying out pressure test of piping.
- Before testing all piping shall be cleaned by blown with compressed air only as water flushing is not desirable to remove loose foreign matters. This should be completed wherever required prior to completion of final weld in order that visual inspection is possible.
- All safety valves and motor operated valves assemblies shall be installed only after flushing and testing is completed successfully.
- Wherever in the line any void exists, due to any reasons, for absence of control valves, safety valves check valves etc. It will be filled with temporary spools.
- All joints welded, screwed of, flanged shall be left exposed for the examination during the test. Before pressuring the lines each weld joint shall be cleaned by wire brush to free from rust and any other foreign matters.
- The test will be carried out with permanent gasket installed unless otherwise specified herein or instructed by the Engineer in Charge.
- In line instruments, other equipment and piping specialities shall be isolated during flushing and pressure testing by metallic blinds, blanks, caps or plugs.
- No pressure test shall be carried out against closed valves unless approved by the Engineer in Charge.
- Piping which is spring or counter weight supported shall be temporarily supported where the weight of the test fluid would overload the supports.
- Retaining pins or spring supports shall be removed only after testing is completed and test fluid fully drained. Gas lines when hydraulically tested, shall be provided with additional temporary supports during testing as directed by the Engineer in Charge by the contractor at his cost.
- Piping system subject to extended pneumatic test period shall be provided with protective device or relieve excess pressure due to thermal expansion for the test fluid.
- Test Pressure Gauges.
 - All gauges used for field testing should be of Bourdon type having a Range 1.5 to 4 times of Test Pressure. Dial scale shall not be less than 150 mm diameter. Test pressure indication should fall in between 35% to 65% of gauge scale range.
 - Prior to the start of test and periodically during the field test programme all test gauges shall be calibrated using a standard Dead Weight Gauge tester or other suitable approved testing

apparatus. Any gauge showing an un-corrective zero reading, or error of around $\pm 2\%$ of full scale range shall be discarded. The Engineer in Charge shall check the accuracy of master pressure gauge used for calibration.

- The pressure gauge shall be installed as close as possible to the lowest point of piping system to be tested to avoid over stressing of any of the lower portion of the system. For longer lines and vertical lines two or more pressure gauges shall be installed at the locations decided by the Engineer in Charge.
- For lines containing check valves, any of the following alternatives will be adopted for pressure testing.
 - Wherever possible pressurize upstream of valve.
 - Replace the valve by a temporary spool and reinstall the valve after testing.
 - Provide blinds on the valve flanges and test the upstream and downstream of the line separately and remove the blind after testing.
- In all the above mentioned cases wherever valve flanges are required to make the break for testing, the contractor shall provide temporary gaskets at the time of initial installation of check valves. Final gaskets will be provided only after completion of testing.
- For lines below 2" i.e. welded check valves flapper or seat shall be removed (if pressurization of upstream of check valve is not possible) during testing. After completion of testing the flopper/seat will be refitted, the gasket in the inspection cover of check valve will be replaced by new one, if required by the Engineer-in-Charge. The gasket for replacement will be supplied by the Contractor. Valves shall be in 'Open Condition', gaskets shall be replaced before Box Up and handing over.

4.2.7.4 Procedure for pressure testing

Not Limited to following, Contractor shall prepare procedure & have approval of Engineer-in-Charge:

- The minimum pneumatic test pressure shall be as indicated in approved Line list or as per instruction of the Engineer-in-Charge.
- The selections of the piping system for one individual test will be based on the followings
- Test pressure required as per approved Line list / drawings.
- Maximum allowable pressure for the material of construction of piping.
- Depending upon the above requirement and based on construction progress, maximum length of piping shall be included in each test.
- Pressuring, inspection and approval.
- All vents and other connections used as vent shall be left open while filling the lines with test fluid for complete removal of air. In all lines for pressurizing and depressurising the system temporary isolating valves shall be provided if valve vents, drains do not exist in the system.
- Pressure shall be applied only after system/line is ready and approved by Engineer-in-Charge.
- Pressure shall be applied by a suitable test pump or other pressure source which shall be isolated from the system as soon as test pressure is reached and established in the system.
- The test pressure shall be retained long enough to facilitate inspection of the complete system. Duration of the test in each case shall be fixed up by the Engineer-in-Charge, but in no case it will be less than 4 hour. No leakage of any kind will be permissible. The glands of the valves in the system being tested shall be tightened by the contractors, so as to stop/minimize the leakage if any. In case leakage is not stopped after adequate tightening of gland, the hand wheel of such valves shall be painted red only on the rim to identify these valves for subsequent replacement of gland packing by the supplier. Valve gland tightening and hand wheel painting shall be the contractor's responsibility/scope.

- Care shall be taken to avoid increase in pressure due to temperature variation during the test.
- After completion of pneumatic test, pressure shall be released. All vents and drains shall be kept open till the lines are fully drained. After draining lines/systems shall be dried by air.
- Pressure test shall be considered complete only after approved by the Engineer-in-Charge. Defects if any, noticed during testing shall be rectified immediately and re testing of the system lines shall be done by the contractor at his cost. Repairs if any shall be carried out after dewatering and completely drying the line by air.

4.2.7.5 Test records

Records in triplicate shall be prepared and submitted by the contractor for each piping system (line wise) for the pressure test done in the pro-forma as given in **Appendix-F**.

4.3 General specification for Painting

4.3.1 Scope of specification

This specification defines the requirements for surface preparation, selection and application of primer and finish paints for Piping & Steel structures, Equipment.

Not Withstanding whatsoever may or may not be indicated herein below, the contractor shall be bound to use the best available quality of materials, workmanship and methods of application, approved, and as per standard practice, it being understood that the specifications are largely indicative and not intended to be exhaustive.

4.3.2 Extent of work

The following surfaces and materials shall require painting.

- All structural steel work including steel supports etc. as provided by the contractor.
- All above ground carbon steel piping and fittings (Including painting of identification marks).
- Coloured identification bands on all piping, as required.

4.3.3 Codes and standards

Materials and workmanship for the work covered by this contract shall conform to the following codes and standards but not limited to:

1. IS: 5 Colour for ready mixed paints and materials
2. IS: 101 Methods of tests for ready mixed Paints and enamels.
3. IS: 2339 Aluminium paint for general purpose in dual containers.
4. IS: 2379 Colour code for identification of pipeline.
5. IS: 2932 Enamel, synthetic, exterior (a) undercoating (b) finishing.
6. Paint manufacturer's instruction & safety data sheet.
7. Technical data sheets for paints/touch – up paints system.

8. Surface preparation shall be carried out in accordance with project technical specification.
- a) ISO 12944
 - b) ISO 8501
 - c) ASTM-D-3359
 - d) SSPC PA-2
 - e) ISO 8504
 - f) ISO 8502

The contractor shall arrange, at his own cost, to keep a set of the above standards at site.

4.3.4 General requirement

The paint manufacturer's instructions shall be followed as far as practicable at all times. Particular attention shall be paid to the following.

- Expiry date of paints/primers, wherever the same is indicated on the sealed containers and where not indicated, six months from the indicated date of manufacture to be considered.
- Proper storage to avoid exposure as well as extremes of temperature.
- Surface preparation prior to painting.
- Mixing and thinning.
- Application of primer paint and the recommended limit on time intervals between coats.
- Absence of inclement weather conditions while applying primer and paint.
- Lapse of minimum time interval between opening of sealed containers and their being fully used up.

Any painting work (including surface preparation) on piping shall be commenced only after the system tests have been completed and clearance for taking up painting work is given by the Engineer in Charge, who may, however, at his discretion authorize in writing, the taking up of surface preparation of painting work in any specific location, even prior to completion of system test.

4.3.5 Tools, tackles and Measuring Instruments

All tools, brushes, rollers, spray guns, blast materials, hand/power tools for cleaning and all equipment, scaffolding material, shot/sand blasting equipment, and air compressor etc. required to be used shall be suitable for the work and all in good order and shall be arranged by the contractor at site and in sufficient quantities.

All paints and primers shall be brought to the site in sealed containers which shall be opened in order of their manufacturing dates in the presence of the Engineer in Charge or his authorized representative. Time expired paints/primer shall not be used in the work.

4.3.6 Surface preparation

4.3.6.1 General

To achieve maximum durability, following methods of surface preparation shall be followed, depending on steel surface condition & instructed by Engineer-in-Charge/Specification. Adhesion of the paint film to

surface depends largely on the degree of cleanliness of the metal surface. Proper surface preparation contributes more to the success of the paint protective system.

- Manual or hand tools cleaning
- Mechanical or power tools cleaning.
- Solvent cleaning
- Sand blasting

Mill scale, rust, scale and foreign matter shall be removed fully to ensure that a clean and dry surface is obtained. Remove all other contaminants, oil, grease etc. by use of an aromatic solvent prior to surface cleaning.

Irrespective of the method of surface preparation the first coat of primer must be applied by brush on dry surface. This should be done immediately and in any case within 4 hours of cleaning of the surface. However, at times of unfavourable weather conditions, the Engineer-in-Charge shall have the liberty to control the time period, at his sole discretion and/or to insist on re-cleaning, as may be required before primer application of primer is taken up. In general, during unfavourable weather conditions, painting shall be avoided as far as practicable.

4.3.6.2 Procedure for surface preparation

Contractor shall submit detailed procedure for painting for its approval by Owner. Contractor shall be also arrange at their cost for the visits of the Paint manufacturer to inspect and certify of the quality of Surface Preparation, application of Painting System for full time during work of painting.

- Manual or hand cleaning
Hand tool cleaning normally consists of the following.
 - Hand de-scaling and/or hammering
 - Hand scraping
 - Hand wire brushing.

Rust, mill scale spatters, old coatings and other foreign matter, shall be removed by hammering, scraping tools or emery paper cleaning, wire brushing or combination of the above methods. On completion of cleaning, loose material shall be removed from the surface by clean rags, and the surface shall be brushed, swept, de-dusted and blown off with compressed air to remove all loose matter.

- Mechanical or power tools cleaning
 - Power tools cleaning shall be done by mechanical striking tools chipping hammers, grinding wheels or rotating steel wire brushes. Excessive brushing of surface shall be avoided as it can reduce paint adhesion. On completion of cleaning, the detached rust, mill scale etc., shall be removed by clean rags and/or washed by air jet before application of the paint.
- Solvent cleaning
 - Solvent cleaning is a procedure for removing, detrimental foreign material like oils, grease, and other contaminants, which are soluble in solvents like white kerosene or mineral turpentine. Solvent cleaning is to be done, if warranted prior to surface preparation.
 - The following sequence of operations shall be followed for cleaning.

- Soil, cement, spatter, drawing compounds, salts and other extraneous matter shall be removed by brushing with wire brushes, stiff fibre or by scraping. Fresh water cleaning may also be applied.
- Oil, grease and other contaminants shall be wiped with rags or brushes dipped in solvent. The final wiping and scrubbing shall be done with clean rags and brushes to prevent spreading of loose oil, grease, etc. over the surface. After the cleaning it must be ensured that no residue is left on the surface.

Fire and explosion hazards are inherent in solvent cleaning operations. Recommended safety precautions of the solvent manufacturer shall be followed in the storage and handling of the solvent.

- Rub down and touch up of primer
 - The shop coated surface shall be rubbed down thoroughly with emery paper to remove all dust, rust and other foreign matters, washed with degreasing solvent (white spirit) to completely remove grease, etc. and then cleaned with warm fresh water or dry air. The portions wherefrom the shop coat has peeled off, shall be roughed up and allowed to dry before giving one coat of anti-corrosive primer. The compatibility between shop coat and primer should be ascertained from the paint manufacturer.
- Non compatible shop coat primer
 - The compatibility of the finishing coat with the earlier coat should be confirmed from the paint manufacturer. In the event of use of primer such as a Zinc rich epoxy, Inorganic Zinc Silicate, etc. as shop coat, the paint system shall depend on the condition of the shop coat. If the shop coat is in a satisfactory condition showing no major defects, the shop coat shall not be removed. The touch up primer and finishing coat (s) shall be identified for application by the Engineer in Charge.
- Sand blasting (To be considered only if carried out within controlled space and environment)
 - Blast cleaning is the ideal surface preparation method to achieve an ideal surface for painting. All the other forms of surface preparation have their limitations. In blast cleaning, an abrasive is directed at high velocity against the surface. The abrasives are generally chilled iron steel shots/grits or coarse sand. There are three recognized specifications for blast cleaning standards and all give three equivalent grades.

Table 4.3: Blasting Grade

Blasting Grade Specification			
Steel structures painting council (SSPC Spec.)	White metal(SP-5-63)	Near white(SP- 10-63)	Commercial(SP- 6-63)
Swedish standard organization	Sa- 3	Sa- 2 ½	Sa- 2

Table 4.4: Blasting Grade Recommendation Guide

Swedish standard	Corrosive environment	Application
Sa- 3	Extremely aggressive	When long terms protection is desired because of difficult access to the surface
Sa- 2 ½	Fairly Corrosive	When long term protection is desired, for chemically resistant systems such as polyurethane, epoxy and chlororubber resin paints
Sa- 2	Mildly Corrosive	For steel to be painted with an ordinary synthetic conventional system

The Swedish standard contains photographs of the various standards of three different degrees of blasted steel and is preferred for reference purpose by most individuals.

While the Swedish standard is pictorial, the other two are descriptive, attempting to define the areas of residual scale, etc. allowable for each grade. The Swedish standards, which are the most universally accepted, illustrate steel in four conditions before blasting has been carried out, as this will obviously affect the visual appearance of the surface after the required preparation. These are

- A completely mill scale covered un-corroded surface.
- A surface that has begun to rust with mill scales present.
- A surface that is fully corroded but not visibly pitted.
- A surface which is severely corroded with obvious pitting.

The grades of cleaning by blasting are pre-fixed by the reference Sa number. Thus Sa3 is steel blasted to white metal with all rust, mill scale etc., being removed fully. This is quite difficult to achieve practically and is normally only specified for certain speciality coatings. Sa 2.5 second quality or near white is the more usually accepted standard and would be considered as a suitable base to realise the full expected service of most coating systems.

Anything less than specified shall be a compromise.

Brush off or sweep blasting is frequently used as a more rapid and probably cheaper method of removing firmly adhering, fouling and broken coating systems.

Surface profile

Blast cleaning produces a roughened surface and the evenness of this profile is important. Most specifications call for peak to trough amplitudes of 100 microns maximum

Table 4.5: Surface profile

Abrasive	Max. Abrasive particle Size (mesh)	Max. Height of Profile (mils)
Sand		
Very fine	80	1.5
fine	40	1.9
medium	18	2.5
coarse	12	3.0
Crushed Iron Grit		
G-50	25	3.3
G-40	18	3.6
G-25	16	4.0
G-16	12	8.0
Iron Shots		
S-230	18	3.0

Abrasive	Max. Abrasive particle Size (mesh)	Max. Height of Profile (mils)
S-330	16	3.3
S-390	14	3.6

4.3.7 Primer application

- After surface preparation, the primer should be worked into by brush application, also to cover the corners, sharp edges, etc. in the presence of an inspector nominated by the Engineer in Charge. The shades of successive coats should be slightly different in colour in order to ensure application of individual coats. The thickness of each coat and complete coverage should be checked as per provisions of this specification. This should be approved by Engineer in Charge before application of successive coats. Airless spray gun method shall be used for painting.

4.3.8 Type and application of paint

- Prepared surfaces shall not be left exposed to weather over-night and also to moist atmosphere before applying primer coat.
- Do not apply paint when the temperature falls below 10 degrees Centigrade.
- Do not apply paint when the relative humidity is above 90% or during fog, rain or mist.
- Primed surface should be over coated after the re-coat ability time specified by paint manufacturer.
- All the Primers and Finishes are supplied in brushing consistency. Thinner should be added, as per paint manufacturer's recommendation, only if viscosity increases during the application due to higher ambient temperature.
- Blast cleaned surfaces shall be coated with the primer within a maximum period of 3-4 hours. If relative humidity is over 75%, this period should be reduced to 1-2 hours, for better performance.
- All two pack primers and paints shall be used up within the pot life mentioned in the data sheets, given by the concerned manufacturer.
- Application of paints is recommended at ambient temperature. The substrata should also be at ambient temperature.
- Paint Material and Painting Systems shall be as per following table 4.5:

Table 4.6: Paint material and painting systems

Sr. No	Description	Operating Temp °C	Activity	Specification of paint Material	No. Of Coats	Dry film Thickness Per Coat	Over coating Interval (Hours)	DFT Required (µ)	Total DFT Min(µ)
1	External Surface-CS MOC Pipe with fitting (Non Insulated)	60	Surface Preparation	Sa 2 ½	-	-	-	-	300
			Prime coat	Inorganic base Ethyl Zinc silicate	1	75	12	75	

Sr. No	Description	Operating Temp °C	Activity	Specification of paint Material	No. Of Coats	Dry film Thickness Per Coat	Over coating Interval (Hours)	DFT Required (μ)	Total DFT Min(μ)
				build (Min 60% Vol. solids)					
			Intermediate coat	Epoxy high build MIO Coating (Min 60% Vol. solids)	1	150	24	150	
			Final Coat	Aliphatic acrylic PU	2	35	12	75	

Notes:

- All primers and finish coats shall be cold cured and air-dried unless otherwise specified.
- Technical data sheets for all paints shall be supplied at the time of submission of quotation.
- All paints shall be applied in accordance with manufacturer's instruction for surface preparation and application.
- The paints and primers, when supplied by the contractor, shall conform to the specifications given above and be of Approved Make.

4.3.9 Storage

All paints and painting material shall be stored only in rooms to be provided by the contractor and approved by the Engineer in Charge for the purpose. All necessary precautions shall be taken to prevent fire. The main storage building shall preferably be separate from the adjacent buildings. A sign-board bearing the words "PAINT STORAGE NO NAKED LIGHT HIGHLY INFLAMMABLE" shall be clearly displayed outside. Fire extinguishers shall be installed in the paint store.

4.3.10 Colour code

The scheme of identifying the materials contained in the equipment and carried in the pipeline shall generally follow the procedure mentioned in IS: 2379, colour code for the identification of pipelines.

The colour code scheme is intended for identification of the individual group of the pipeline. The system of colour-coding consists of a ground colour and colour bands super imposed on it as per BIS standards.

Table 4.7: Color code for equipment as applicable (This color should be verified with DAFFPL)

Equipment	Colour
Water meter	Light Blue
Tanks or Vessels	Dark grey
Pumps and Drives	Light grey
Compressors and Drives	Light grey
Generation Units	Dar grey

Equipment	Colour
Instruments	Light grey
Electrical items cable trays	Dark grey
Structural steel work and pipe supports	Dark grey
Overhead obstructions	Yellow with Black stripes
First aid Equipments	Signal green
Danger points on Electrical Installation	Orange

Table 4.8: Color code for pipeline as applicable (This color should be verified with DAFFPL)

Table Heading Left	Column
Portable water	Green
Fire water	Red
All drains	Dark grey + two black rings
Process fluids Acids	Yellow + one purple ring
Process fluids Alkali	Yellow + one violet ring
Process fluids Others	Dark Grey
Compressed air	Sky blue
Instrument air	Sky blue + one green ring
Width of colour band for one ring	150 mm
For more than one ring width of each ring	100 mm
Spacing between two rings	100 mm
Spacing between two sets of rings	1500 mm

Colour bands to distinguish one fluid from another of the same group, shall be selected from tables of IS 2379. Ground colours as given in the scheme shall be applied throughout the entire length for un-insulated pipes. For insulated pipes colour coating of 2 m. length shall be applied over the aluminium sheeting at places requiring colour bands. Colour band (S) shall be applied at the following locations.

- At battery limit points
- At intersections in pipe racks
- At other points, such as midway of each piping rack, near valves, junction joints at service appliances, wells, etc.
- For long stretches/yard piping at 50m. Intervals.
- At start and at terminating point.

4.3.10.1 Lettering

The chemical, commercial or other commonly understood name of the flowing medium in the pipe or the contents in a tank or equipment shall be written on the ground color applied to the surface. The ground colour shall be applied in convenient lengths at selected places where personnel normally have to attend in the plant area.

4.3.10.2 Size of lettering

The following size of lettering shall be stencilled on the pipe or equipment such that the writing is clearly and easily visible from a maximum number of locations around the area.

Table 4.9: Size of lettering as applicable (Size of Lettering should be verified with DAFFPL)

Dia. of pipe, equipment	Size of lettering
Upto 30 mm	10 mm
Above 30 mm. upto 50 mm	20 mm
Above 50 mm. upto 80 mm	30 mm
Above 80 mm. upto 150 mm	40 mm
Above 150 mm. upto 250 mm	65 mm
Above 250 mm	100 mm

Source: Insert source text here

4.3.10.3 Direction of flow

Direction of flow shall be marked with arrows on pipe lines carrying fluids. The colour of the arrows shall be black or white and shall be in contrast to the ground colour on which it is painted

4.3.11 Inspection and testing

- All painting materials including primers and thinners brought to the site by the contractor for application shall be procured from reputed manufacturers as per specifications and shall be accompanied by manufacturer's test certificates. In case such certificates are not available, Engineer in Charge may direct the contractor to have the materials tested in accordance with relevant specifications at owner's/outside laboratories, accepted by the Engineer in Charge, and all costs thereof shall be borne by the Contractor.
- The Engineer in Charge, at his discretion may call for additional tests of materials accompanied by manufacturers test certificates. The Contractor shall arrange to have such tests performed, including batch wise test of wet paints for physical and chemical analysis. All costs thereof shall be borne by the Contractor.
- The painting work shall be subjected to inspection by the Engineer in Charge at all times. In particular, following stage inspection will be performed and contractor shall offer the work for inspection and approval at every stage before proceeding with the next stage. The record of inspection shall be maintained and Full Time Inspection by Paint Manufacturer.
- Stages of inspection are as follows :
 - Surface preparation
 - Primer application
 - Each coat of paint.
- Any defect noticed during the various stages of inspection shall be rectified by the contractor to the entire satisfaction of the Engineer in Charge before proceeding further. Irrespective of the inspection, repair and approval at intermediate stages of work, contractor shall be responsible for making good

any defects found during final inspection/guarantee period/defect liability period as defined in the General Conditions of Contract.

- Random salt contamination shall be checked before application of paint to ensure no salt deposition on surface. Frequency shall be decided by the paint manufacturer and Engineer-in-Charge. Adhesion Test XCUT & Dolly as per instructions of Engineer-in-Charge.
- Dry film thickness (DFT) and Wet Film Thickness (WFT) shall be checked and recorded after application of each coat.
- The contractor shall provide thickness-measuring instrument (ELKOMETER) with appropriate range(s) for measuring dry film thickness of each coat.
- At the discretion of the Engineer in Charge, the contractor shall ask the paint manufacturer to provide expert technical service at site as and when required. This service should be free of cost and without any obligation to the owner, as it would be in the interest of the manufacturers to ensure that both surface preparation and application are carried out to their recommendations.
- Final inspection shall include measurement of dry film thickness, check of finish and workmanship. The thickness should be measured at as many points/ locations as decided by Engineer in Charge and shall be within + 10% of the dry film thickness.

4.3.12 Guarantee

The contractor shall guarantee that the chemical and physical properties of materials used are in accordance with the specifications.

The contractor shall produce test reports from the manufacturer regarding the quality of the particular batch of paint supplied. The Engineer in Charge shall have the right to test for quality, the wet samples of the paint at random. Batch test reports of the manufacturers for each batch of paint supplied shall be made available by the contractor.

Applied paint must be guaranteed for duration of minimum 10 years maintenance free.

4.4 Measurement of work and Basis of payment

- Measurement of weights will be in metric tonnes corrected to the nearest kilogram.
- Linear measurements will be in meters corrected to the nearest centimetre.
- Payment against erection of all types of equipment shall be on number basis at the rates given separately in the schedule of rates. Any dismantling and re-erection of equipment required for the purpose of flushing, testing, calibration etc. shall be carried out by the contractor within the quoted rates
- Measurement of pipelines shall be based on the approved execution drawings. Pipelines shall be measured along the centre lines of pipes, curvilinear centre lines of bends and elbows; centre lines of flanges and all other fittings, such as tees, reducers etc., all in the line instruments, filters, sight glasses etc. All types of valves including control valves shall be excluded from this measurement. Branch connections shall be measured from the outer surface of the header.
- Erection of all types of valves such as gate/globe/ check/ball/control safety valves strainer etc. will be paid on number basis at the rates given separately in the schedule of rates. Any dismantling and erection of the valves required for the purpose of flushing, testing, calibration etc. will be carried out by the contractor within the quoted rates. For safety valves, measurement shall be on the basis of inlet pipe size.

- All hot/cold bends, tees, reducers etc. for sizes 4" and above shall be fabricated and erected as per requirements, if required, by the contractor at no additional cost and his rates for piping of sizes 4" and above shall be inclusive of this work.
- For fabrication and erection of reinforcement pads, the rate is inclusive in piping work.
- Vents and drains shall be measured from O.D. of pipe lines and shall be paid for at the corresponding unit rates for similar sizes of pipe. Other piping attachments such as couplings, earthing lugs etc. shall be provided by the contractor within his quoted rates for piping.
- Fabrication and Erection of all types of supports, if required, shall be carried out by the contractor as part of piping work and rates for the same shall be quoted separately per tonne.
- While fabricating the supporting elements, the contractor will ensure that the dimensions shown in the approved drawings match with site conditions. In case of deviation due to site requirement payment will be made as per the actual measurement
- Supply, fabrication of spool pieces for temporary use to aid contractor's work such as fabrication, erection, flushing and testing of piping shall be done by contractor as part of piping work and no separate payment shall be made for this.
- Radiography And Dye Penetrate Test
 - Schedule of rates of piping work category should include charges for radiography and required DP test as per piping code/ specifications. Repeat radiography due to defective films or on repaired joints due to contractor's fault or for additional radiography necessitated due to poor performance of contractor's welder will be done at contractor's cost
- ALL MEASURING LATEST VERSION AND DEMANDED BY CLIENT ENGINEER SHALL BE IN SCOPE OF CONTRACTOR.

5 Pre Commissioning and Commissioning

5.1 General

After erection / installation / testing of the equipment, it shall be the responsibility of the Contractor to start up and commission all the facilities. Contractor shall ensure that all the necessary pre commissioning activities applicable for each component of the facility shall be carried out as per the good engineering practices and manufacturer's recommendations.

Contractor shall ensure that all necessary pre-commissioning activities applicable for each component of the facilities shall be carried out as per the general specification laid down elsewhere in the bidding document, in accordance with the good engineering practices and as per Contractor's / manufacturer's recommendations.

A pre commissioning activity shall be considered to be completed, only when it has been witnessed by Client's representatives and the pre commissioning formats have been signed by client's representatives, Contractor's representatives, Third party's representatives (wherever applicable) and others as indicated on the approved formats as a token of successful completion of the said activity.

5.2 Mechanical Completion

Mechanical completion of a system means that all installation work of that system as described in the scope of work of the bid package have been completed in accordance with approved for construction drawings, specifications, applicable codes as defined in the bid package and good engineering practices, all tie in connections have been made, all pre commissioning activities defined later required for the system have been completed and the system / facilities are ready for commissioning and witnessed by Owner's / Third party representative (wherever specified).

5.2.1 List of Minimum Activities to be Carried Out after Installation and Hook Up

- Calibration check of instruments and loop checking of all the systems / equipment including packaged items
- Testing of all kind of valves
- System flushing and system leak test.
- Recommended pre-commissioning checks for Switchgear, MCC and other packaged items.
- Checking of electrical equipment for proper earthing, continuity, insulation resistance and secondary injection test of relays after insulation resistance test.
- During the pre-commissioning / commissioning of electrical system stability of differential relays, illumination level checking and battery capacity test shall also be carried out
- Flushing and leakage testing of the lines

5.3 Pre-Commissioning Activities

Pre-commissioning activities are defined as the activities to be performed after erection / installation of an equipment / system to make it "READY FOR COMMISSIONING". This includes but not limited to the activities like system checking, site modifications, flushing / cleaning of piping, calibration of PSV's / TSV's, system leak check up to the normal operating pressure, purging of the system using inert gas, calibration of all the instruments and thereafter loop checking, electrical equipment's for proper earthing, continuity,

Insulation resistance, secondary inspection of relays after insulation resistance, complete checking of the safety system, operability test of equipment's and system as whole plus recommended checks on electrical system. Manufacturer's recommendations should be followed during testing.

5.3.1 Execution of Pre-Commissioning Activities

It shall be Contractor's responsibility to complete all the pre-commissioning activities before start-up. Contractor shall formulate necessary procedure and obtain approval from CLIENTS's representative and shall carry out as per approval procedure.

5.3.2 Pre-Commissioning Documents

It shall be the responsibility of the Contractor to prepare detailed format of checklist of pre-commissioning and commissioning activities for each equipment and system. Contractor shall submit the said format for Owner's approval. This checklist in addition to indicating the check/test to be carried out in each equipment / system shall also indicate the sequence & schedule of activities.

All the checklist points shall be dealt by the Contractor to the Owner's satisfaction. System readiness for pre-commissioning shall be determined based on the completion of relevant portion of checklist by Contractor as per the approved format. Contractor shall submit a detailed schedule for carrying out the pre-commissioning activities in a network form.

Pre-commissioning documents shall contain the following:

- System, sub system identification
- Detailed procedure for various pre-commissioning activities such as system check, flushing, purging, blowing, leak test, system tightness, instruments / MOV operability test, internal inspection, etc with formats to record the observations of each of the activities carried out.
- Procedure and formats of operability tests for different equipment / systems.
- List of commissioning spares
- List of spares recommended for one- year operation.
- Contractor shall submit the draft of the above mentioned pre-commissioning documents 90 days before the activities are to be carried out. The documents shall be submitted to CLIENTS for review and approval and comments, if any shall be incorporated by the Contractor.

5.4 Operating Manual

The Contractor shall prepare a draft start up and operation manual of the plant / facility and submit it to Owner at least 90 days prior to start of commissioning activities. In particular the following minimum information shall be covered as a minimum:

- Description of facility.
- Pre-start checks
- Start-up procedure.
- Normal operating procedure.
- Shut down procedure. (Normal / Emergency)
- Contractor instruction/ operating manual for all equipment for start-up, shut down, normal operation, maintenance and spares.
- Operating parameters and set points of different alarms and trips
- Reduced size Copies of line lists.
- Equipment and instrument data sheet.

- Electrical single line diagram.
- Area classification drawings and control scheme logics.
- Piping and instrumentation drawings.
- All shut down schemes.
- As built drawing of the complete facility.

Review of operating manual shall be done by the CLIENTS and all the changes, additions, deletion, if required shall be incorporated in the final start up and operating manual. Sub-Contractor operating manuals shall form a part of final operating manual.

In case of any revisions due to any reasons, the same should be submitted as revised sheets during the start-up and commissioning stage. However, the same shall be incorporated and submitted as final total manual.

5.5 Commissioning

30 days in advance of starting of commissioning, Contractor shall submit a proposal to Owner giving complete detail of the program / procedures to be followed during commissioning. These documents shall be approved by Owner.

Commissioning shall be started only when all the utilities and other auxiliary facilities of the tank system are fully operational and the pre commissioning activities as specified / recommended have been successfully completed. Commissioning means un-interrupted operation of tank system with all its utilities and safety systems for 72 hours as per process scheme at its design conditions. Owner would like to run all facilities together or part as per their requirement.

The log sheets suitably prepared for different equipment / system shall be provided by Contractor which shall be reviewed / approved by Owner. These approved log sheets shall be used during pre-commissioning and commissioning of the plant.

At the end of 72 hours of the stable operation of system all the log sheets shall be signed by Owner & Contractor. Whether commissioning has been successful or not shall be decided by the Owner, based on the 72 hours observations recorded in the log sheets and the test results of sampling wherever required.

After the successful commissioning of the system, it shall be handed over by the Contractor to Owner for normal operation and maintenance.

The Contractor shall also associate himself during performance guarantee run of the systems.

5.5.1 Commissioning Procedure

Contractor shall prepare this document, 30 days before the start of commissioning, to detail out the procedure for commissioning of systems. Contractor shall have required inputs from Owner and the Contractor's representative. The document shall include the shift rosters for the Contractor's personnel deployed during commissioning operations of the systems.

5.5.2 Manpower for Commissioning

For pre-commissioning and commissioning of the facilities, Contractor shall deploy personnel with

experience in operation of similar facilities; it shall be round the clock uninterrupted operation. The Contractor shall arrange and provide all categories of personnel i.e. shift engineers, operators, technicians, etc.

The Contractor shall submit the organization chart with bio-data of key personnel for approval to Owner.

5.6 Spares and Consumables

The Contractor shall be responsible for the supply of all spares and consumables till all the units are handed over to Owner.

The utilities like air, power and water for pre-commissioning / commissioning shall be provided to the Contractor

It shall be the Contractor's responsibility to supply lubes, chemicals, desiccant or other similar materials. It shall be the Contractor's responsibility to repair any damage to the system occurred during storage, installation, pre-commissioning and commissioning stages.

The Contractor shall maintain a record of start-up spares consumed during pre-commissioning and hand over the balance items to Owner.

5.7 Inspection

CLIENTS reserve the right to inspection / tests (including stage inspection) of any of the equipment / items at any stage of manufacturing. Contractor shall intimate to CLIENTS of readiness for final inspection of respective item.

6 List of Approved Vendors

6.1 Civil Work

Table 6.1: List of Approved Civil Vendors

Sr. No	Material	Manufacturers / Brand / Make
1	Cement OPC / PPC / SRC	Ultra Tec, Ambuja, ACC
2	White Cement	Birla Cement, J K Cement
3	Reinforcement Steel Bars	SAIL, TATA, RINL
4	Fine aggregates	Good Quality River Sand with approved sample by Owner before Use.
5	Coarse aggregates , Rubble for soling	Good Quality, sample to be got approved by Owner before Use.
6	Clay brick Bricks	Good Quality from Chimney Bhatha, sample to be got approved by Owner before Use.
7	Structural Steel, H beam, I beam, Channel, Angle, Plate, flat, round pipe, chequered plate	SAIL, TATA, JINDAL, RINL, JINDAL
8	Welding electrodes	ADVNI, ESAB, D & H
9	Admixture, non-shrink cementitious Grout, epoxy grout, Tile fixing adhesive, floor Hardener, Bonding Agents etc.	Fosroc, BASF, BAL Endura, JBA, Dr. Fixit,
10	Internal / External paint - Primer weather proof external paint	Berger paints India ltd, Asian paints, godless Nerolac, ICI, Shalimar, Jotun
11	Cement paint	Snowcem, Indocem,

Notes:

- Contractor to follow the above mentioned makes. Makes of Items not listed here or in case none of the above makes is available, Contractor to follow the equivalent makes with prior approval from Owner. Deviation from approved make list is not allowed.
- It will be the responsibility of the Contractor to provide all supporting documents to establish that the brand/make offered by them is equivalent to the specified make and client's decision regarding approval of equivalent make shall be final and binding

6.2 Mechanical/Piping

Table 6.2: List of Approved Mechanical equipments Vendors

Sr. No.	Mechanical ITEM	Makes
1	Pumps	Mather & Platt / Kirlosker, Sulzer (India)
2	Motor	ABB / Simens / CGL, Kirloskar
3	Diesel Engine	Cummins / KEOL
4	M.S. ERW Pipes	Jindal / Surya Roshni / TATA / SAIL
5	Pipe Fitting	Tube Products / Teekey Tubes / Pipe fit/ Topaz / Tube Product / Fit Tech
6	Strainer	GujaratOtofilt / Flair / Jaypee
7	Gate valve	H sarkar / KBL / Advance / Audco / BDK / GM ENGINEERING
8	Globe valve	Leader / Sant / GM ENGINEERING
9	Butterfly Valve	Advance / Audco / GM ENGINEERING
10	Non-return Valve	H sarkar / Advance / KBL / GM ENGINEERING
11	Wrapping coating	Pypecote / Rusto-Seal, Asian Paints, STP
12	Primer & Paint	Jotun, Sigma, Akzonoble, Asian Paints, Goodless Nerolac, Berger Paints
13	Hydrant Valve	SBJ / Winco / Sukan
14	Branch pipe with Nozzle	SBJ / Winco / Sukan
15	Fire hose	CRC / Jay Shree / Newage
16	Hose Coupling	SBJ / Winco / Sukan
17	Water Monitor	HD / SBJ / Winco
18	Pressure Gauge	H Guru /General Instruments
19	Pressure switch	Indfos / Denfoss
20	Fire Extinguishers	Safex / Zenith / Kanex
21	Level Transmitter & Level switch	Sigma / Levcon
22	Welding Electrode	Esab, D&H, Advani Orlicon , Honavar, Phillips, GE, Lincon (USA)
23	HDPE Pipe	Dutorn / Jain irrigation / Parixit
24	LHS Cable	Kidde/Honeywell/Protectowire
25	MVW nozzle	HD / kidde
26	Q B detector	HD / Tyco / Kiddey
27	Deluge Valve	HD/ darling mousco
28	Foam equipment	HD / SBJ/ New age
29	Mechanical contractor	Credential shall be approved by Client
30	NDT Agency	Credential shall be approved by Client

Sr. No.	Mechanical ITEM	Makes
Sr. No	Piping Item Description	Approved Brand
31	Structural steel	SAIL / TISCO or equivalent brand with prior approval of Engineer-in-charge
32	MS Pipe	Maharashtra Seamless, Indian Seamless Tubes, Ratnamani Metals & Tubes, Surya Roshni Ltd., Jindal Pipes, MAN Industries, Welspun Gujarat Stahl, Mahalaxmi Seamless
33	SS Pipes	Ratnamani Metals & Tubes, Sandvik Asia Ltd, Jindal Saw Pipes
34	Pipe Fitting	Topez, EBY Industries, Sanghvi, Gujarat Infra pipes, Gujarat Infra pipes, PipeFit, Tube Products Incorporate, Fittech
35	Flanges	Chaudhry Hammer, Echjay Industries, Echjay Forgings, Paramount Forge, Shradha Forgings, WESTERN FORGINGS, GHAZIABAD ISPAT, KISHAN STEELS
36	Valves	BDK Engineering Industries, Larsen & Toubro, Fouress Engineering, KSB Ltd, Niton Valves, Oswal Industries, Econo valves P Ltd, NecoSchubrtSulzer (NSSL), Advance Valves, Tyco valves & Controls, Intervale I Ltd, BHEL (Trichy), Hawa Engineers Ltd
37	Gaskets	IGP Engineers Ltd, Madras Industrial Products, Star Flex Sealings, Goodrich Gaskets, Champion Jointings, Uni Klinger Ltd
38	Fasteners	AEP Company, Fasteners & Allied Products, Pioneer Nuts & Bolts P Ltd, Sundaram, Unbrako, TVS, Multi fasteners, Ashvin Fasteners
39	Electrodes	ESAB India Ltd, Honawar Electrodes, D & H Welding electrodes, Advani-Orlicon, Phillips, GEE, Lincoln USA
40	SS Braided Flexible Hose	Parker, Precision Hose INC., Unaflex

Notes:

- Contractor to follow the above mentioned makes. Makes of Items not listed here or in case none of the above makes are available, Contractor to follow the equivalent makes with prior approval from Owner. No change or introduction of new make shall be permitted during execution of contract.
- It will be the responsibility of the Contractor to provide all supporting documents to establish that the brand/make offered by them is equivalent to the specified make and Owner's decision regarding approval of equivalent make shall be final and binding.

Appendices

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Appendix A. Standard Welding Procedure Specification (Sample)

(To be submitted by contractor)
 For _____ welding of _____ Pipes & Fittings, Date of Testing

1. Procedure
2. Material
3. Diameter and Wall thickness
4. Joint Design
5. Filler Metal & No. of Leads
6. Electrical or flame characteristics
7. Position
8. Direction of Welding
9. No. of Welder
10. Time laps between passes
11. Type of line up clamps
12. Removal of line up clamps
13. Cleaning
14. Pre heat

Note: Welding of the pipe joints shall be done through welding generator or welding rectifiers only.

15. Stress relief
16. Shielding gas & flow rate
17. Shielding flux
18. Speed of Travel
19. Sketches & other details to be added

Pass	Electrode	Diameter	Amps	Volt

Approval of Owner's Inspector

Contractor's name _____
 Authorised representative with Seal

Appendix B. Welder Qualification Test Record (Sample)

(To be submitted by contractor)

1. Name of welder
2. Identification No.
3. Date of Birth
4. Permanent Address
5. Name of Employer
6. Date of Test
7. Valid Until
8. Welding Process Manual metal arc/oxy acetylene/Tungsten inert gas
9. Base Material
10. Shape Pipe/Plate
11. Tested According to
12. Inert gas used
13. Joint Design Bevel Angle
14. Welding technique Upwards/Downwards
15. Welding position Flat/Horizontal/Vertical/Over head
16. Heat Treatment Pre heat
17. Place of test Stress Relief

Approval of Owner's Inspector

Signature of Contractor with Seal

Appendix C. Welder's Identification Card

(To be submitted by contractor)

Attached herewith

Name :
Identification : Photograph
Date of Testing :
Valid Until :
Approval for :
Welding Position :

Approval by
(Owner's representative)

Contractor's Signature
(with seal)

Appendix D. Radiographic procedure for pipe welding

(To be submitted by contractor)

Location :
Date of Testing :
Name of Contractor :
Material : Carbon Steel/Alloy Steel/Stainless Steel
Diameter and Thickness :
Type of Weld Joint :
Radiation Source :
Intensifying Screens :
Lead Screens :
Geometric Relationship :
Limit of Film Coverage :
Film type and make :
Exposure Time :
Processing :
Density :
Sensitivity :
Type Penetrameter :

Approval of Owner's Inspector

Signature of Contractor

(with seal)

Appendix E. Flushing Report

(To be submitted by contractor)

Client _____ Located _____ Date _____

Table E.1: Flushing Report

Line no	Service	From	To	Operating pressure	Test pressure	Flushing medium	Remarks

Owner's Representative

Contractor's Representative

Date

Date

Appendix F. Test Report

(To be submitted by contractor)

Client _____ Located _____ Date _____
 Medium _____ Time _____

Table F.1: Test Report

Line no	Service	From	To	Design pressure	Test pressure	Duration of test	Remarks

Approved by _____

Owner's Representative

Contractor's Representative

Date

Date

Appendix G. Welding Electrodes selection Chart

Note: Client approved WPS/PQR shall be followed, below detail are only for guide line.

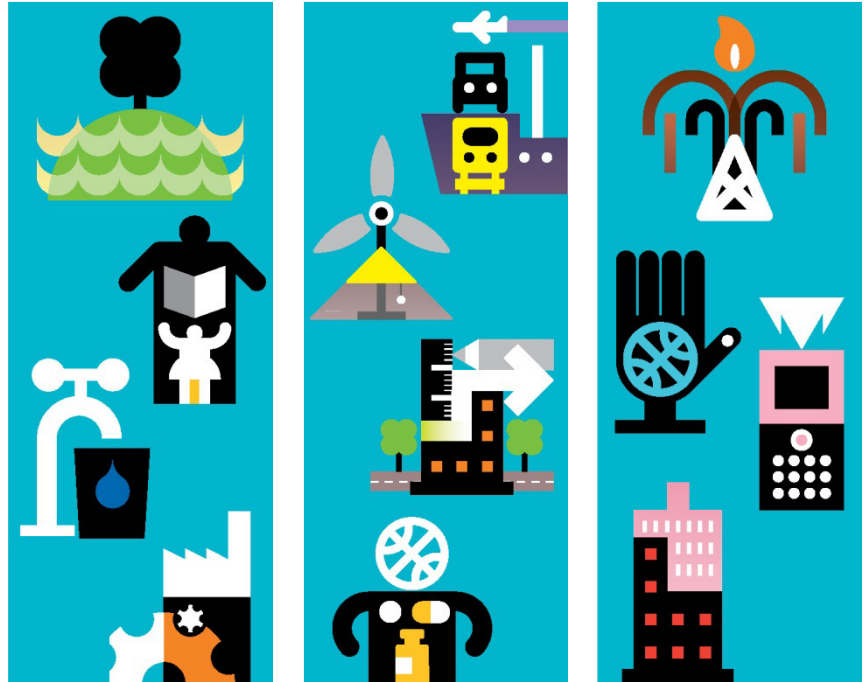
WELDING ELECTRODES SELECTION CHART					
SR. NO.	MATERIAL	BASIC SPECIFICATION	ELECTRODE FOR ROOT RUN	ELECTRODE FOR FILLER PASSES	REMARKS
1	STRUCTURAL STEEL	CONFORMING TO IS-2062 / ASTM A-36	-	AWS-E-6013 (Thickness up to 14 mm)	
2	M.S. ERW PIPES	CONFORMING TO IS-1239,IS-3589 AND ASTM A-53	AWS-E-6010 -	- AWS-E-6013 (Use in utility piping)	
3	C.S.PIPE	CONFORMING TO API-5L	AWS-E-6010	AWS-E-6010 (Not to be used without client written approval)	
4	C.S.SEAMLESS PIPES	CONFORMING TO ASTM-A-106 GR.B ASTM-A-53	AWS-E-6010 (Not be used without client written approval) -	- AWS-E-7018 (Not be used without client written approval)	
5	S.S. PLATE / PIPE	TP-304	AWS-ER-308-16	AWS-E-308-16	
6	S.S. PLATE / PIPE	TP-304L	AWS-ER-308L-15 AWS-ER-308L-16	AWS-E-308L-15 AWS-E-308L-16	

WELDING ELECTRODES SELECTION CHART

7	S.S. PLATE / PIPE	TP-316	AWS-ER-316-15	AWS-E-316-15	
			AWS-ER-316-16	AWS-E-316-16	
8	S.S. PLATE / PIPE & PIPE FITTINGS	TP-316L	AWS-ER-316L-15	AWS-E-316L-15	
			AWS-ER-316L-16	AWS-E-316L-16	
9	S.S. PLATE / PIPE & PIPE FITTINGS	TP-321	AWS-ER-347-15	AWS-E-347-15	
			AWS-ER-347-16	AWS-E-347-16	
10	S.S. PLATE TO C.S. PLATE	A 240TP304/304L	AWS-ER-309	AWS-E-309-L	
		/316/316L TO SA 515GR 60/70	AWS-ER-309-L		
11	S.S. PIPE TO C.S. PIPE	A 312TP304/304L	AWS-ER-309	AWS-E-309-L	
		/316/316L TO SA 106GR B/A-53GR.B	AWS-ER-309-L		
12	Ni 201,Sch.40	Nickel 201 (UNS-02201)	AWS ERNi-1 (UNS-02061)	AWS ERNi-1 (UNS-02201)	Nickel welding electrode-141 Nickel filler metal -61
13	Inconel-600,Sch.40	Inconel alloy -600	AWS ERNiCrFe-3,6 (UNS-06600)	AWS ENiCrFe-3,6 (UNS-06600)	Inconel welding electrode 182
14	S.S. FITTINGS TO C.S. FITTINGS	A 182F304/304L	AWS-ER-309	AWS-E-309-L	
		/316/316L TO SA 105 GR B	AWS-ER-309-L		

7 List of Attachments

1. 322538-RSD-103 Technical Specification for Oily Water / Storm Water Transfer Pumps
2. DAFFPL-MMD-322538-RSD-03 Data sheet for Oily Water / Storm Water Transfer Pumps
3. 322538-RSD-104 Technical Specification for Flexible Hoses
4. 322538-MSD-0501-01 Flexible Hose Data sheet
5. 322538-MSD-03 Piping Material Specification – A2Z
6. 322538-MSD-04 Piping Material Specification – A1M
7. 322538-PKA-0002-02 OWS Drain Layout Option-II
8. 322538-MPE-0106-01 Piping Layout for Aljac Sampler System for ATF Storage Tank
9. 322538-MPB-0107-01 Oil Water Collection & Transfer Piping Layout & Section
10. 322538-MSD-455 Technical Specification for Closed Circuit Type Fast Flushing Samplers for Jet A1 Fuel Storage Tank
11. 322538-PKC-0003-01 Schematic Diagram for Closed Circuit Type Fast Flushing Sampler System for ATF Storage Tank
12. 322538-MSD-401 Piping Material Specification – A21A



Technical Specifications for Oil / Storm Water Transfer Pumps

Modernization of Fuel Farm-IGI Airport,
Shahbad Mohammadpur, New Delhi

September 2015

Delhi Aviation Fuel Facility Private Limited



Technical Specifications for Oil / Storm Water Transfer Pumps

Modernization of Fuel Farm-IGI Airport,
Shahbad Mohammadpur, New Delhi

September 2015

Delhi Aviation Fuel Facility Private Limited

1 st Floor, Wing "A", T-III Project Office, IGI Airport, New Delhi-110037

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description	Standard
R0	14.09.15	JCP	HRS	VST	Issued for Bidding	

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Modernization Of Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. IGI Airport, New Delhi

SPECIFICATIONS Oily Water/Storm Water Transfer Pumps	Project No.:322538
	Reference: Tank Farm Area
	No. of Sheets: 18

Job Number	Facility Location Code	Document Number
322538	Shahabad Mohammadpur, IGI Airport-New Delhi	322538-RSD-103

Code 1: Approved and Work may Proceed.
 Code 2: Revise & Re-submit. Work may Proceed subject to incorporation of comments.
 Code 3: Revise & Re-Submit. Work should Not Proceed.
 Code 4: Review Not Required. Work may Proceed.

Approval to proceed shall not be deemed as Acceptance or Clearance of Design, Calculations, Analyses, Test Procedures/Methods, or Selection of Materials by the Contractor. The Contractor shall Not be relieved from full compliance of Contract Requirements and Technical Specifications.

Dated: **Delhi Aviation Fuel Facility Pvt. Ltd.**

Document No.

R0	14.09.2015	Issued for Bidding	JCP	HRS	VST	
Rev	Date	Issued For	Prepared By:	Checked By:	Approved By:	Approved By:
Mott MacDonald Pvt. Ltd.					Client	

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Abbreviations

ASA	-	American Standards Association
ASME	-	American Society for Mechanical Engineers
QA/QC	-	Quality Assurance / Quality Control
API	-	American Petroleum Institute
ASTM	-	American Society for Testing and Materials
SS	-	Stainless Steel
CS	-	Carbon Steel
GA	-	General Arrangement
NPSH	-	Net Positive Suction Head
MLC	-	Metre of Liquid Column
BKW	-	Brake Kilo Watt
MOC	-	Material of Construction

1 General

1.1 Introduction

- M/s Delhi Aviation Fuel Facility Private Limited (DAFFPL) is a joint venture between Indian Oil Corporation Limited (IOCL), Bharat Petroleum Corporation Limited (BPCL) & Delhi International Airport Limited (DIAL). M/s Indian Oil Sky Tanking Limited (IOSL) is responsible for running day to day operations of receiving the Jet fuel, storing the same in Fuel Farm and refuelling the Air Crafts.
- DAFFPL has availed design, engineering, procurement assistance and construction management services from Mott MacDonald which has been retained to provide consultancy services for the same.
- Existing Fuelling System i.e. Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL) for refuelling the aircrafts at IGI Airport, New Delhi is slated for modernization and up-gradation so as to conform to International Standards for receipt, storage and dispensing of Jet A1 fuel.
- At DAFFPL fuel farm, Jet A1 fuel is brought aboveground/underground pipe from Oil Terminals of IOCL and BPCL and also by road tanker. This fuel is stored in the Cone Roof Vertical Tanks installed in the fuel farm. Presently, the aircrafts are being refuelled by hydrant pumps through underground Jet A1 fuel hydrant pipe line.
- This document specifies the minimum acceptable requirements set by the Purchaser for design, engineering, procurement, fabrication, assembly, inspection, testing, commissioning and delivery to site of Electrically Driven Oily water handling pumps for installation within the Fuel Farm of DAFFPL, IGI Airport, New Delhi.

1.2 Definitions

For the purposes of this document the following definitions shall be used:

- Must/Shall the word 'shall' is to be understood as mandatory.
- Should the word 'should' is to be understood as strongly recommended.
- May the word 'may' is to be understood as indicating a possible course of action.
- Owner Delhi Aviation Fuel Facility Pvt. Ltd., IGI Airport, New Delhi.
- Consultant Mott MacDonald Pvt. Ltd .
- Manufacture / Supplier / Vendor The party responsible for manufacture or supply of equipment and Services to perform the duties specified by the Consultant or company.

1.3 Site Particulars

1.1.1 Location

The site is located at Shabad Mohammadpur adjoining to Indira Gandhi International Airport, New Delhi. The site is approachable by road.

1.1.2 Environmental Design Parameters

The following information is set out here for general guidance:

Project	:	Delhi Aviation Fuel Facility Private Limited
Site address	:	Aviation Fuelling Station Shahbad, Muhammadpur IGI Airport, New Delhi
Nearest Railway Station	:	New Delhi Railway Station
Nearest Airport	:	Indira Gandhi International Airport, New Delhi
Altitude	:	237 m
Operating Max. Temperature	:	48.4 °C
Operating Min. Temperature	:	-2.2 °C

Design Temperature	:	50 °C
Humidity, Maximum	:	100 %
Humidity, Minimum	:	25 %
Maximum Rainfall	:	20-30 mm in one hour duration
Designed Wind Velocity	:	47 m/s
Barometric Pressure	:	0.98 bar
Seismic Zone	:	Zone IV as per IS: 1893

1.4 Battery Limits (As applicable)

1.4.1 Civil

- Complete civil structural requirements related to pump installation (by Owner).

1.4.2 Inst. supply

- 240 V \pm 10 % AC, 50 Hz plus minus 5% single phase supply shall be provided by the Owner at one point at site.

1.4.3 Area Classification

- Hazardous.

1.4.4 Gen. Electrical

- 415 V plus minus 10% AC, 50 Hz plus minus 5 % single phase supply shall be provided by the Owner at one point at site.

1.5 General Purchase Conditions

1.5.1 Conflicting requirements

- All conflicts between the requirements of this specification, related specifications, standards, codes, requisition data sheets and data sheets shall be referred to the Company for clarification before proceeding with the manufacture of the affected parts.

1.5.2 Qualification Criteria

- The Vendor shall have the single point responsibility for the complete work.
- The Vendor shall be a regular manufacturer and supplier of the specified equipment/ package.
- Vendor in the last five years should have engineered, manufactured, tested, supplied and commissioned at least TEN (10) nos. of identical or similar packages in terms of capacity, rate, accuracy etc. relevant parameters and at least Five (5) of these packages shall have completed the continuous trouble free operations of a minimum 8000 Hrs. as on the bid due date in the last three (3) financial years. Vendor to give documentary evidence (confirmation from the purchaser and to refer name of person details).
- The vendor shall have full-fledged service support set-up in India or have appropriate arrangements for the same with the established local reputed company.
- The offered packages shall be of proven make from the existing production range of the manufacturer and must meet performance requirement as stated in the specifications.
- The vendor shall be required to submit the documentation and proof for above requirements and purchasers may at his discretion make additional checks for the same.

1.5.3 Bid submission

The bidder is advised to submit the bid/offer as per following procedure:

- All the pages of the bid shall be duly signed and stamped.
- Bidder is requested to adhere to all Technical Specification as well as all Commercial Terms. The Technical Bid should contain the proposed quality assurance plan. Bidders to submit company profile along with the details of similar works done in the last 3 years along with copies of certificates from clients and Copy of balance sheet for last 3 years.

- One copy of **Priced Technical Bid** shall be sent with Enquiry No. and Due Date on email id bksingh@daffpl.in with Copy to vishnu.vardhan@daffpl.in,

Mr BK Singh

M/s Delhi Aviation Fuel Facility Private Limited (DAFFPL)

1 st Floor, Wing "A", T-III Project Office,
IGI Airport, New Delhi-110037.

- One copy of **Unpriced Technical Bid** shall be sent marked with Enquiry No. and Due Date on email id Virender.Thakur@mottmac.com

Mr. Virender Thakur –Project Manager

Mott Mac Donald, A-20, Sector-2

Noida-201301.

- Please note that Priced offer should be sent through COURIER ONLY. Priced offer SHOULD NOT be sent through E-Mail or Fax. **Non-compliance shall result in rejection of offers.**
- The bidder is requested not to take any deviations from the Technical / Commercial conditions. However, in case bidder expressly desires to deviate on any specific point, the same shall be highlighted under a separate clause called “**DEVIATIONS**” made part of the bidder’s offer. (Deviations, if any, as per the attached Performa)
- The rates & list for mandatory spares for 2 years shall be furnished separately; the same shall be supplied one month before trial run.
- Vendor shall clearly specify whether equipment shall be transported in fully assembled condition or in a knocked down condition and to be assembled at site.
- If not bidding, please return enquiry documents along with regret letter by due date. Bids received after Due Date or NOT fully in accordance with enclosures shall NOT be considered.
- DAFFPL reserves the right of cancelling this Enquiry without assigning any reasons.

2 Specifications of Centrifugal Pump Sets

2.1 Scope of Work

- This specification covers the minimum requirements for the design, selection, engineering, obtaining approval from Owner / Consultant, manufacturing, supply, guarantee, inspection, testing as per the approved Quality Assurance Plan at work, coating as applicable, packing, transportation and delivery of pump sets to site in compliance with the mechanical data sheet, specification and standards attached to these specifications along with all other associated auxiliaries like motor, bearing base plate, coupling, foundation bolts, etc. and mountings. The scope also includes supervision during erection, testing and commissioning and providing performance guarantee.
- The Vendor shall provide electrically driven Centrifugal Pump set in accordance with this specification, the duties and conditions listed in the relevant data sheet, and the documents included in the bid documents.
- The scope of supply includes:
 - Electric Motor Driven Pumps with effective sealing system.
 - Flameproof Electric Motors as the prime mover having class F insulation.
 - Flexible Coupling System between prime movers (electric motors) and driven (centrifugal pumps).
- The Vendor should ensure technical feasibility of their tender offer, after inspecting the site. It must be understood that the vendor shall be required to Supply & execute/s every such items of work which is considered necessary for satisfactory performance of the pump sets, though such items is required are not specified in the tender documents.

2.2 Construction Method

- This specification covers the minimum technical requirements for ISO 5199 centrifugal pumps. The pumps covered by this specification shall be designed, manufactured and tested in accordance with the relevant design as modified in this specification. The relevant design standards include ASME, DIN, ISO and Manufacturer's Standard.
- The Vendor shall specify and recommend materials class for pump sets parts as suitable for Oily Water/Storm Water transfer in accordance with this specification and Data Sheet of each type of pump sets.
- All wetted areas must NOT contain any zinc, cadmium, bronze, copper, brass or other yellow metals.
- The material specification of all components of the Oily Water/Storm Water Transfer pump sets unit(s) shall be clearly stated in the Vendor's proposal.
- Welding and weld repairs shall be performed in accordance with the procedures qualified to the requirements.
- Major parts of rotating elements, such as impellers and balancing drums etc. shall be individually statically balanced. In addition to the static balancing, impeller, balancing drums, shafts and other rotating assemblies shall also be dynamically balanced.
- Impellers shall be made in one piece and preferably shall have solid hubs; fabricated impellers shall not be used. Impellers shall be secured to the pump shaft and shall be retained against circumferential movement by keying or lock rings. Means shall be provided to prevent loosening during operating including rotation in reverse direction. On pumps with overhung shafts impellers shall be secured to the shaft by a locknut or cap screw which tightens in the direction of normal rotation. Cap screws shall be of high strength material.
- Shafts shall be of ample size to transmit the full driver output, accurately machined throughout their entire length and properly finished at the bearing surfaces. Shafts shall be provided with sleeves locked to the shaft. The sleeves shall be furnished of wear, corrosion and erosion resistant material suitable for the fluid handled. Shafts shall have adequate stiffness to with

stand any hydraulic thrust imbalance that may occur over entire range of the pump characteristic curve.

- The hard facing of the shaft sleeve shall be carried under the throat bushing, in order to prevent galling between the shaft sleeve and the throat bushing. Alternatively, the throat bushing shall have sufficient clearance to accomplish the same objective. Replaceable shaft sleeves shall be provided to protect the shaft where it passes through stuffing boxes.
- Coupling shall be a flexible spacer type. The bidder shall indicate make and supplier. Coupling shall be dynamically balance after full machining and key way cut. Vendor shall deliver the fully machined coupling assembly along with the pump sets. The driver shaft dimensions and tolerances shall be as per the standards applicable.
- Removable coupling guard, non-sparking type shall be supplied and mounted so that they cover rotating parts to within 15 mm of stationary housing and shall be open at the bottom to permit manual shaft rotation. Guards shall be designed to prevent contact with coupling or shaft as a result of bodily contact. Guards shall be of spark proof material.
- Common base plate with trolley arrangement shall be supplied for pumps and motors by the pump vendor. Base plate shall be fabricated mild steel drain-rim type and shall be provided with sloping surface to avoid any accumulation of liquid. The base plate shall extent beyond pump and driver feet.
- The base plate shall be fully machined to receive pump and driver. Base plate, pump supports and pumping unit shall be constructed so to minimise misalignment caused by mechanical forces such as normal piping strains, internal differential thermal expansion and hydraulic piping thrust.
- The Centrifugal pump shall be easily removable from motor.
- Tie in points for all disciplines shall be located at the Oily Water/Storm Water Transfer pump sets unit/(s) extremities at those locations agreed with the Purchaser. The Vendor shall route systems to these points on board of the packages.
- Head Vs capacity curve shall preferably be flat but in no circumstance the shut off head be less than the total dynamic head at any capacity of the pump.
- Similar pumps shall have the same shut off head and shall have characteristics suitable for capacity sharing.
- Pumps with constant speed driver shall be capable of at least head at rated conditions by installing a new impeller considering effective speed of motor. Similarly, it should be possible to achieve 5% head decreased by adding another new impeller. However this should not less than the minimum diameter of impeller for the service.
- Pumps of self venting type are preferred and casing drain connections are required for all pumps. Casing vent connections are required for pumps, except those with top suction nozzle, which may be considered as self venting. Pressure gauge connection in pump nozzles shall not be furnished, unless specifically noted on the data sheets.
- Unless otherwise specified, all CS outside surfaces of the parts shall be suitable cleaned and coated as per code requirement and site climate condition by vendor.
- A nameplate of 18 Cr 8 Ni stainless steel, securely attached by stainless steel pins at an easily accessible point on the pump sets, shall be furnished. The nameplate shall be stamped with the following information:
 - DAFFPL Tag No. :
 - Serial No. mode of pump and year of manufacture :
 - Service :
 - Capacity (m3/hr) :
 - Pumping head (m) :
 - Specific gravity of liquid :
 - Revolutions per minute :
 - Motor rating :
 - Weight of pump set unit :

- The maximum permissible noise level shall not exceed 85 dBA, when measured at 1 metre from pump discharge.
- For the classification of hazardous areas, Vendor to follow the IP "Model Code of Safe Practice in the Petroleum Industry" (Part 15 3rd Ed: 2005 "Area classification Code"); IEC 60079, "Electrical Apparatus for Explosive Gas Atmospheres" (Part 10, "Classification of Hazardous Areas").
- Oil Water Transfer pump set unit/(s) shall be located in a Hazardous Area Div. 2. All instrumentation and electrics shall be suitable for Class 1, Div. 2, and Group D hazardous area, temperature Class T4 to NEC standard or equivalent IEC standard.
- Design of electrical equipment shall be such as to minimise the risk of explosion or fire due to use of electricity in areas where flammable liquids, vapour and gases will always be present.
- The Vendor shall ensure all supplied equipment and assemblies should conform to the ATEX 95 Directive and associated guidelines.
- The Vendor shall ensure all supplied equipment and assemblies conform to the electromagnetic compatibility requirements [EMC] and associated guidelines.
 - Low Voltage Directive 72/23/EEC
 - Machine Directive 89/392/EEC
- Vendor shall furnish details of motors as listed in data sheets. For each pump set, the vendor shall furnish the above details with Tag Nos., for each pump clearly. The pump set vendor shall stand guarantee for the satisfactory performance of the pump set. The performance of pump set shall be tested without overloading the motors. Motor shall be subject to test run.
- All pumps & motors shall be properly aligned, bolted and doweled to the base plates by pump set Vendor. Trial runs of pump sets shall be carried out for 72 hours continuous duty at site.
- Electrical motor motors shall confirm to IE2 standard for high efficiency electric motors. The frame size shall be suitable for motor with VFD application.
 - 100% of load, then Insulation Class – F Temperature rise limited to Class F.
 - 85% of load, Insulation Class – F Temperature rise limited to Class B.
- The Vendor shall submit a detailed procedure for welding and weld repairs, for approval by the Purchaser before commencement of work. Pre-qualified procedures shall be permitted, subject to approval by the Purchaser.
- Welding and welds repairs shall be in accordance with a written procedure, duly approved by the Owner.
- All NDT procedures shall be in accordance with the ASME design code applicable to the Oily Water/Storm Water Transfer pumping unit/(s) and shall be submitted by the Vendor for approval by the Owner. However, pre-qualified procedures shall be permitted, subject to approval by Owner.
- Post Weld Heat Treatment (PWHT) shall be in accordance as per the requirements.

2.2.1 Pump Technical Details

- The pump specific speed (N_{ss}), calculated at the best efficiency point (BEP) for the maximum impeller diameter of the casing, shall not exceed 13,000 (rpm, m³/hr, m).
- The impellers, shaft and couplings shall be dynamically balanced to the required grade as per applicable codes.
- Pump shall be equipped with mechanical seals unless otherwise specified on pump data sheet
- The pump model shall be selected so that required margin (minimum 1 m) between NPSH available and NPSH required is maintained for prescribed configuration throughout the entire operating range from minimum continuous stable flow up to and including rated capacity. Further up to 125% of the BEP capacity, NPSH required by the pump shall be less than the NPSH available in the piping system.
- The base plate shall incorporate a sloping drip collecting area under the pump unit (as a minimum) including a drain point and flange at the lowest point. Flanged drain valve with a blind flange shall be provided.
- Bearings shall be of the antifriction type and shall have a bearing design life of L10 - 25,000 hours minimum in continuous operation at rated pump conditions. Bearings for horizontal pumps shall be oil lubricated.
- No part of the equipment mounted on the base plate shall overhang the edge i.e. all equipment shall be within the dimensions of the base plate.

- The base plate shall be provided with lifting lugs for a single point lift, installed such that the centre of gravity of the package is midway between opposite lugs. In addition, none of the slings shall bear against any of the equipment on the pump base plate.
- In the pump performance curve, the Rated flow shall be lying within a range of 80% to 110% of best efficiency flow rate.
- Impellers shall be dynamically balanced with wear rings, if installed. Pumps shall be provided with replaceable casing wear rings (and if specified on data sheet, impeller wear rings) of compatible materials with non-galling characteristics. The wear rings shall be positioned and rigidly attached to prevent loosening.
- Spot/Tack welding is not considered an acceptable means of rigidly attaching wear rings. If open bladed impellers are offered and accepted a means shall be provided to compensate for wear between the impeller blades and the cover plate.
- Shafts shall be designed to carry loads without exceeding normal limits of combined stress, taking into account fatigue stress due to change in load or speed. The shaft stiffness shall limit the total deflection to 0.002 in (50µm) at the primary seal faces under the most severe dynamic conditions for the entire operating range of the pump with maximum diameter impeller and the specified speed and fluid.
- Oil lubricated bearings shall be provided with oil level indicators.
- Bearing housings shall be equipped with labyrinth type end seals where the shaft passes through the housing.
- Lifting lugs or eyes shall be provided on the pump base plate or mounting plate. Earthing lugs (2 off) shall also be provided.
- All flanged connections shall be in accordance with ASME B16.5. Bolt holes on all flanges shall straddle the horizontal and vertical centre lines. Vendor shall provide mating flanges with nuts, bolts and gaskets in case of non-standard sizes.
- Vent, if required, and drain connections shall be provided at suitable points on the pump casing, with isolation valve, flanged connection & termination at the base plate edge.
- Motor shall have power ratings, including the service factor (if any), at least equal to the following percentage of pump rated brake horse power:

Motor Name Plate Rating (KW)	Percentage of Rated Pump Power (%)
< 22	125
22 - 55	115
> 55	110

- Pump couplings shall be supplied by the pump vendor. Spacer type flexible all-steel couplings shall be provided for all pumps. Rigid all-steel, axially adjustable, couplings shall be supplied for vertical pumps with bearings integral with driver.
- The performance of pumps handling more viscous than water shall be corrected in accordance with the Hydraulic Institute standard.
- Pump performance testing, when specified on data sheet, shall be done at a minimum of five points, which will be:
 - Closed valve (where practical otherwise at minimum flow)
 - Minimum stable flow.
 - Rated flow.
 - Best Efficiency Point.
 - Maximum Operating Point.
- When performance test is specified on the data sheet, bearings temperature and vibration shall be measured at all points of the performance test, including closed valve when acceptable and jointly agreed by Owner and Vendor.
- Hydrostatic test pressure shall be 1.5 times the design pressure of the component and shall be for a minimum duration of 30 minutes. Hydro testing shall apply to all pressure retaining components.
- Modifying the impeller to meet performance by under filing, or overfilling is not allowed. An increase of 5% in head at rated flow shall be possible by fitting an increased diameter impeller in the pump.
- The underside of the base plate shall be painted by vendor such that the package can be installed without further preparations. Holes in the base plate for grouting shall be located to

allow ease of installation. The base plate shall be designed such as to keep the volume of grouting to a minimum.

- The noise level of all equipments shall not exceed the limit as specified. The maximum permissible noise level (sound pressure level) at a distance of 1 m from the complete pump package shall be 85 dB (A).
- Vendor shall submit the guaranteed sound power levels and sound pressure levels of the pump set. The pump set shall meet the maximum noise limits by design and not by corrective measures. Vendor shall submit Equipment Noise data sheet in accordance with the requirement.
- The motor rating shall be based on the end of curve power requirement (considering maximum fluid density and viscosity)

2.2.2 Sealing System

- The seal system shall be provided in its entirety by one of the approved Seal Vendors. The seal selection, piping plan and leakage detection system shall be in accordance with codes.
- Mechanical seal guarantees shall be in accordance with applicable codes.
- For single seals, the seal leakage detection system shall be based on a pressure transmitter operation, fitted on the seal cavity upstream of the leakage line orifice.
- To ensure selection of the optimum mechanical seal and seal auxiliary facilities for the duty specified, the pump manufacturer shall be responsible for the engineering coordination, installation, and performance of its auxiliary facilities such as circulation, injection, quenching and cooling, as required for the seal selected by the seal manufacturer.
- The seal system and the seal facing materials shall be robust against entrained solids in the process media.
- The Vendor, in conjunction with the seal vendor, shall guarantee three years of trouble free operation for double mechanical seals and one year of trouble free operation for single mechanical seals. Vendor shall replace any failed components or alternatively, the entire seal system if repeated failures occur within this period. The technical bid shall propose how this warranty can be implemented, preferably in the form of a maintenance bond.

2.2.3 Painting of the Oil Water Transfer Pump Set Units

- Detailed proposed procedures for painting and repair system shall be submitted by the Vendor for approval by the Owner. The painting shall preferably be carried out with following procedure for 4 coat system having a total DFT, of not less than 300 microns:
 - Surface preparation by sand /grit blasting to SA 21/2.
 - Surface primer followed by corrosion resistant layer of paint.
 - Final top layer over and above the corrosion resistant layer of paint.
 - Layer for protection during transit.
 - Colour shade of final coat of paint shall have prior approval of Owner.
 - All electrical and instrumentation items shall be masked during painting.
 - External Stainless steel components shall be solvent cleaned and left bare.

2.2.4 Tagging of the Oil Water Transfer Pump set Units

- The Vendor shall supply & tag all equipment with its appropriate ID number.
- The Vendor shall fix to each pump set, a plate detailing the design, operating and test conditions for individual equipment items and the pumping unit as a whole.
- The Vendor shall supply and install a range of safety signs, agreed with the Owner pertaining to the function of Oil Water Transfer pumping unit/(s).
- All tags, labels and signs shall be compatible with the environmental conditions.
- All tags shall be stainless steel engraved with black text in English.

2.2.5 Accessories for Oil Water Transfer pump set unit

- Following accessories of Oily Water/Storm Water Transfer Pump set Units shall be in accordance with mentioned Standards/Codes and the data sheet:
 - Prime Movers for the pump set unit.
 - Coupling and guards between prime mover and pump set unit.
 - Base plate for the pump set unit.

- Piping & Appurtenances.
- Special Tools.

2.3 Applicable Codes and Standards

- Latest published issue or amendment shall be followed unless stated otherwise.
- Specified standards may be replaced by equivalent standards that are internationally or otherwise recognised provided that it can be shown to the satisfaction of the Owner that they meet or exceed the requirements of the latest edition of the Specified standards.
- All standards, codes or specifications proposed by the Vendor shall be the latest issue of internationally recognised, and agreed with the Purchaser before implementation.

Applicable Code / Standard	Description
ASME B31.3	Process Piping.
ASME B16.34	Valves – Flanged, Threaded and Weld Ended.
ASME B16.5	Steel Pipe Flanges and Flange Fittings.
ASME B16.11	Forged Steel Fittings, Socket-Welding and Threaded.
ASME B16.20	Metallic Gaskets for Pipe Flanges - Ring-Joint, Spiral-Wound, and Jacketed.
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolt for High Pressure or High Temperature Service, or Both.
ISO 9001	Quality Management Systems.

2.4 Acceptance Criteria

The following shall be minimum acceptance criteria

- “Vendor” shall submit a detailed Quality Assurance Plan incorporating stage of inspection to be carried out by “Owner’s Representative”, for approval, prior to commencement of work.
- Access to the “Owner’s Representative”, of manufacturing shop, at all reasonable times shall be available to “Owner’s Representative”, All raw materials to be used in fabrication shall be offered for inspection and shall be used only if duly approved by the “Owner’s Representative”,
- “Vendor” shall arrange for inspection & testing of the equipment at his own cost which shall be witnessed by “Owner’s Representative”,
- “Vendor” shall furnish all the material test certificates.
- “Vendor” shall issue a call for inspection to “Owner’s Representative”, intimating readiness of the equipment / components for inspection / witnessing test giving 7 days prior notice.
- No surface / parts shall be painted or sandblasted until the inspection is completed.
- “Vendor” shall extend all the required testing equipment/facilities to “Owner’s Representative”.
- The “Vendor” shall submit the testing procedures to “Owner’s Representative”.
- The following tests shall be carried out as minimum requirement for testing:
 - Material test
 - Final Dimensional Check
 - Hydro Testing : 1.5 times the Design pressure
 - Performance Testing
- Fresh tap water may be used for hydrostatic testing. However, immediately after completion of the test the water shall be drained off and the vessel shall be thoroughly dried with hot air.
- The “Vendor” shall take adequate precaution, such that no scaling or rusting occurs inside the pump or any part thereof.
- Type, routine & acceptance test of electrical items.
- All welds shall be flush ground and sharp edges shall be rounded off.
- All bolt holes shall be straddle centre line of unit.
- Site performance test for pump sets to be carried out.
- Trial runs of pump sets shall be carried out for 72 hours continuous duty at site.
- Upon successful completion of testing operation and after the “Owner’s Representative”, has satisfied that the equipment installed is functioning as intended, the “Owner’s Representative”,

shall issue to the "Vendor" a "Taking Over Certificate" as a proof of the final acceptance of the system by the "Owner".

- Such certificate shall not be unreasonably withheld nor shall the "Owner's Representative", delay issuance thereof, on account of minor omissions or defects, which do not affect the commercial operation and/or cause any serious risk to the equipment.
- Such certificate shall not relieve the "Vendor" of any of his obligations which otherwise survive by the terms and conditions of the contract after issuance of such certificate.
- "Vendor" shall arrange test certificates for all the accessories being provided with pump sets.
- "2 sets of detailed O&M manual shall be provided.

2.5 Exclusion from "Vendor" scope

- All civil works. However, necessary civil loading data shall be furnished by "Vendor" within 15 days of the purchase order date for the design of civil foundation, etc.

2.6 Deviations

There shall be no deviations to this bid specification. However, if any special deviation from this technical requisition is must, the same supported by adequate technical back-up data shall be furnished separately during submission of offer by the "Vendor". In the absence of any such indications, it shall be assumed that the offer complies with all the requirements and such assumptions shall be strictly binding on the "Owner's Representative".

2.7 Contractor Quality Control

- Unless accepted otherwise by the "Owner's Representative", "Vendor" shall employ a Quality Management System complying with the program described in ISO 9001-2000. The Vendor shall prove and satisfy the Owner that his obligations within the scope of this document are in accordance with the relevant section of BS EN ISO 9001. Prior to commencement of work, the Vendor shall submit a Quality Plan and procedural specifications for Owner's review and approval.
- The Quality Plan shall define scope of work of all the sub-vendors associated with the work. This Specification shall only indicate a general requirement and shall not relieve the Vendor of his obligations to comply with the requirements of the Contract.
- Work which, in the opinion of the "Owner's Representative", is not in accordance with the Drawings or this Specification shall be rejected. Any delay caused by such rejection shall not in any way relieve the "Vendor" of his obligations under the Contract.

2.8 Guarantee

Unless otherwise specified in General purchase conditions regarding guarantee, the following shall govern and the following are covered by the guarantee clause:

- Quality of components used.
- In case of any defect / non-performance, the "Vendor" shall undertake necessary modification / replacement work at site in order to set right the defect.
- "Vendor" shall guarantee that all materials used in the equipment are new and have been submitted to regular acceptance procedure and are free from any defect regarding quality, form and appearance.
- Pump set unit shall be guaranteed for design, materials, workmanship and satisfactory performance for a period of 12 months from the date of commission or 18 months from the date of receipt at site, whichever is earlier.
- The "Vendor" shall be completely responsible for any design work carried out by him. "Owner's Representative", approval of his design shall not relieve him of his responsibility from the satisfactory performance of such item.
- Compliance with this specification or approval of work by "Owner's Representative", or release of units for shipment shall in no way release or relieve the "Vendor" of any responsibility for carrying out all provisions of this specification.

- The guarantee for performance shall cover individual items, bought-out items and systems including any electrical for their ratings / outputs as well as for the integrated operation of the equipment and its auxiliaries as a whole.

2.9 Documentation/Information to be furnished

The Vendor shall submit all necessary completely filled-in data sheets, G.A. of all pump sets, pump foundation drawings with loading details along with offer and documentation relating to the works as stated in the Project Specifications and Drawings or as otherwise requested by the “Owner’s Representative”.

- Complete technical particulars & General Arrangement scheme and terminal details drawing of pumps with overall dimensions.
- QA/QC plan.
- List of Erection & Commissioning spares. Special tools and fixtures for installations of the pumping unit(s) shall be included in the quotation and furnished as part of the initial supply. The requirements for quantities shall be agreed upon by Owner and the Vendor.
- The Vendor shall provide a list with prices of specialist tools and operational spare parts for Oil Water Transfer pumping unit(s) and instrumentation for start-up, commissioning and for twenty four (24) months operation.
- All spares shall be suitably marked and numbered, for easy identification with the maintenance manuals and with the particular item and shall be suitably packed and preserved to prevent deterioration during transport and / or storage at DAFFPL Fuel Farm, Shabad Mohammadpur IGI Airport, New Delhi.
- Following documents for motors also to be submitted by vendor:
 1. Torque - Speed Curve.
 2. Thermal Withstand Curves (Cold & Hot).
 3. Load – Efficiency Curve.
 4. Starting Current - Time Curve.
 5. Motor Data Sheets / Technical Particulars.
- Operation & Maintenance Manual.
- Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of engineers and owners, and other information specified.
- Product Test Reports: Certified reports of manufacturers design and production tests indicating compliance of unit and accessories with referenced standards.
- Field test reports indicating and interpreting test results relative to compliance with performance requirements specified. Include certified copies of field test records.
- “Vendor” shall submit the drawings and documents in required number of copies to the “Owner’s Representative”, for approval, as per the schedule given below:

After Placement of Work Order			
SN	Drawing / Documents	For Approval	Prior to Dispatch
1	G.A. drawings showing location of suction & discharge connections, auxiliary piping details, direction of rotation, when viewing from coupling end, model no., dimension, weights etc.	7	6
2	Cross-sectional drawings with parts numbered with MOC and list of parts, which agreed with the pumps, furnished.	7	6
3	Description & literature of all accessories including make, model, capacity, etc.	7	6
4	Allowable forces & moments, Performance curves which include diff. Head, efficiency, water NPSH req. BKW all expressed as function of capacity at peak efficiency. In addition, head curve for max. & min. These curves shall indicate viscosity corrections, if any.	7	6
SN	Drawing / Documents	For Approval	Prior to Dispatch
5	Completely filled in pump data sheets and separate deviation list, if any.	7	6

		After Placement of Work Order	
6	Material Test Certificates.	--	6
7	Test certificates for tests carried out at vendor/sub-vendor's shop.	--	6
8	List of recommended spare parts, prices and delivery dates.	7	6
9	Operating and maintenance manuals.	--	6
10	Drawing showing mechanical seal installation & other setting dimensions.	7	6
11	Installation drawings.	7	6

Vendor shall furnish the final record documents as listed above along with or immediately after the supply/despatch of the equipment. The reports and other documents shall be grouped for each equipment and all the documents shall be provided in a folder.

2.10 Testing the Oil Water Transfer Pumping Units

2.10.1 Purchaser's Requirements

The Vendor will perform following scope of activities in seriatim to fulfill Owner's Requirement for Testing the Oil Water Transfer Pumping Unit(s):

2.10.2 General

Preparation of all testing processes and procedures and submit the same for its approval by the Owner. These should be in line with the design codes and international standards.

2.10.3 Pre Test Inspection

The Owner shall undertake a visual and dimensional inspection of the pumping units and produce a list of items. Any deviation from the standards shall have to be corrected by the Vendor prior to commencement of any test.

2.10.4 Testing of Strength

Hydrostatic Testing of the pumping units shall be conducted in accordance with applicable Design Code. A stabilised test pressure test shall be held for the specified time. During testing, pre tested items unsuitable to be in the test system may be removed.

2.10.5 Cleaning & Drying

The pumping units shall be cleaned and dried thoroughly on completion and acceptance of the strength test.

2.10.6 Leak Testing

The pumping units shall be fully assembled and pneumatically leak-tested on completion of cleaning and drying. Leaks, if any, shall be rectified.

2.10.7 Functional Testing

The pumping units shall be assembled and functionally tested on completion of leak testing.

2.10.8 Factory Acceptance Test

Upon satisfaction of the Vendor that the pumping units are fully functional, the Vendor shall inform the Owner with 10 days advance notice for Factory Acceptance Test, which shall be undertaken in the presence of the "Owner's Representative".

2.10.9 Post Test Inspection

The "Owner's Representative" shall undertake visual inspection of the pumping units after completion of the FAT. The "Owner's Representative" will produce a list of his observations, which shall be attended by the Vendor prior to commencing any activity for packing.

2.10.10 Dossiers

The Vendor shall prepare a detailed dossier/(s) for manufacturing, inspection and testing and submit the same to the Owner.

2.11 Packing, Protection, Preservation & Delivery

The Vendor will perform following activities for packing & transportation of the Oil Water Transfer Pumping Unit(s):

2.11.1 Packing, Protection & Preservation

On completion and acceptance of testing and FAT, the pumping units shall be preserved, protected, packaged keeping in view the outer maximum dimension of the package acceptable for transportation either by land/rail to DAFFPL Fuel Tank Farm at Shabad Mohammadpur, IGI Airport, New Delhi for its storage.

2.12 Method of Measurement

The item shall be measured in numbers.

2.13 Basis of Payment


Payment terms shall be as per "DAFFPL" terms and conditions.

Appendices

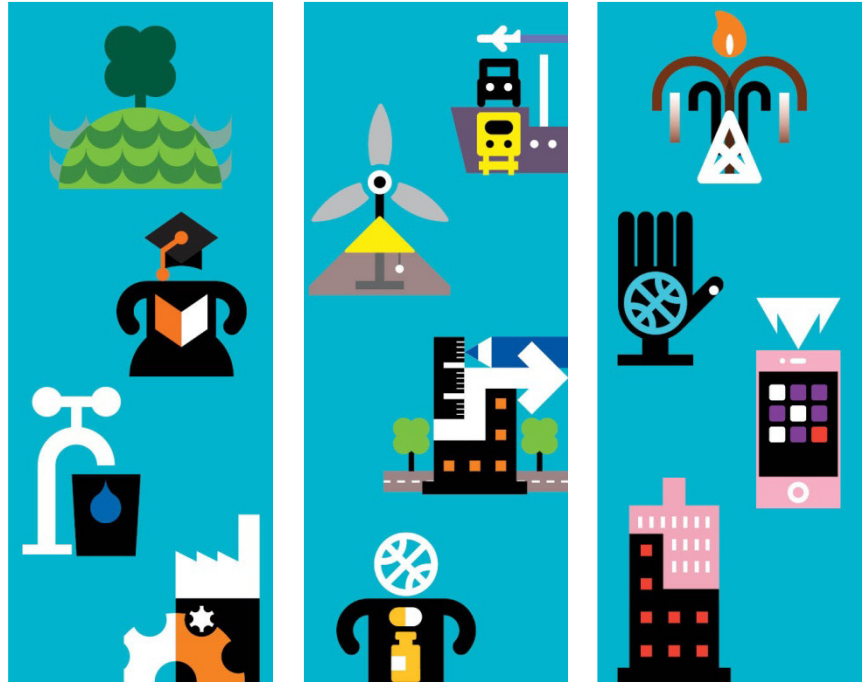
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Appendix A. Reference Documents

- A.1 Refer Document no. “DAFFPL-MMD-322538-RSD-03” for Pump/Motor Datasheet**
- A.2 Refer Document no. “322538-PIC-0007-01” for P&ID for Oil Water Collection and Transfer**

Rev	Date	Description	Prp	Chk.	Appv.	Rev	Date	Description	Prp.	Chk.	Appv.	
0	14.09.15	Issued for Approval	JCP	HRS / TKV	VST							
SERVICE	Qty Reqd	1	Working	1	Stand-By	0	Tag No.	PF-215 A/B				
	Liquid	Oily Water /Storm Water		Toxic	No	Corrosive	No	Suspend Solid	No	Type	%	
	Location	Outdoor	Area class	Non-hazardous		Operation	Continuous	Area Classification	CI-II, IIA/IIIB, T4			
OPERATING CONDITION	Density of Liquid	kg/m ³	1000.00	Pressure in suction equipment		1.03	- kg/cm2 (a)					
	Viscosity	cP	1.00	Pressure in discharge equipment		1.03	- kg/cm2 (a)					
	Vapour Pressure	m.Liq(a)	1.00	Head in suction equipment		10.33	- m Liq (a)					
	Temperature	Normal	°C	50.00	Head in discharge equipment		10.33	- m Liq (a)				
		Minimum	°C	40.00	Height of liquid in Suction		-3.30	- m Liq				
		Maximum	°C	80.00	Head loss suction		1.70	- m Liq				
	Capacity	Normal	m3/hr	10.00	Net Suction Head		5.33	- m Liq (a)				
		Rated	m3/hr	10.00	NPSH- available		4.33	- m Liq (a)				
		Maximum	m3/hr	10.00	Total Head Loss in Discharge		12.10	- m Liq				
	Process upset temperaure	if applicable		Total Discharge pressure		22.43	- m Liq (a)					
Process upset Pressure	if applicable		Pressure - Differential		17.10	- m Liq						
UTILITY	Electric Supply	Volts	415 ± 10%		Phase	3.00	Cycle	50 HZ ± 3%				
	Cooling Water Supply	flow, m3/hr	*	Pressure , kg/cm ²	Temperature , °C	*						
	Sealing Water Supply	flow, m3/hr	*	Pressure , kg/cm ²	Temperature , °C	*						
	Steam Supply	flow, m3/hr	*	Pressure , kg/cm ²	Temperature , °C	*						
PUMP TECHNICAL DETAILS	Pump Design Data			Vendor detail		Bearing and Lubrication Type			Vendor Detail			
	Basic type	Horizontal		*	Type of Lubrication	flooded oil bath			*			
	Pump manufacturing standard	ISO 5199		*	Radial bearing Type				*			
	Type of split	Radial		*	Thrust bearing Type				*			
	Depth of the pit (m)	3.3		*	Accessories			Vendor Detail				
	No. of stages	Minimum		*	Base Plate & frame	combined	supplied by vendor					
	Impeller diameter (Min/Rated/Max)			*	Foundation Bolt	supplied by vendor						
	NPSH Required			*	Coupling Type	Normal	supplied by vendor					
	Viscos correc. factor C _Q /C _H /C _η			*	Coupling Make	*						
	Recommended Pump speed, rpm	3000		* * *	Coupling gurad	Normal	supplied by vendor					
	Efficiency at rated capacity			*	Vibration instrument & connection	not required			*			
	Shaft Power -kw			*	Drain & vent connection	required	*					
	Safe minimum flow			*	Relief valve connection & supply	not required			*			
	Shut off Head			*	Drip Tray	not required			*			
	Design pressure/Hydrotest pressure			*	Drain rim	not required			*			
	Pump piping detail			Vendor detail		Mechanical Seal/ packing detail			Vendor Detail			
	Pump suction	ANSI	Class 150	*	Type of shaft sealing	Mechanical seal			*			
	- position from driving end	End		*	Mechanical seal details	SiC/C			*			
	Pump discharge	ANSI	Class 150	*	If Mechanical seal selected	seal plan to be submitted						
	- position from driving end	Top		*								
DRIVER DATA	Pump Driver	electric motor		Flame proof	Fixed/variable	variable	Trasmission	direct drive				
	Type	TEFC, Squil.Cage, IE2		IP-55 , Insu CI-B	Frame Size & No		*	*				
	Type of Explosion Protection	Exd		*	Cable Type	A2FXY						
	Rated Power and Speed	*	Kw	* rpm	Driver Supplied By	supplied by vendor			*			
	Torque-Starting/Full Load	*		*	Driver Installed By	supplied by vendor			*			
MATERIALS AND ACCESSORIES	Materials			Vendor detail		Materials		Vendor detail		Inspection and Test		
	Casing	CS	*	Throat Bush	*	*	Material certificate	required				
	Impeller	A 216 WCB	*	Casing studs	*	*	Hydro Test	required				
	Shaft	AISI 410	*	Wet bolting	A193 Gr B7	*	Performance Test	required				
	Casing wear ring	AISI 410	*	Interstage bush	*	*	NPSH Reqd. Test	required				
	Impeller wear ring	AISI 410	*	Balance drum	*	*	Complete unit Test	witnessed				
	Shaft Sleeve	AISI 410	*				Auxiliary Test	observed				
GENERAL NOTES	N1	Max. allowable pump speed for single suction impeller based on Maximum NSS 12800 (m3/hr,m,rpm)					8494	RPM				
	N2	Max. allowable pump speed for Double suction impeller based on Maximum NSS 12800 (m3/hr,m,rpm)					12013	RPM				
	1	* indicates data to be furnished by the vendor					10	All nuts/ bolts shall be mm series				
	2	Vendor to furnish pump characteristic curve					11	Hydro test pressure shall be 2 times maximum duty pressure and 1.5 times shut off pressure				
	3	Mechanical seal and elastomers shall suit pumping fluid										
	4	Motor shall not be overloaded over the entire range of curve					12	Motor starter shall be DOL up to 7.5 kw, Star-Delta for 10 kw to 75 kw and VFD/ Soft starter above 75 kw				
	5	Pump assembly shall be dynamically balanced					13	Vendor to furnish QA plan, test certificates, relevant drgg and O&M manual				
	6	Vibration level shall be less than 50 microns in all directions					14	Vendor to furnish list of mandatory spares for 2 years of O & M				
	7	Base plate to be drilled and machines to mount pump and motor					15	Nozzle orientation plan shall be proposed by the vendor and approved by the client, before manufacturing.				
	8	Nameplate shall mention Tag No. of the pump										
9	If end flanges are not as per specification, vendor to supply matching flanges.											
Client : Delhi Aviation Fuel Facility Private Limited 1st Floor, Wing "A", T-III Project Office, IGI Airport, New Delhi-110037								501, Sakar-II Ellisbridge Ahmedabad - 380006 India T +91 (0) 79 2657 5550 F +91 (0) 79 2657 5558 W www.mottmac.com				
Title: Oily Water / Storm Water Transfer Pump Centrifugal Pump Datasheet												
Date	Prepared	Checked	Approved	Scale	Drawing / Document Number		Sheet	Status	Rev. No.			
14.09.15	JCP	HRS / TKV	VST	-	DAFFPL-MMD-322538-RSD-03		1 of 1	EXE	0			

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Technical Specifications for SS-316L Flexible Braided Hoses

Modernization of Fuel Farm-IGI Airport,
Shahbad Mohammadpur, New Delhi

November 2015

Delhi Aviation Fuel Facility Private Limited



Technical Specifications for SS-316L Flexible Braided Hoses

Modernization of Fuel Farm-IGI Airport,
Shahbad Mohammadpur, New Delhi

November 2015

Delhi Aviation Fuel Facility Private Limited

C/o Aviation Fuelling Station, Delhi International Airport, Shahabad Mohammadpur,
New Delhi-110061

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
0	12.08.2015	AKP	HVC/TKV	VST	Issued for Enquiry
1	22.09.2015	AKP	HVC/TKV	VST	Issued for Enquiry
2	20.11.2015	AKP	HVC/TKV	VST	Issued for Enquiry

Information class: Standard

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Modernization Of Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. IGI Airport, New Delhi

SPECIFICATIONS SS-316L Flexible Braded Hoses	Project No.:322538
	Reference: Tank Farm Area (ATF)
	No. of Sheets: 14

Job Number	Facility Location Code	Document Number
322538	Shahabad Mohammadpur, IGI Airport-New Delhi	322538-RSD-104

- Code 1:** Approved and Work may Proceed.
- Code 2:** Revise & Re-submit. Work may Proceed subject to incorporation of comments.
- Code 3:** Revise & Re-Submit. Work should Not Proceed.
- Code 4:** Review Not Required. Work may Proceed.

Approval to proceed shall not be deemed as Acceptance or Clearance of Design, Calculations, Analyses, Test Procedures/Methods, or Selection of Materials by the Contractor. The Contractor shall Not be relieved from full compliance of Contract Requirements and Technical Specifications.

Dated: **Delhi Aviation Fuel Facility Pvt. Ltd.**

Document No.

Rev	Date	Issued For	Prepared By:	Checked By:	Approved By:	Approved By:
			Mott MacDonald Pvt. Ltd.			Client

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Abbreviations

SA	-	American Standards Association
ASME	-	American Society for Mechanical Engineers
QA/QC	-	Quality Assurance / Quality Control
API	-	American Petroleum Institute
ASTM	-	American Society for Testing and Materials
SS	-	Stainless Steel
CS	-	Carbon Steel
GA	-	General Arrangement
NPSH	-	Net Positive Suction Head
MLC	-	Metre of Liquid Column
BKW	-	Brake Kilo Watt
MOC	-	Material of Construction

1 General

1.1 Introduction

- M/s Delhi Aviation Fuel Facility Private Limited (DAFFPL) is a joint venture between Indian Oil Corporation Limited (IOCL), Bharat Petroleum Corporation Limited (BPCL) & Delhi International Airport Limited (DIAL). M/s Indian Oil Sky Tanking Limited (IOSL) is responsible for running day to day operations of receiving the Jet fuel, storing the same in Fuel Farm and refuelling the Air Crafts.
- DAFFPL has avail design, engineering, procurement assistance and construction management services from Mott MacDonald which has been retained to provide consultancy services for the same.
- Existing Fuelling System i.e. Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL) for refuelling the aircrafts at IGI Airport, New Delhi is slated for modernization and up-gradation so as to conform to International Standards for receipt, storage and dispensing of Jet A1 fuel.
- At DAFFPL fuel farm, Jet A1 fuel is brought aboveground/underground pipe from Oil Terminals of IOCL and BPCL and also by road tanker. This fuel is stored in the Cone Roof Vertical Tanks installed in the fuel farm. Presently, the aircrafts are being refuelled by hydrant pumps through underground Jet A1 fuel hydrant pipe line.
- This document specifies the minimum acceptable requirements set by the Purchaser for design, engineering, procurement, fabrication, assembly, inspection, testing, commissioning and delivery to site of Flexible Hoses for sampling of Fuel from Tank Farm.

1.2 Definitions

For the purposes of this document the following definitions shall be used.

- **Must/Shall** the word 'shall' is to be understood as mandatory.
- **Should** the word 'should' is to be understood as strongly recommended.
- **May** the word 'may' is to be understood as indicating a possible course of action.
- **Purchaser** Delhi Aviation Fuel Facility Pvt. Ltd., IGI Airport, New Delhi.
- **Consultant** Mott MacDonald Pvt. Ltd
- **Mfg. / Supplier/vendor** The party responsible for manufacture or supply of equipment and services to perform the duties specified by the Consultant or company.

1.3 Site Particulars

1.3.1 Location

- The site is located at Shabad Mohammadpur adjoining to Indira Gandhi International Airport, New Delhi. The site is approachable by road.

1.3.2 Environmental Design Parameters

The following information is set out here for general guidance:

Project	:	Delhi Aviation Fuel Facility Private Limited.
Site address	:	Aviation Fuelling Station Shahbad, Muhammadpur IGI Airport, New Delhi
Nearest Railway Station	:	New Delhi Railway Station
Nearest Airport	:	Indira Gandhi International Airport, New Delhi
Altitude	:	237 m
Operating Max. Temperature	:	48.4 °C
Operating Min. Temperature	:	-2.2 °C
Design Temperature	:	50 °C
Humidity, Maximum	:	100 %
Humidity, Minimum	:	25 %
Maximum Rainfall	:	20-30 mm in one hour duration
Designed Wind Velocity	:	47 m/s
Barometric Pressure	:	0.98 bar
Seismic Zone	:	Zone IV as per IS: 1893

1.4 Area Classification

- Hazardous

1.5 Bid submission

The bidder is advised to submit the bid/offer as per following procedure:-

- All the pages of the bid shall be duly signed and stamped.
- Bidder is requested to adhere to all Technical Specification as well as all Commercial Terms. The Technical Bid should contain the proposed quality assurance plan. Bidders to submit company profile along with the details of similar works done in the last 3 years along with copies of certificates from clients and Copy of balance sheet for last 3 years.
- One copy of **Priced Technical Bid** shall be sent with Enquiry No. and Due Date on email id bksingh@daffpl.in with Copy to vishnu.vardhan@daffpl.in,

Mr BK Singh
M/s Delhi Aviation Fuel Facility Private Limited (DAFFPL)
1 st Floor, Wing "A", T-III Project Office,
IGI Airport, New Delhi - 110037

- One copy of **Unpriced Technical Bid** shall be sent marked with Enquiry No. and Due Date on email id Virender.Thakur@mottmac.com

Mr. Virender Thakur –Project Manager
Mott Mac Donald, A-20, Sector-2
Noida - 201301

- The bidder is requested not to take any deviations from the Technical / Commercial conditions. However, in case bidder expressly desires to deviate on any specific point, the same shall be highlighted under a separate clause called “**DEVIATIONS**” made part of the bidder’s offer. (Deviations, if any, as per the attached Performa)
- If not bidding, please return enquiry documents along with regret letter by due date. Bids received after DUE DATE or NOT fully in accordance with enclosures shall NOT be considered.
- DAFFPL reserves the right of cancelling this Enquiry without assigning any reasons.

2 Scope of Work

- The scope covers design, manufacturing and fabrication as required, testing, inspection, packing, transportation, guarantee & supply of SS316L Flexible hoses to site. The specification is to be read in conjunction with the applicable standards. It is to be noted that the attached bill of materials can vary during order placement.
- The bidder shall make all possible efforts to comply strictly with the requirements of the attached specification / data sheet. In case, any deviations are considered essential by the bidder after making all possible efforts, these shall be separately listed in the bidder’s offer in the format “Deviations / exceptions”.
- The deviations / exceptions shall be listed separately for each item specification / data sheet with cross-references and proper reasons for the deviations / exceptions. In case of any deviation not listed under the ‘Deviations / exceptions’ shall be considered acceptance of specification / data sheet by bidder.
- Compliance to this specification shall not relieve the bidder of the responsibility of supplying the items of proper design, material, and workmanship to meet the operating requirements specified in the specifications.
- The bidder shall be responsible for the co-ordination of all sub-suppliers and for the overall guarantee of items offered. It is the specific responsibility of the bidder to invoke all applicable referenced specifications to each sub-supplier purchase order.
- The bought out items / supplies shall be sourced from a regular and established manufacturer. Along with his offer, the bidder shall indicate the sub supplier / vendor list, as required, for each item, for owner’s approval.
- Owner / their representative / engineering consultant / TPIA have all the rights to inspect the material and progress of work at vendor’s workshop at any reasonable time.
- Supplier should furnish the list of operation and maintenance spare for two years and provide the separate offer for the list of spares.

2.1 Scope of Supply

Table 2.1: Scope of Supply

Sr No	Location	Service	Size	Qty.	Hose Length (mm)	Remarks
1	Tank farm area	ATF (Aviation turbine fuel)	25 NB	9	6000	For Sampling purpose inside the tank
2	Tank farm area	ATF (Aviation turbine fuel)	25 NB	3	3000	For Sampling purpose inside the tank

Note: For further details of flexible hoses, refer data sheet 322538-MSD-0501-01, Rev 2.

3 Technical Specification

This specification outlines the minimum requirements for the design, selection of materials, procurement, manufacturing and fabrication as required, supply, guarantee, inspection, testing as per the approved Quality Assurance Plan, packing, transportation and delivery to site in compliance with the enclosed Bill of quantities, site requirements, technical specifications and standards mentioned herein.

3.1 Technical Notes for Hoses

3.1.1 Design and Construction

- Supplier shall supply hose & hose coupling in accordance with the specification sheets / Bill of Quantities / specification sheets / technical notes and other enclosures to the requisition.
- All codes and Standards for manufacture, testing, inspection etc. shall be of latest editions. For SS316L hoses, the MOC shall correspond to the material specified in the Data Sheet.
- Hose & Hose coupling shall be designed, manufactured and tested, inspected and marked as per the manufacturing standards; design codes and standards (latest editions) indicated in the respective specification sheets / Bill of Quantities.
- Supplier shall be responsible for establishing final required thicknesses based on the operating and design criteria specified in data sheets.
- Any conflict between the requisition, enclosures, specification sheets, and referred standard codes shall be brought to the notice of the Owner representative for clarification. However, the specification sheets and enclosures of the Material Requisition including subject notes shall govern. No deviation to specification / Standards shall be permitted through vendor drawing approval. Approval of drawings by owner / representative / consultant shall be valid only for design features.
- Welding Procedure Specification (WPS) and Procedure Qualification Records (PQR) shall be established and approved before carrying out welding.
- All SS joints shall be 100% DP tested & 100% radiographed.
- Weld repairs must be approved by the authorized inspector prior to start of the repair. Repairs of the bellows material will not be permitted in any stage of the fabrication process.
- Flanges for flanged hoses shall be in accordance with ASME B16.5, unless specified otherwise in the requisition. Flange face finish shall be as specified in the data sheet. The interpretation for range of face finish shall be as follows:
 - Smooth Finish/ 125 AARH : Serrations with 125 to 250 μ in AARH
- Manufacturer shall guarantee suitability of hoses of the service and working condition as specified in the data sheet, specification. The end condition of hoses will be supplied as specified as in the data sheet.
- All hoses shall be tested at two times the design pressure along with end connection.
- The material of the flexible hoses should not react with ATF.

- The length of the finished hose assembly shall not differ from the specified length by more than $\pm 1\%$. Hose assembly shall be measured after being subjected to various tests.

3.1.2 Marking & despatch

- Hose & Hose coupling shall be dry, clean, and free from moisture, dirt, and loose foreign materials of any kind.
- Hose & Hose coupling parts shall be coated with approved rust preventive and protected from any mechanical damage during transportation, shipment, and storage.
- Each hose shall have weatherproof tag attached with a corrosion resistant metal wire. The weatherproof tag shall be embossed with item code, size of hose and length of hose. Working pressure shall be marked on both ends.

4 Inspection & Testing Requirements

4.1 Inspection & Testing

The items shall be subjected to stage wise inspection and testing at Manufacturer's works by Owner representative / TPIA as per approved drawing / data sheet / technical specification and approved QAP. Manufacturer / Supplier shall submit detailed Quality Assurance (QAP) procedures for approval to Owner representative before commencement of fabrication. Approved QA procedures shall form the basis for inspection.

The necessary calibrated instruments shall be provided by supplier for testing. Manufacturer / Supplier shall inform readiness of items for inspection, 03 working days in advance. Material shall be despatched only after clearance certificate for despatch is issued by Owner / Consultant.

Bidder shall confirm all relevant material test reports before dispatch, and if required client/other agencies shall provide Third party inspection before dispatch.

Inspection will be done at vendor's work before dispatch as per QAP.

4.2 Inspection authority

- Inspection shall be carried out by Third party inspection agency (TPIA) and in such cases, all test certificates / documents shall be duly certified by the third party.
- Owner / Owner's representative however reserves the right to inspect the items.

4.3 Acceptance

Owner reserves the right to accept or reject the material based on the aforementioned inspection data if it does not meet specification.

4.4 Inspection and Test Requirements for Hose

Table 4.1: Inspection plan for Hose

SN	Stage/Activity	Characteristics	Quantum of check	Record	Scope of inspection	
					Supplier / Contractor	TPIA
1.0	Incoming materials					
1.1	Incoming Materials (SS 316L pipe / SS wire braiding / Flanges / Couplings, stub ends)	Chemical and Mechanical properties for SS materials, IGC as required, Chemical for SS wire Braiding, Manufacturer's Test Certificates for Hoses	100%	Test Certificates	R / W	R
1.2	Incoming Materials	Dimension	100%	Report	W	R
2.0	WPS, PQR, WPQ					

SN	Stage/Activity	Characteristics	Quantum of check	Record	Scope of inspection	
					Supplier / Contractor	TPIA
2.1	WPS, PQR, WPQ New Qualifications	Visual, radiography, tensile, bend etc.	100%	WPS, PQR, WPQ	W	W
2.2	Existing WPS, PQR, WPQ	Visual, radiography, tensile, bend etc.	100%	WPS, PQR, WPQ	R	R
3.0 In Process Inspection						
3.1	Welding (Weld fit up)	Visual & Dimensional	100%	Report	W	R
3.2	Welding (final welds)	Weld soundness	100%	DPT & Radiograph	R	R
3.3	Assembly	Fitment	100%	Report	W	R
4.0 Final Inspection						
4.1	Product evaluation and testing	Hydro testing	100%	Test Report	H	H
4.2	Product evaluation and testing	Vacuum Test	100%	Test Report	H	W
4.3		PMI Check – as per Tech. notes	Supplier–100%; TPIA-random	Test Report	W	W
4.4		Visual, dimensional, marking	Supplier–100%; TPIA-random	Test Report	W	W
4.5		Pickling & Passivation for Stainless Steel components	100%	Test Report	W	R
5.0	Packing	-	At Random	Test Report	W	R
6.0	Documentation	Material Test Certificates / Check Testing Reports/ Hydro Test/ Vacuum Test Reports / dimension Report/ Pickling Passivation Report / Inspection Release Note, etc.	100%	Test Certificates / TPIA inspection release note	H	H

5 Preparation of Shipment

5.1 Packing

- All packing shall be carried out after satisfactory inspection and testing of the package. In the case of 'witnessed inspections' this is subject to receipt by the Vendor of the Release Note for Shipment.
- All components of the equipment shall be cleaned and dried before preservation is commenced.
- The equipment shall be suitably prepared for the type of shipment specified. The preparation shall make the equipment suitable for 6 months of outdoor storage from the time of shipment, with no disassembly required before operation, except for inspection of bearings and seals.
- All exterior surfaces, except for machined surfaces, shall be given at least one coat of the manufacturers' standard paint. Exterior machined surfaces, including shafts, shall be coated with suitable rust preventive.
- All interior areas of crankcases and carbon steel oil systems auxiliary equipment such as reservoir, vessels, and piping shall be coated with suitable rust preventive. The casing inner diameter shall be protected by non-combustible rust preventive.
- All flanges shall be blanked-off with wooden discs, in which the nuts of the studs are to be embedded
- All flanged and threaded openings shall be provided with gasketed metal closures or steel plugs.
- The ends of small pipes shall be provided with plastic caps and sealed with tape.

5.2 Shipping

- Each unit shall be boxed in a seaworthy close-boarded case with a waterproof lining.
- Initial spares shall be packaged in a separate rigid box, which shall be placed in the case containing the main equipment.
- Transport to site will be via truck over extremely rough terrain. Therefore goods shall be packed /delivered in such a way as to withstand the severe road conditions in which include unpaved poorly graded roads.
- None of the pressure parts to be furnished or used in connection with this Contract will be shipped until shop inspection and testing to the satisfaction of the inspecting authority has been made. Such shop inspection of the item shall however; neither relieves the Vendor from full responsibility for furnishing items conforming to the requirements of this contract nor prejudice any claim, right or privilege which the Owner may have because of the supply of defective or unsatisfactory apparatus. Should the inspecting authority waive the right to inspect any apparatus, such waiver shall not relieve the Vendor from obligations under this contract.

6 Performance guarantee and warrantee

6.1 Guarantee

Items shall be fully guaranteed against any manufacturing defects / poor workmanship / inferior design or quality etc. for a period of 12 months from the date of commissioning or 18 months from the date of delivery whichever is later. During this period, supplier shall arrange to repair / replace any defective part free of cost or replace complete set if required.

In the event of non-fulfilment of Performance guarantees, the vendor, at his own cost, shall do modification and rectification to meet the guarantee requirement of the purchase order. If, within reasonable time limit (as agreed to by both the parties), the vendor fails to make the required rectifications in the items or its components, the Owner may reject at his discretion, those items and can ask the vendor to supply new items of proper design and manufacturing to meet the Performance guarantees, as per the Purchase Order.

6.2 Defects Liability and Warranty

All the items shall be capable of performing the duties specified in this specification without damage, distortion, or failure of any component.

The completion of stipulated tests and issue of test certificates shall not relieve the vendor of his ultimate responsibility of guaranteeing the items and its Performance.

The items shall be guaranteed against manufacturing defects, inadequate design, non-Performance, defective materials and poor workmanship for period of 18 month from the date of supply (date of receipt of material at site will be considered as the date of supply) or 12 month from the date of supply whichever is later.

7 Non-material requirements (Documents)

7.1 Documentation along with bid documents



- Supplier shall submit his complete descriptive and illustrative Catalogue / Literature.
- One copy of the technical specification, item specification sheets (if enclosed), Bill of Quantities signed as “Accepted” by the Supplier with all deviations, if any, marked clearly.
- If the item is either not in vendor's manufacturing range or has no deviation, the Supplier shall write clearly on specification sheets as “Regret” or “No deviation”.
- If there is any deviation in the technical notes, the same shall be listed clause wise.
- Failure to submit documents as specified in above clauses, the offer is likely to be rejected.
- Supplier shall submit drawings, as mentioned below, after placement of order and before start of manufacture.
 - Detailed dimensioned, cross - section drawing with parts / material lists, weights etc. also indicating details / dimensions for accessories.

7.2 Final Documentation for all items

- All the inspection documents, test certificates, Material test certificates inline with QAP requirements shall be submitted in original along with four readable good quality prints before final dispatch of materials. The documents shall be duly verified by Owner representative / TPIA. The actual values obtained shall be recorded in the test certificates / documents.
- Test reports shall be submitted for all mandatory tests as per the applicable code. Test reports shall also be furnished for any supplementary tests wherever specified.

8 List of Attachments

- 322538-MSD-0501-01, Rev 2, Data sheet for Flexible hoses.

2	20.11.2015	AKP	Issued for Execution	VNP	TKV							
1	22.09.2015	AKP	Issued for Execution	VNP	TKV							
0	12.08.15	AKP	Issued for Execution	VNP	TKV							
Rev.	Date	Prp	Description	Chkd	Apr.	Rev.	Date	Drawn	Description	Chkd	Apr.	
SS-316L FLEXIBLE BRADED HOSES SPECIFICATION												
	SPECIFIC DETAIL			DESCRIPTION					REMARKS			
DESIGN DATA	SERVICE			Refer sheet 2 of 2								
	DESIGN TEMPERATURE - Deg C			50								
	DESIGN PRESSURE - Kg/cm2 g			10								
	TYPE			FLEXIBLE								
CONSTRUCTION DETAIL	CLASS / RATING			150 #								
	SIZE RANGE			15 to 40 NB								
	END CONNECTION 1			25 NB NPT Female coupling / AS PER SITE REQUIREMENTS								
	END CONNECTION 2			25 NB NPT Female coupling / AS PER SITE REQUIREMENTS								
	FACE FINISH			NA								
	HOSE PIPE			CLOSE PITCH BUTT WELDED ANNULAR CORRUGATIONS, HEAVY WALL SS316L TUBE (NO INTERLOCKING) WITH DOUBLE SS316L BRAIDING								
	SPECIFIC REQUIREMENTS			STD								
MATERIAL OF CONSTRUCTION	END CONNECTION			SS 316L								
	PIPE NIPPLE / NOZZLE			ASTM A312 TP 316L / A358 TP 316L Cl.1								
	STUB END/QUICK COUPLING/ADAPTER COUPLER			SS 316L								
	STUD & NUTS (EXT)			SS 316L								
STANDARD	DESIGN STANDARD			MFG. STD.								
	FLANGE STANDARD			NA								
	TESTING			AS PER QAP								
	OTHERS											
VENDOR DETAIL	MODEL NO / MAKE			*								
	INLET PRESSURE(KG/CM2)			*								
	BACK PRESSURE (KG/CM2)			*								
	OPERATING TEMPERATURE C			*								
	CONDENSATE LOAD (KG/HR)			*								
	WEIGHT			*								
GENERAL NOTES												
1	*! MARK DATA TO BE FURNISH BY VENDOR.											
2	VENDOR SHALL PROVIDE 2 NUMBERS OF LOOSE MALE CONNECTORS FOR EACH HOSE TO BE CONNECTED TO 25 NB PIPE.											
3	VENDER TO CONFIRM THE END CONNECTIONS AS PER SITE REQUIREMENTS.											
4	THE MATERIAL OF FLEXIBLE HOSES SHOULD NOT REACT WITH ATF.											
This document should not be relied on or used in circumstances other than those for which it was originally prepared and for which Mott MacDonald was commissioned. Mott MacDonald accepts no responsibility for this document to any other party other than the person by whom it was commissioned.												
Client : C/o Aviation Fuelling Station, Delhi International Airport, Shahabad Mohammadpur, New Delhi-110061 India								 Mott MacDonald, A20, Sector 2, Noida 201 301, Uttar Pradesh, India T : +91 (0)120 254 3582 F : +91 (0)120 254 3562 W: www.mottmac.com				
Title : FLEXIBLE HOSE SPECIFICATION (AVATIATION FULING TANK FARM)												
Date	Prepared	Checked	Approved	Document No.	Sheet	Rev.	Status					
20.11.15	AKP	VNP	BKP	322538-MSD-0501-01	1 of 2	2	EXE					


PIPING MATERIAL SPECIFICATION

CLIENT	Delhi Aviation Fuel Facility Pvt.Ltd.	PIPING CLASS	A2Z
JOB NO	322538	BOILER CODE	NO
PROJECT	Modernization of Existing Fuel Farm	PWHT	NO
LOCATION	Shahbad,Muhammad Pur,IGI Airport, New Delhi		

ITEMS	TYPE	SIZE		SCH/ THK/RAT.	FACE/FINISH RADIUS	DIM/ DGN STD	MATERIAL	DESCRIPTION	NOTE
		END	LOWER						
PIPE		PE	15	250	PN10	MNF STD	HDPE	SMLS	
	APDAPTOR		15	250	PN10		HDPE		
FLANGE		PE	15	150	PN10	MNF STD	HDPE	SMLS	
		PE	200	250	PN10	MNF STD	HDPE	SMLS / FAB	
BENDS		PE	15	250	PN10		HDPE		
FITTINGS									
VALVES	CHECK BALL BUTTERFLY	Refer Valve Specification							
BOLTING	STUDS					B 18.2	A 193 Gr B7	GAL.	
	NUTS					B 18.2	A 194 Gr 2H	GAL.	
GASKET	RING				3.0 mm	B 16.21	NON ASBESTOS FIBER NON ASBESTOS FIBER WITH PTFE ENVELOPE		
STRAINER	SW	15	40	800 #	Y TYPE	MNF STD	B: PP , T:PTFE		
	FLG	50	250	150 #	Y TYPE	MNF STD	B: PP , T:PTFE		
	FLG	50	250	150 #	BASKET TYPE	MNF STD	B: PP , T:PTFE		
MISC									

GENERAL NOTES

- BEND/FITTING THK SHALL BE SUIT TO PIPE THICKNESS.
- B : BODY , T : TRIM , St : STELLITED, MNF: MANUFACTURING , INT : INTERNAL

TITLE PIPING MATERIAL SPECIFICATION A2Z	 Mott MacDonald	A20, Sector-2, Noida-201301 Uttar Pradesh India Web www.mottmac.com
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Date	Prepared By	Checked By	Approved By	Scale	Document No.	Sheet	Rev.	Status
8/5/2015	DEM	VNP	BKP/GDS	NA	322538-MSD-03	2 of 2	1	EXE

PIPING MATERIAL SPECIFICATION

CLIENT	Delhi Aviation Fuel Facility Pvt.Ltd.	PIPING CLASS	A1M
JOB NO	322538	IBR	NO
PROJECT	Modernization of Existing Fuel Farm	PWHT	NO
LOCATION	Shahbad,Muhammad Pur,IGI Airport, New Delhi		

SERVICE Aviation Jet A1 Fuel & Utilities

DESIGN CONDITION

BASE MATERIAL : STAINLESS STEEL - SS316 (Seamless)
 RATING CLASS : 300 #
 CORROSSION ALLOWANCE, mm : NIL

PRESSURE TEMPERATURE RATING

TEMP-° C	-29.00	50.00	100.00	150.00	200.00	250.00	300.00	325.00	350.00	375.00	400.00	425.00
PRES-Bar	19.00	18.40	16.20	14.80	13.70	12.10	10.20	9.30	8.40	7.40	6.50	4.60

PIPE JOINTS	ITEMS	SIZE	DESCRIPTION
	PIPE JOINTS	40 NB & BELOW 50 NB & ABOVE	SOCKET WELD COUPLING BUTTWELD
	DRAINS	ON LINE<= 40 NB ON LINE>= 50 NB	SAME AS LINE SIZE, SW TEE AS PER P & ID OR 20 NB, HALF COUPLING
	VENTS	ON LINE<= 40 NB ON LINE >= 50 NB	SAME AS LINE SIZE,SW TEE AS PER P & ID OR 20 NB, SW COUPLING
	TEMP. CONN PRESS. CONN	ALL ALL	AS PER HOOK UP DIAGRAM AS PER HOOK UP DIAGRAM AS PER PIPING DRG/MM STD

- GENERAL**
- 1 NDT SHALL BE AS PER JOB SPECIFICATION
 - 2 ASBESTOS FREE GASKET AND STEM PACKING SHALL BE USED FOR ALL VALVES.

BRANCH CONNECTION CHART

LEGEND

R	REINFORCED FAB TEE
S	SOCKOLET
T	TEE
U	UNREINFORCED FAB TEE
W	WELDOLET
H	HALF COUPLING
SW	SOCKETWELD
SC	SCREWED

BRANCH

RUN PIPE

TITLE PIPING MATERIAL SPECIFICATION A1M	<p>Mott MacDonald</p>	A20, Sector-2, Noida-201301 Uttar Pradesh India Web www.mottmac.com
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Date	Prepared By	Checked By	Approved By	Scale	Document No.	Sheet	Rev.	Status
05.08.15	DEM	VNP	BKP/GDS	NA	3225238-MSD-04	1 of 2	0	EXE


PIPING MATERIAL SPECIFICATION

CLIENT	Delhi Aviation Fuel Facility Pvt.Ltd.	PIPING CLASS	A1M
JOB NO	322538	SHEET	2 OF 2
PROJECT	Modernization of Existing Fuel Farm		
LOCATION	Shahbad,Muhammad Pur,IGI Airport, New Delhi		

ITEMS	TYPE	SIZE		SCH/ THK/RAT.	FACE/FINISH RADIUS	DIM/ DGN STD	MATERIAL	DESCRIPTION	NOTE	
		END	LOWER							UPPER
PIPE	PE	15	20	SCH 80s		B 36.19	A 312 TP 316	SMLS		
	PE	25	40	SCH 40s		B 36.19	A 312 TP 316	SMLS		
	BE	50	50	SCH 40s		B 36.19	A 312 TP 316	SMLS		
	BE	80	200	SCH 10s		B 36.19	A 312 TP 316	SMLS		
	BE	250	600	SCH 10s		B 36.19	A 358 TP 316 CL.1	SMLS		
FLANGE	SW	RF	15	40	300 #	125 AARH	ANSI B 16.5	A 182 GR F 316		
	WN	RF	50	150	300 #	125 AARH	ANSI B 16.5	A 182 GR F 316		
	LJ	RF	15	600	300 #	125 AARH	ANSI B 16.5	ASTM A 105	NOTE-3	
BENDS	SW	PE	15	40	3000 #		ANSI B 16.11	A 182 GR F 316		
		BE	50	150		R= 1.5 D	ANSI B 16.9	A 403 WP 316	SMLS	NOTE-1
		BE	200	450		R= 1.5 D	ANSI B 16.9	A 403 WP 316	WELDED	NOTE-1
		BE	500	600		R= 1.5 D	ANSI B 16.9	A 403 WP 316	WELDED	NOTE-1
FITTINGS	SW	PE	15	40	3000 #		ANSI B 16.11	A 182 GR F 316		
		BE	50	150		R= 1.5 D	ANSI B 16.9	A 403 WP 316		NOTE-1
		BE	200	600		R= 1.5 D	ANSI B 16.9	A 403 WP 316		NOTE-1
VALVES	GATE	SW	15	40	800 #		API 602	B: A 182 F 316 ; St		
	GATE	FLG	50	600	300 #	125 AARH	API 600	B: A 351 Gr CF8M T: SS316		
	GLOBE	SW	15	40	800 #		BS 5352	B: A 182 F 316 ; St		
	GLOBE	FLG	50	600	300 #	125 AARH	BS 1873	B: A 351 Gr CF8M T: SS316		
	CHECK	SW	15	40	800 #		BS 5352	B: A 182 F 316 ; St		
	CHECK	FLG	50	600	300 #	125 AARH	BS 1868	B: A 351 Gr CF8M T: SS316		
	BALL	SW	15	40	800 #		BS 5351	B: A 182 F 316 ; St		
	BUTTERFLY	FLG	50	600	300 #	125 AARH	BS 5351	B: A 351 Gr CF8M T: SS316		
BOLTING	STUDS NUTS						B 18.2	A 320Gr L7		
							B 18.2	A 194 Gr 7		
GASKETS	RING				3.0 mm		B 16.20	Spiral ound with SS316 Centringm Ring		
STRAINER		SW	15	40	800 #	Y TYPE	MNF STD	B: A 182 F 316 ; St		
		FLG	50	250	150 #	Y TYPE	MNF STD	B: A 351 Gr CF8M T: SS316		
		FLG	50	250	150 #	BASKET TYPE	MNF STD	B: A 351 Gr CF8M T: SS316		
MISC										

GENERAL NOTES

- BEND/FITTING THK SHALL BE SUIT TO PIPE THICKNESS.
- B : BODY , T : TRIM , St : STELLITED, MNF: MANUFACTURING .
- STUBEND WITH LOOSE FLANGE CAN BE USED AS PER JOB SPECIFICATION (stubend thk as per pipe thk)

TITLE PIPING MATERIAL SPECIFICATION A1M				 Mott MacDonald		A20, Sector-2, Noida-201301 Uttar Pradesh India Web www.mottmac.com		
Date	Prepared By	Checked By	Approved By	Scale	Document No.	Sheet	Rev.	Status
05.08.15	DEM	VNP	BKP/GDS	NA	322538-MSD-04	2 of 2	0	EXE



Notes

1. For more details of PF-215A/B refer P&ID no. 322538-PIC-0007-01.
2. MOC of OWS & storm water drain pipe lines shall be HDPE.


Key to symbols

LEGEND

1. SECURITY CABIN (4 NOS)
2. ADMIN AND CANTEEN BUILDING
3. PUMP HOUSE
4. TESTING RING
5. LT/HT/DG AND CONTROL ROOM
6. DIESEL TANK FARM
7. ATF STORAGE TANK FARM
8. TLD PUMP HOUSE
9. HIGH FLOOD LIGHT TOWER (20m HIGH)
10. REPAIR SHOP
11. METER CALIBRATION UNIT (5KL)
12. TANK LORRY DECANTING GANTRY
13. REPAIR SHOP HPC/LOC
14. U.G. STORAGE TANK (2 NOS)
15. PARKING AREA
16. FUELLERS PARKING
17. WATER STORAGE TANK
18. FIRE HYDRANT PUMP HOUSE
19. DIP PLATFORM
20. TUBE WELL NO.1
21. OVER HEAD WATER TANK
22. COOLING TOWER
23. U.G. SLOP TANK
24. WATER STORAGE TANK
25. TUBE WELL NO.2
26. TUBE WELL NO.3
27. A.O./TLF ROOM
28. WATER STORAGE TANK
29. ROAD FOR FIRE TANDER
30. HIGH MUST TOWER (2NOS)
31. FOAM TANK
32. CONNECTION POINT


Reference drawings

P1	28.07.15	CBP	Issued for Approval		
Rev	Date	Drawn	Description	Ch'k'd	App'd



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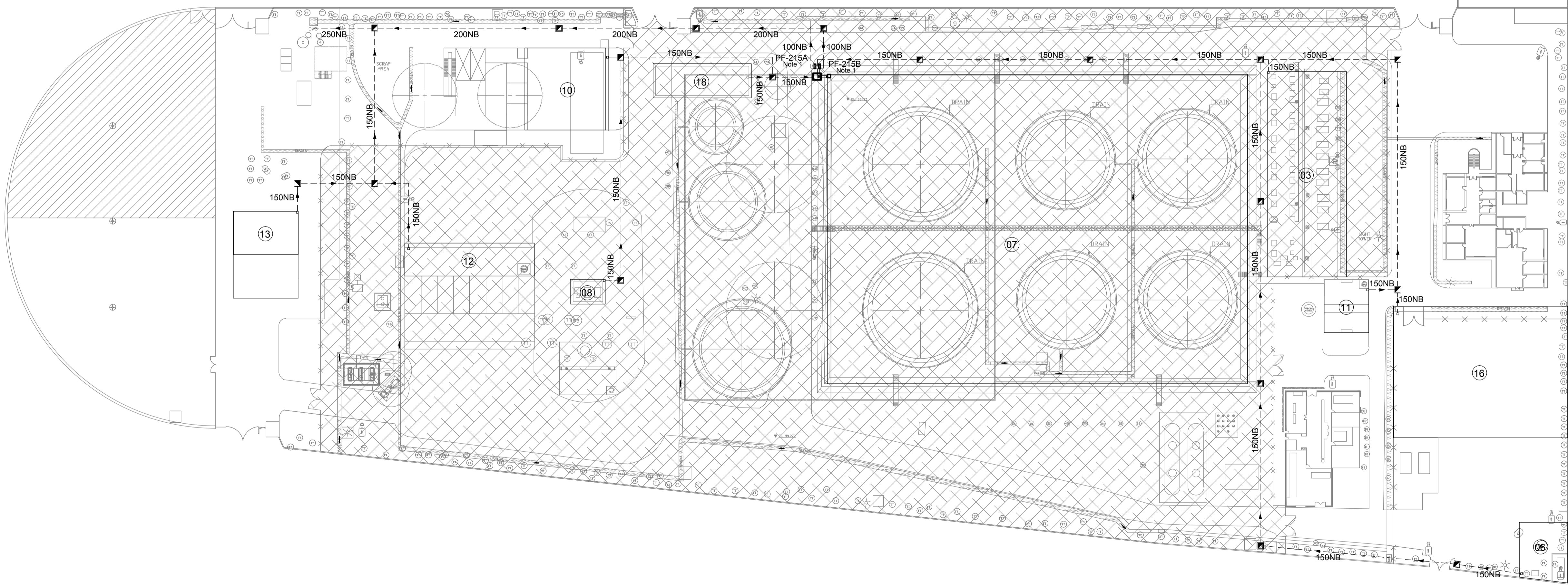


Title
Modernization of Existing Fuel Farm

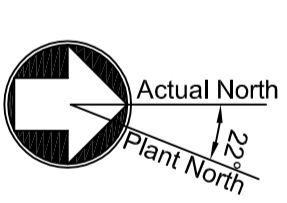
OWS Drain Layout Option - II

Designed	JCP	Eng check	MMS
Drawn	CBP	Coordination	AKM
Dwg check	HRS	Approved	VST
Scale at A1	Status	Rev	Security
1:600	APR	P1	STD

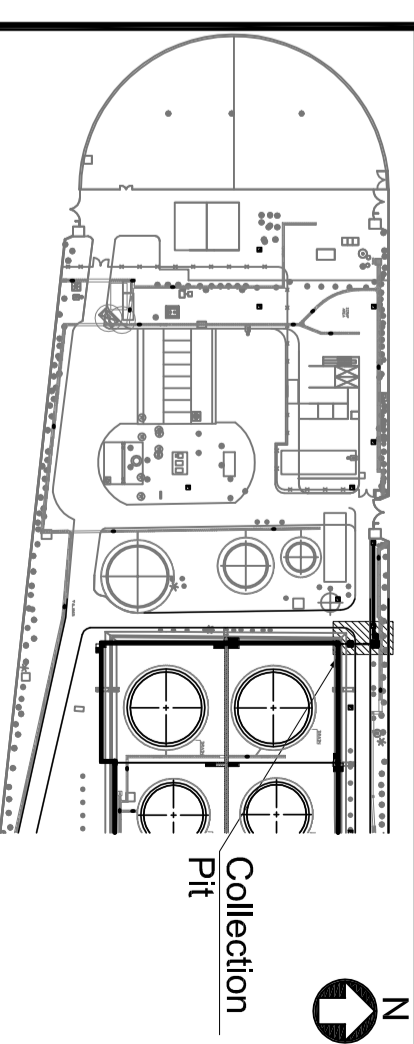
Drawing Number
322538-PAK-0002-02



- Notes
1. All dimensions are in millimeters and levels are in meters, unless otherwise specified.
 2. Structural details if shown like rack, stairs, supports etc., are indicative. Refer structural/civil drawings for the same.
 3. All equipment's sizes are based on conceptual layout, equipment list or mechanical data sheet.



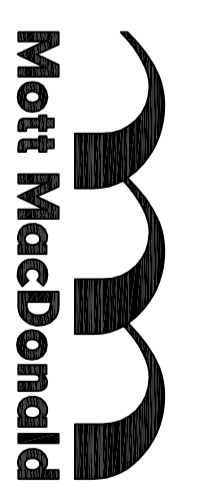
Reference drawings



Key to symbols

- 1) 322538-MPE-0100-01 Plot plan
- 2) 322538-PIKA-0002-02 OWS Drain Layout
- 3) 322538-PI-C-0007-01 P & I Diagram : Oil Water Circulation & Transfer
- 4) 322538-CCB-0006-01 Modification in Existing Layout & Details of Foundation

Rev	Date	Drawn	Description	Ch'k'd	App'd
0	04.08.15	RD	Issued for Bidding	U.J.	VST



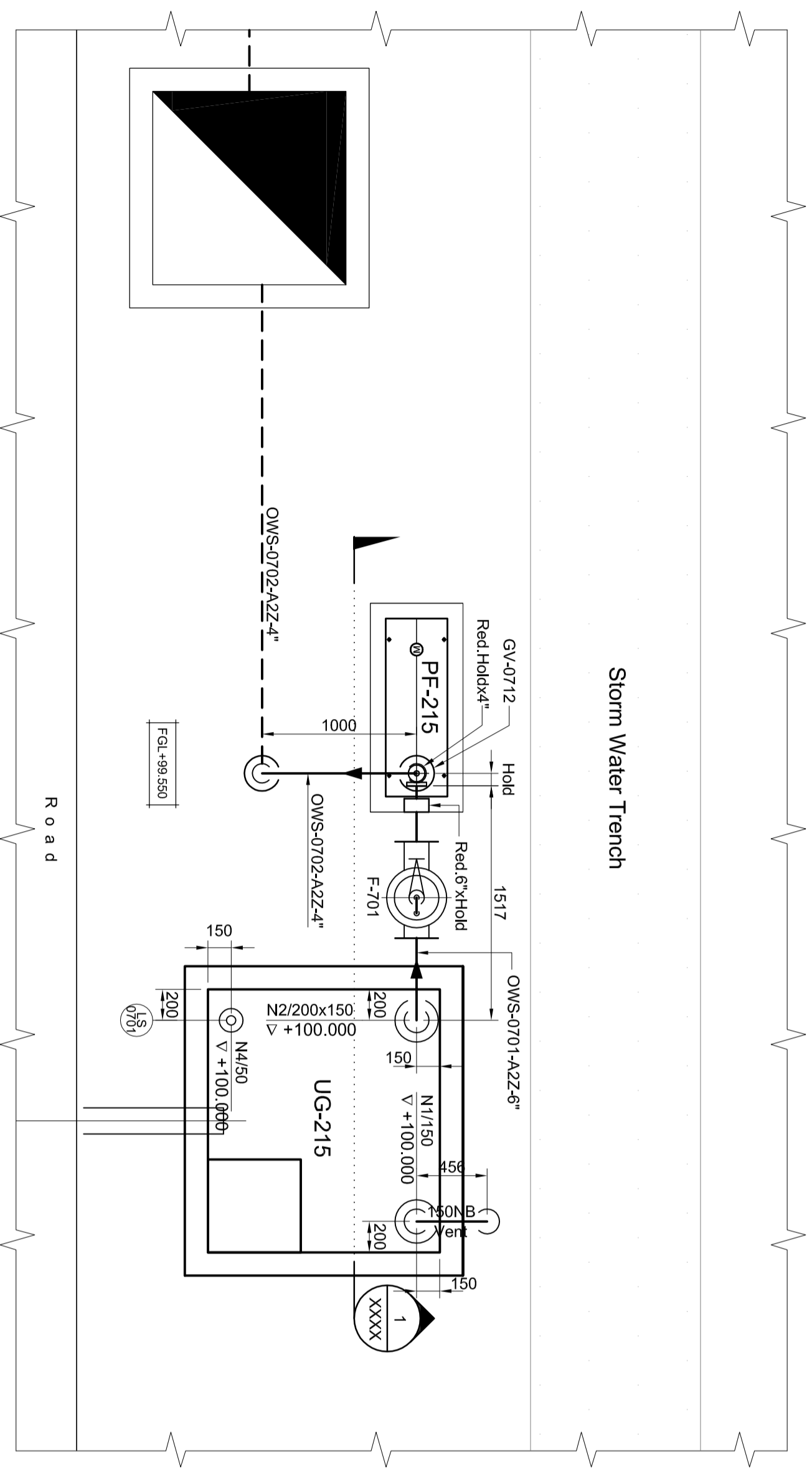
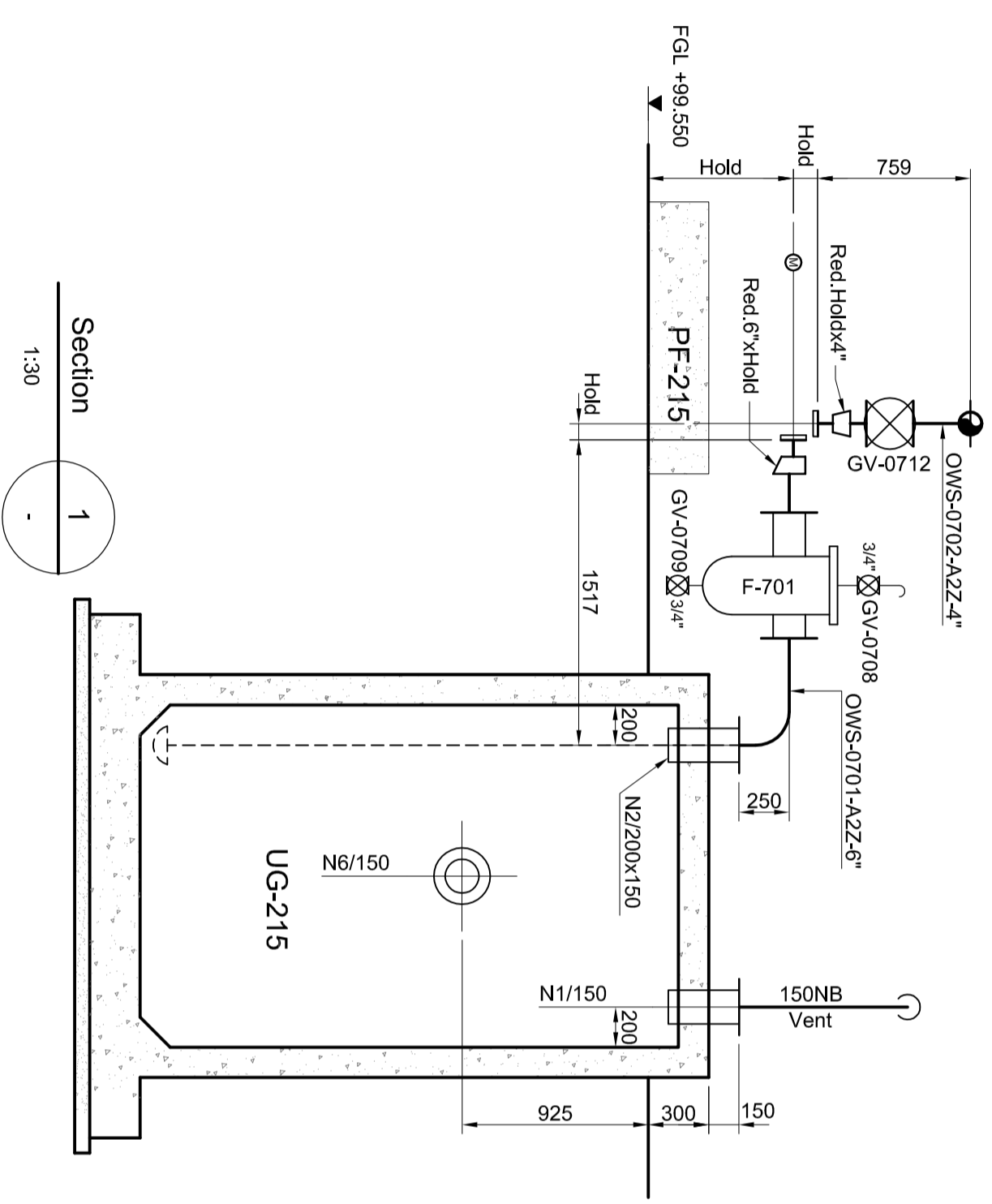
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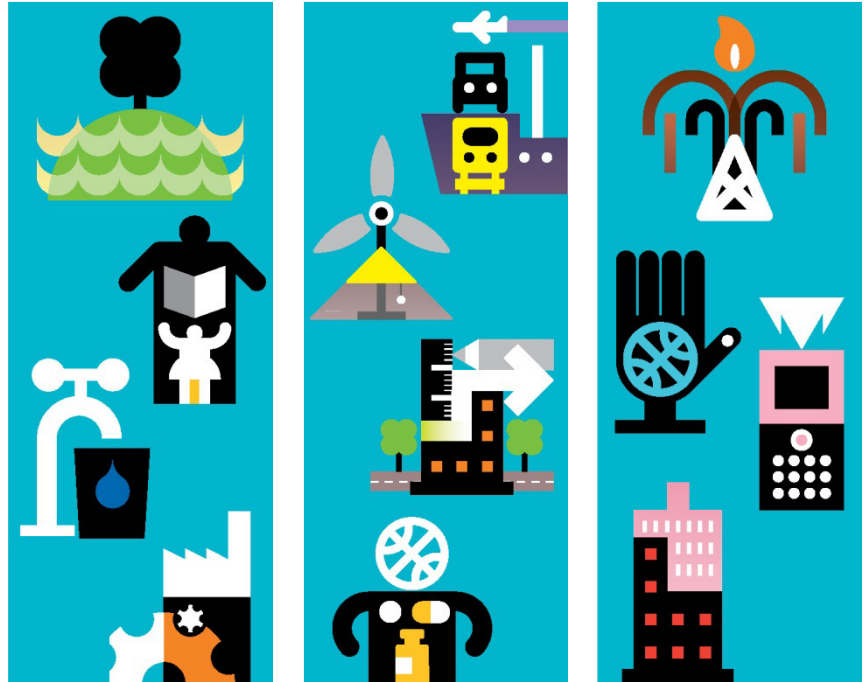


Title
Modernization of Existing Fuel Farm
Oil Water Collection & Transfer
Piping Layout & Section

Designed	U.J.	Eng check	MMS/VNP
Drawn	R.D.	Coordination	VSG
Dwg check	U.J.	Approved	VST
Scale at A2	1:30	Status	EXE
Drawing Number	322538-MPB-0107-01	Rev	0
		Security	STD



Piping Layout Plan : Oil Water Collection Pit
Scale 1:30



Modernization of Existing Fuel Farm

Tech. Specs for Closed Circuit type Fast
Flushing Samplers for Jet A1 Fuel Storage Tank
September 2015

Delhi Aviation Fuel Facility Pvt.Ltd.



Modernization of Existing Fuel Farm

Tech. Specs for Closed Circuit type Fast
Flushing Samplers for Jet A1 Fuel Storage
Tank
September 2015

Delhi Aviation Fuel Facility Pvt.Ltd.

Aviation Fuelling Station, Shahbad Mohammad Pur, IGI Airport, New Delhi-110061

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description	Standard
R0	14/09/15	DEM/JCP	VNP/HRS	VST	Issued for Bidding	

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Modernization Of Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. IGI Airport, New Delhi

Technical Specifications for Jet A1 Fuel Storage Closed Circuit Sampler	Project No.: 322538
	Reference: Tank Farm Area (ATF)
	No. of Sheets: 15

Job Number	Facility Location Code	Document Number
	Shahbad Mohammadpur, IGI Airport-New Delhi	322538-MSD-455

Code 1: Approved and Work may Proceed.
 Code 2: Revise & Re-submit. Work may Proceed subject to incorporation of comments.
 Code 3: Revise & Re-Submit. Work should Not Proceed.
 Code 4: Review Not Required. Work may Proceed.

Approval to proceed shall not be deemed as Acceptance or Clearance of Design, Calculations, Analyses, Test Procedures/Methods, or Selection of Materials by the Contractor. The Contractor shall Not be relieved from full compliance of Contract Requirements and Technical Specifications.

Dated: **Delhi Aviation Fuel Facility Pvt. Ltd.**

Document No.

R0	14.09.2015	Bidding	DEM/JCP	VNP/HRS	VST	
Rev	Date	Issued For	Prepared By:	Checked By:	Approved By:	Approved By:
			Mott MacDonald Pvt. Ltd.			Client

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1 Performance Requirements

1.1 General

Modernization of facilities in Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL), IGI Airport, New Delhi is envisaged and upgrade the same conforming to International Standards for Aviation Fuel Systems.

Jet A1 fuel shall be pumped in to the vertical cone roof tanks through underground pipe lines from IOCL and BPCL Oil Terminals at Bijwasan, New Delhi.

This document specifies the minimum acceptable parameters & requirements set by the Owner for the design, engineering, procurement, fabrication, assembly, inspection, testing and delivery to site of Storage Tank Fast Flushing Samplers(Closed Circuit type Samplers) of **50Ltr** (preferably ALJAC or equivalent make) to install the same with each of Jet A1 Fuel Storage Tanks in Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL).

1.2 Scope

The Fast Flushing Samplers will be installed with each Jet A1 Fuel Storage Tank of the tank farm for visual inspection of samples of Jet A1 fuel drawn from the respective tanks. After satisfactory visual inspection, the sampled Jet A1 Fuel will be routed, via piping system, to the Product Recovery Tank.

Deviation from good engineering practice is not intended. In the absence of any omission in this specifications, good engineering practices will prevail, utilising first quality of new materials and workmanship.

1.3 Definitions

Owner Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL).

Vendor The Company named on the Owner's order form as being the selected supplier of the Check Valves.

"must / shall" Indicates a mandatory requirement.

"should" Indicates a preferred course of action.

"may" Indicates one acceptable course of action.

1.4 Compliance

Compliance by the Vendor with provisions in this specification shall not relieve him of his responsibilities to supply the tanks conforming to the requirements and guide lines as specified in the mandatory codes and standards.

In case, there is a conflict between the Owner supplied documents and the referenced / mandatory specifications, the more stringent one shall prevail.

Should there be any deviation/ from this Specification or associated data sheets, the Vendor shall notify the Owner in writing and obtain Owner's decision in writing in respect of such deviation/(s).

1.5 Quality Conformance

The Vendor shall prove and satisfy the Owner that his obligations within the scope of this document are in accordance with the relevant section of BS EN ISO 9001. Prior to commencement of work, the Vendor shall submit a Quality Plan and procedural specifications for Owner's review and approval.

The Quality Plan shall define scope of work of all the sub-vendors associated with the work. This Specification shall only indicate a general requirement and shall not relieve the Vendor of his obligations to comply with the requirements of the Contract.

1.6 Safety

All work shall be performed in accordance with the safety requirements listed in the contract documentation and any mandatory standards and legislation.

2 Scope

2.1 Scope of Work

- Design, engineering, procurement, manufacturing, inspection, testing, packing and forwarding, loading, supply at site commissioning and providing performance guarantee **of complete closed circuit type fast flushing sampler for Jet A1 turbine fuel storage tank**. All along with other necessary components if any, commissioning spares recommendation of spare parts for 2 years normal operation etc. efficient operation.
- The Vendor shall provide Fast Flushing Samplers(Closed Circuit type) in accordance with this specification, the duties and conditions listed in the relevant data sheet, and the documents included in the bid documents.

2.2 Scope of Supply

The scope of supply includes **6 nos.** of complete system of **closed circuit type fast flushing samplers with capacity of 50 Ltrs.** for Jet A1 turbine fuel storage tanks along with all fittings and appurtenances with tag nos. from **SP-201 to SP-206**. Detailed information is given in the Table 2.1.

Table 2.1: Details of Fast Flushing Sampler

Tag No.	Location	Type	Quantity	Capacity
SP-201 to SP-206	VF-201 to VF-206	Closed circuit type fast flushing sampler	6 Nos.	50 Ltr

3 Codes, Standards and Documents

3.1 Applicable Codes and Standards

Latest published issue or amendment shall be followed unless stated otherwise.

Specified standards may be replaced by equivalent standards that are internationally or otherwise recognised provided that it can be shown to the satisfaction of the Purchaser that they meet or exceed the requirements of the latest edition of the Specified standards.

All standards, codes or specifications proposed by the Vendor shall be the latest issue of internationally recognised, and agreed with the Owner before implementation.

ASME B31.3	Process piping.
NFPA 30	Flammable And Combustible Liquid Code.
ASME B16.5	Steel Pipe Flanges and Flange Fittings.
ASTM B209M 14	Standard Specification for Aluminium and Aluminium-Alloy Steel and Plate
ASTM E34 – 11e1	Standard Test Methods for Chemical Analysis of Aluminium and Aluminium base Alloys
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
ASTM A194	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure/Temperature Service, or both.
ISO 9001;2008	Quality Management Systems.

4 Climatic Data & Design Temperature

4.1 Location

The site is located at Shahbad Mohammadpur adjoining to Indira Gandhi International Airport, New Delhi. The site is approachable by road.

4.2 Topography

The whole Site is levelled surface, with a nominal gradual slope.

4.3 Environmental Design Parameters

Table 4.1: Environmental Design Parameters for General Guidance

Project	:	Delhi Aviation Fuel Facility Private Limited
Site address	:	Aviation Fuelling Station Shahbad, Muhammad Pur, IGI Air Port, New Delhi
Nearest Railway Station	:	New Delhi Railway Station
Nearest Airport	:	Indira Gandhi International Airport, New Delhi
Altitude	:	237 m
Operating Max. Temperature	:	48.4 °C
Operating Min. Temperature	:	-2.2 °C
Design Temperature	:	50 °C
Humidity, Maximum	:	100 %
Humidity, Minimum	:	25 %
Maximum Rainfall	:	20-30 mm in one hour duration
Designed Wind Velocity	:	47 m/s
Barometric Pressure	:	0.98 bar
Seismic Zone	:	Zone IV as per IS:1893

Source: Insert source text here

5 Modus Operandi for Execution

5.1 Elements

- Managing timely execution of all contract elements.
- Planning and reporting of time bound progress to Owner.
- Close co-ordination with Owner regarding any Techo-Commercial issue.
- Ensure HSE (Health, Safety & Environment) Systems at Vendor's factory.
- Strict control on QA/QC systems at the Vendor's factory.

5.2 General

Team of competent personnel shall be appointed by the Vendor and notified to the Owner for exercising controls on the performance and output of various functions to manufacture the Fast Flushing Samplers. A focal point shall be identified and named as Project Manager for contact with the Owner. Owner will not permit for change of the Project Manager till completion of all obligations by Vendor.

Sub-contractors to the Vendor could be appointed only after written approval of the Owner. However, the Vendor will remain responsible for complete scope of against the contract for the performance of any or all subcontractors.

If mutually agreed upon, within two weeks of award of the contract, a kick off meeting may be arranged by the Vendor with the Owner. The Vendor shall submit to the Owner, a detailed programme of works and updated on a weekly basis.

Vendor shall allow free access to Owner at their premises for the purposes of inspection and ascertaining compliance to various provisions of the Contract.

The Vendor shall inform the Owner well in advance (at least Seven Days Notice) to witness all tests, inspections and final releases of equipment.

6 Design

6.1 General

The scope under this contract is to supply 6 nos. Jet A1 Fuel Storage Fast Flushing Samplers for its installation within tank dyke of Fuel Farm of DAFFPL at IGI Airport, New Delhi. The Fast Flushing Samplers will be fabricated from Aluminium, Aluminium housing, white epoxy lined base internal surface and Toughened clear glass tube with all the fittings and appurtenances.

The Vendor, within 10 days of award of contract, shall submit to the Owner the suggested solutions of any issue/(s) coming in way of completion of the design as required by this document.

6.2 Scope

1. Design Engineering, Procurement, Fabrication, Assembly, Inspection, Testing and Delivery to site of Fast Flushing Samplers for its installation in the Fuel Farm of DAFFPL, IGI Airport, New Delhi.
2. Provide to the Owner, the fabrication & production drawings.
3. Close co-ordination with Owner to develop, prepare, finalize and complete the design to entire satisfaction of the Owner.
4. Vendor to prepare design dossiers and its submission to Owner for review.

6.3 Performance Guarantee

The Vendor shall guarantee the closed circuit type fast flushing Samplers for its performance:

- At specified design conditions.
- Against defect/(s) arising due to any bad workmanship or materials and improper design.

Guarantee period shall extend one year from the date of commissioning but shall not exceed 24 months from date of its receipt at site in good condition.

6.4 Letter of Conformance

The Vendor has to submit a signed statement indicating compliance with the relevant Material Standard and Technical Specification.

6.5 Design Development

The Vendor shall develop the design document to enable procurement, fabrication, inspection, testing and delivery to the satisfaction of the Owner.

6.6 Fabrication & Assembly Documents

The Vendor shall submit all of their internal documentation required for fabrication and assembly of the Fast Flushing Samplers.

Within 10 days of award of contract, the Vendor shall supply to the Owner, a schedule for the issue dates of all documents.

The Vendor shall control its documents and drawings such that only the latest revision is available and a record of each document and drawing is made.

The Vendor shall supply two copies of all documents and drawings to the Owner for review and submit them using a transmittal system.

Prior to submission to the Owner, the Vendor shall have reviewed sub-vendor's documents/drawings. Within 12 working days from the date of submittal, the Owner shall provide comments after review of the documents and drawings. Vendor shall comply with Owner's comments for any changes without any additional cost.

Vendor shall keep full fabrication/manufacturing records in order to have full information to accurately produce the As-Built documentation to hand over to Owner on completion of the works. No hand mark-ups or coloured markings are acceptable in the documents for hand over.

7 Procurement

7.1 General

The Vendor is responsible for the procurement of all materials and consumables, in accordance with specifications, standards and drawings issued with the enquiry package. The Fast flushing Samplers and the appurtenances shall be suitable for installation and use at Fuel Farm of DAFFPL at IGI Airport New Delhi with a 25-year life expectancy (except for the damage due to operational mishandling).

All materials shall be of well-tried and tested types from reputed manufacturers and shall be of adequate thermal rating and guaranteed tolerance.

7.2 Standardisation

The Owner may indicate preferred suppliers for some items to the Vendor. This will be identified separately from this specification.

7.3 Testing Materials

The Vendor shall supply all temporary materials required for strength and leak testing.

7.4 Tie in Materials

The Owner shall supply all stud bolts, gaskets and ring joints for tie in of packages on site.

8 Fabrication

8.1 Scope

The scope for Fast Flushing Samplers fabrication shall be sub-divided in the following activities:

- Mechanical fabrication.
- Assembly of components.
- Non Destructive Testing (NDT).
- Inspection.

8.2 General

The Vendor shall prepare a document in line with the design codes and international standards, for proposed Fast Flushing Samplers and procedures for its manufacturing and NDT. The same shall be got approved by the Owner before commencement of fabrication/manufacturing.

8.3 Materials

The Vendor shall use Aluminium appurtenances and fittings. The Sampling jar shall be of Borosilicate clear glass.

The material specification of all components of the Fast flushing Samplers shall be clearly stated in the Vendor's proposal.

8.4 Non Destructive Testing

All NDT procedures shall be in accordance with the ASME design code applicable to the underground storage tank and shall be submitted by the Vendor for approval by the Owner. However, pre-qualified procedures shall be permitted, subject to approval by the Owner.

8.5 Inspection of The The Fast Flushing Samplers

The Vendor shall submit a full dossier for inspection system and plan for approval by the Owner. The Vendor shall also provide every opportunity to the Owner to inspect the work in accordance with Vendor's procedures and shall be granted direct access to the inspectors and inspection & test records.

8.6 Tagging of The Fast Flushing Samplers

The Vendor shall fix to each Sampler, a plate detailing the design, operating and test conditions. All tags, labels and signs shall be compatible with the environmental conditions. All tags shall be stainless steel engraved with black text in English.

9 Appurtenance For The Closed Fast Flushing Samplers

Each of the Fast Flushing Samplers shall have the appurtenances as per the Data Sheet.

10 Testing Of Closed Fast Flushing Samplers

10.1 Owner's Requirements

The Vendor will perform following scope of activities in seriatim to fulfill Owner's Requirement for Testing the Fast Flushing Samplers:

10.1.1 General

Preparation of all testing processes and procedures and submit the same for approval by the Owner. They should be in line with the design codes and international standards.

10.1.2 Off Site Inspection

Following shall be made available to the Owner:

- Mill Test Data shall be forwarded no later than the time of shipment of the Aluminium to the field.
- All Chemical and Physical reports shall indicate the specification to which the Aluminium were manufactured.
- All data report shall be readily identifiable with matching Heat Numbers.

10.1.3 Pre Test Inspection

Owner shall undertake a visual and dimensional inspection of the Fast Flushing Samplers and produce a list of observations. Any deviation from the standards shall have to be corrected by the Vendor prior to commencement of any test.

10.1.4 Cleaning & Drying

Fast Flushing Samplers shall be cleaned and dried thoroughly on completion Pre-Test Inspection by the Vendor.

10.1.5 Leak Testing

On completion of cleaning and drying, the Fast Flushing Samplers shall be leak-tested in accordance with the procedure approved by the Owner. Leaks, if observed, shall be rectified.

10.1.6 Factory Acceptance Test

Upon satisfaction of the Vendor that the Fast Flushing Samplers is meeting the requirements, the Vendor shall inform the Owner with 10 days advance notice for Factory Acceptance Test, which shall be undertaken in the presence of the Owner.

10.1.7

10.1.8 Post Test Inspection

Owner shall undertake visual inspection of Fast Flushing Samplers after completion of the FAT and produce a list of his observations, which shall be corrected by the Vendor prior to commencing any activity for transportation of the tanks.

10.1.9 Dossiers

The Vendor shall prepare a detailed dossier for manufacturing, inspection and testing and submit the same to the Owner.

11 Protection, Preservation & Delivery

Vendor will perform following activities for transportation & delivery of Fast Flushing Samplers at site:

11.1 Protection & Preservation

On completion and acceptance of testing, the Fast Flushing Samplers shall be stored, protected keeping in view the outer maximum dimension of the Fast Flushing Samplers acceptable for its transportation to Fuel Farm of DAFFPL, IGI Airport, New Delhi.

Owner will review and approve the procedure submitted by the Vendor detailing method of storage, protection and shipping of all items.

The Vendor shall arrange for delivery of the Fast Flushing Samplers in accordance with the conditions of contract.

11.2 Lifting & Handling Study

Based final weight and dimensions of the Fast Flushing Samplers, the Vendor shall scientifically evaluate and prepare a document for lifting and handling studies for the consignment. This shall include assessment of integrity of the consignment during lifting & handling, gross weight, center of gravity, lifting points and lifting tackle requirements.

11.3 Logistics

This will be responsibility of the Vendor to deal with all logistics issues associated with the delivery of the Fast Flushing Samplers.

11.4 Fast Flushing Samplers Identification

Vendor should ensure fixing of name plate on exterior of Fast Flushing Samplers for its identification. As a minimum, the following information should be printed:

- Dimensions and gross weight.
- Instructions for lifting and storage.
- Complete address of Consigner (The Vendor) and Consignee (The Owner).
- Brief Specifications of the Fast Flushing Samplers and the appurtenances.
- Details of Purchase Order of the Owner
- Date & Year of Manufacturing.

12 Data sheet

12.1 Data Sheet for Storage Tanks Fast Flushing Sampler

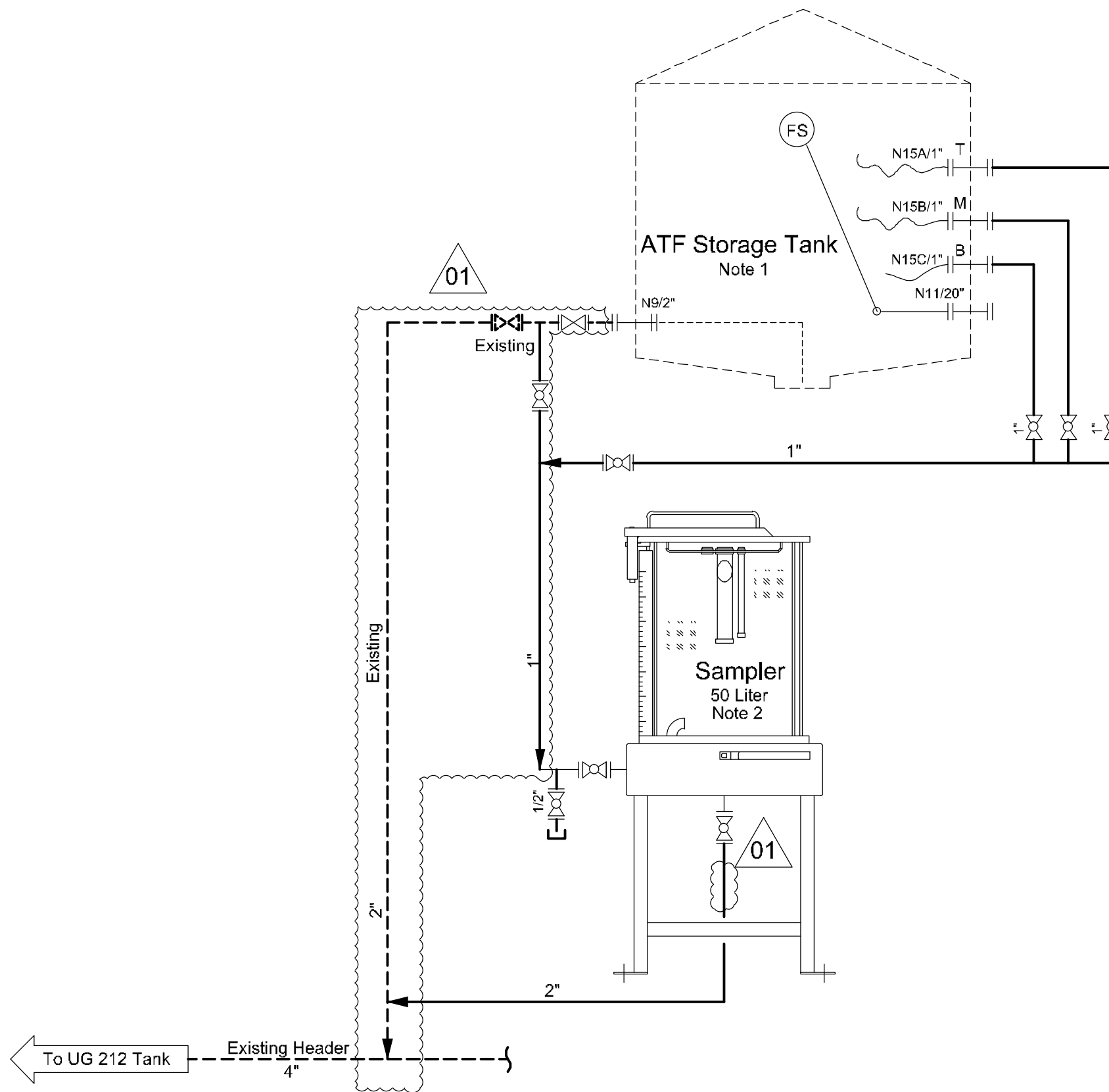
Table 12.1: Datasheet for Fast Flushing Sampler for Storage Tanks

Sr No	Description	Characteristics
A Process data		
1	Tag No.	SP-201 to SP-206
2	Process Fluid	Jet A1 Fuel. See Note 1.
3	Operating Temperature	48.4° C / -2.2° C (Max./Min.)
4	Design Temperature	(-) 5° C to (+) 60° C
5	Fluid Density @ 15° C	775 to 840 Kg/m ³
6	Kinematic Viscosity at - 20° C.	8.000 mm ² /s (Max)
7	Vapour Pressure at 40° C	Negligible
8	Vapour Density	Heavier than Air
9	Maximum Differential Pressure	18.0 barg.
10	Conductivity of Jet A1 Fuel	50 – 600 pS/m
B General data		
10	Inlet Fittings	Threaded ¾ inch NPT female
11	Outlet Fittings	Threaded 1-1/2 inch NPT female
12	Inlet Valve	Spring Closed Ball Valve.
13	Outlet Valve	Spring Closed Ball Valve.
14	Sampler Lid	Dimensions - Vendor to Advise.
15	Bowl	Toughened Glass Tube
16	Base with complete frame work	Aluminium Housing, white epoxy lined base internal surface
17	Nozzle For Thermometer	Yes.
18	Nozzle For Hydrometer	Yes.
19	Test For Aromatic Resistance	Yes.
20	External Shell Water Detector	Yes
21	Semi-Rotary Emptying Pump with Non Return Valve.	No.
22	Leak Test	Yes.

General Notes:

1. Process Fluid is Jet A1 Fuel conforming to IS 1571: 2008 and DEF STAN 91-91 Issue 8 (amendment 3)
2. Preferred Make of Storage Tank Fast Flushing Sampler: ALJAC Fuelling Components Ltd., Closed Circuit Sampler, or approved equivalent.
3. RF denotes: Raised Face.
4. WNRF denotes: Weld Neck Raised Face.



Note :
 1. Existing Storage Tank.
 2. Sampler shall be closed circuit type sampler.



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 Mott MacDonald A20 Sector 2 Noida 201301 India T +91 (0)12 0254 3582 F +91 120 254 3562 W www.mottmac.com	Client M/s Delhi Aviation Fuel Facility Pvt. Ltd. Aviation Fuelling Station Shahbad, Muhammad Pur IGI Airport, New Delhi - 110061 	Rev	Date	Drawn	Description	Ch'k'd	App'd	Title Modernization of Existing Fuel Farm Schametic Diagram for Closed Circuit Type Fast Flushing Sampler System for ATF Storage Tank Drawing Number 322538-PKC-0003-01	Drawn	CBP	
		0	15.09.15	CBP	Issued for Engineering	HRS	VST		Checked	HRS	
		01	16.09.15	TSC	Revised as Per Client's Comments				Approved	VST/AKS	
		Scale at A3 NTS									Security
									STD	EXE	01

PIPING MATERIAL SPECIFICATION

CLIENT	Delhi Aviation Fuel Facility Pvt.Ltd.	Piping Class	A21A
JOB NO	322538	IBR	NO
PROJECT	Modernization of Existing Fuel Farm	Radiography	----
LOCATION	Shahbad,Muhammad Pur,IGI,Airport-NewDelhi	Requirement	AS PER B 31.3

SERVICE ATF

DESIGN CONDITION

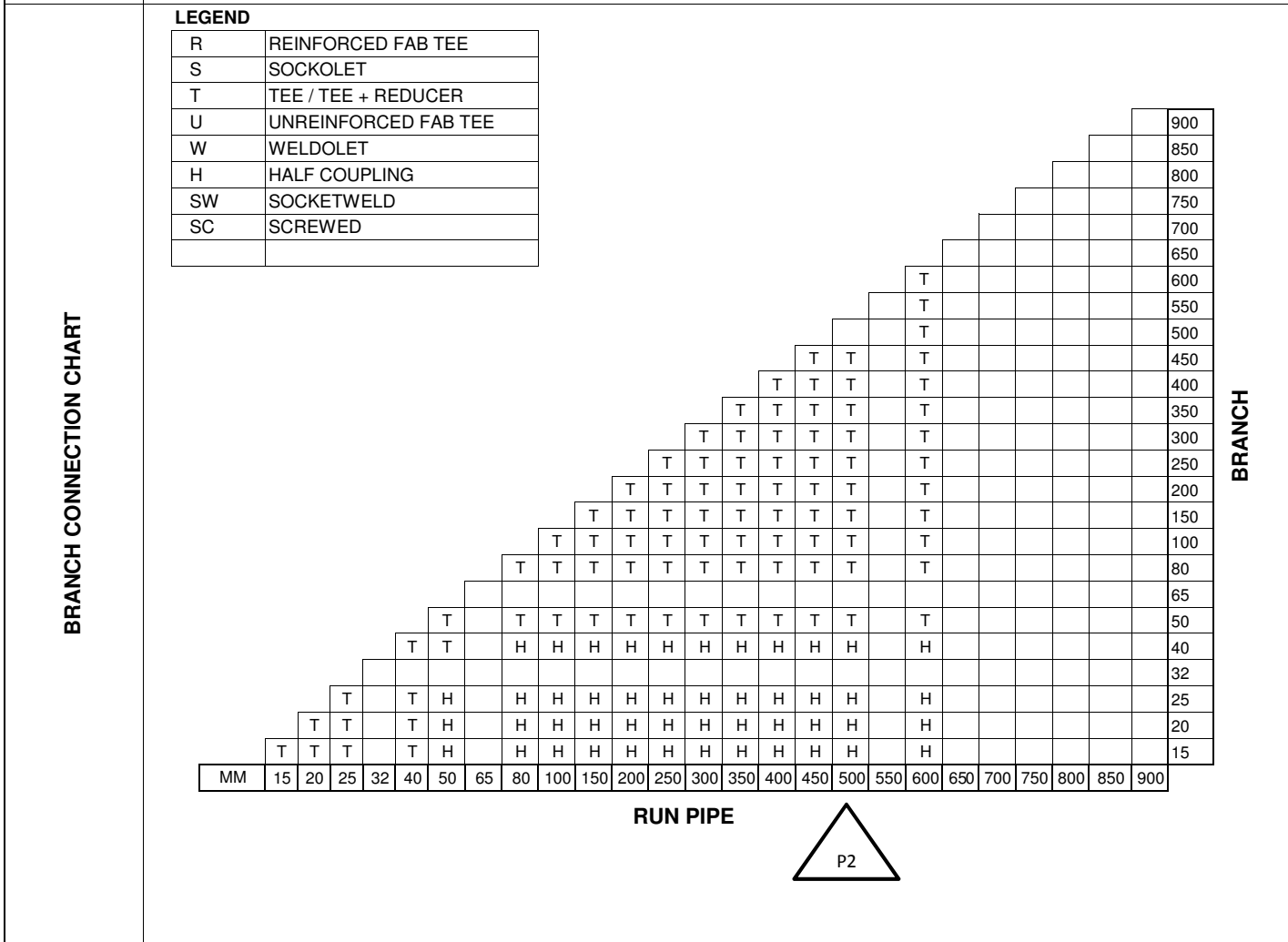
BASE MATERIAL :	CARBON STEEL
RATING CLASS :	150 #
CORROSION ALLOWANCE, mm :	3.0
DESIGN PRESSURE & TEMP. :	17.0 Kg/cm ² & 50.0 Deg C

PRESSURE TEMPERATURE RATING

TEMP-° C	(-)29 to 38	50.00	100.00	150.00	200.00	250.00
PRES-Bar	19.60	19.20	17.70	15.80	13.80	12.10

PIPE JOINTS	ITEMS	SIZE	DESCRIPTION
	PIPE JOINTS		40 NB & BELOW 50 NB & ABOVE
DRAINS		ON LINE <= 40 NB ON LINE >= 50 NB	SAME AS LINE SIZE, SW TEE AS PER P & ID OR 20 NB, HALF COUPLING
VENTS		ON LINE <= 40 NB ON LINE >= 50 NB	SAME AS LINE SIZE, SW TEE AS PER P & ID OR 20 NB, HALF COUPLING
TEMP. CONN PRESS. CONN		ALL ALL	AS PER HOOK UP DIAGRAM AS PER HOOK UP DIAGRAM AS PER PIPING DRG/MM STD

- GENERAL**
- 1 NDT SHALL BE AS PER JOB SPECIFICATION
 - 2 ASBESTOS FREE GASKET AND STEM PACKING SHALL BE USED FOR ALL VALVES.



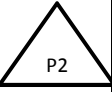
TITLE
PIPING MATERIAL SPECIFICATION
A21A



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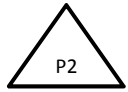
Date	Prepared By	Checked By	Approved By	Scale	Document No.	Sheet	Rev.	Status
16.10.15	SHK	UJ	AKS	NA	322538-MSD-401	1 of 2	P2	APR


PIPING MATERIAL SPECIFICATION

CLIENT	Delhi Aviation Fuel Facility Pvt.Ltd.						PIPING CLASS	A21A		
JOB NO	322538						SHEET	2 OF 2		
PROJECT	Modernization of Existing Fuel Farm									
LOCATION	Shahbad,Muhammad Pur,IGI,Airport-NewDelhi									
ITEMS	TYPE	SIZE		SCH/ THK/RAT.	FACE/FINISH RADIUS	DIM/ DGN STD	MATERIAL	DESCRIPTION	NOTE	
		END	LOWER							UPPER
PIPE		PE	15	40	SCH 80		B 36.10	API 5L Gr B PSL-II	SMLS	
		BE	50	50	SCH 80		B 36.10	API 5L Gr B PSL-II	SMLS	
		BE	80	150	SCH 40		B 36.10	API 5L Gr B PSL-II	SMLS	
		BE	200	300	SCH 30		B 36.10	API 5L Gr B PSL-II	EFW	
		BE	350	400	SCH 20		B 36.10	API 5L Gr B PSL-II	EFW	
		BE	450	600	SCH 20		B 36.10	API 5L Gr B PSL-II	EFW	
FLANGE	SW SO	RF	15	40	150 #	125 AARH	ANSI B 16.5	ASTM A 105		
		RF	50	400	150 #	125 AARH	ANSI B 16.5	ASTM A 105		
BENDS	SW	PE	15	40	3000 #		ANSI B 16.11	ASTM A 105	SMLS	
		BE	50	50	SCH 80	R= 1.5 D / 3D	ANSI B 16.9	A 234 Gr WPB	SMLS	NOTE-1 & 3
		BE	80	150	SCH 40	R= 1.5 D / 3D	ANSI B 16.9	A 234 Gr WPB	SMLS	NOTE-1 & 3
			200	300	SCH 30	R= 1.5 D / 3D	ANSI B 16.9	A 234 Gr WPB	WELDED	NOTE-1 & 3
			350	400	SCH 20	R= 1.5 D / 3D	ANSI B 16.9	A 234 Gr WPB	WELDED	NOTE-1 & 3
FITTINGS	SW	PE	15	40	3000 #		ANSI B 16.11	ASTM A 105	SMLS	
		BE	50	50	SCH 80		ANSI B 16.9	A 234 Gr WPB	SMLS	NOTE-1
		BE	80	150	SCH 40		ANSI B 16.9	A 234 Gr WPB	SMLS	NOTE-1
			200	300	SCH 30		ANSI B 16.9	A 234 Gr WPB	WELDED	NOTE-1
			350	400	SCH 20		ANSI B 16.9	A 234 Gr WPB	WELDED	NOTE-1
VALVES	GATE	SW	15	40	800 #		API 602	B: A 105 T:13% Cr; St		
	GATE	FLG	50	400	150 #	RF	API 600	B: A 216 Gr WCB T:13% Cr, St		
	GLOBE	SW	15	40	800 #		BS 5352	B: A 105 T:13% Cr; St		
	GLOBE	FLG	50	400	150 #	RF	BS 1873	B: A 216 Gr WCB T:13% Cr, St		
	CHECK	SW	15	40	800 #		BS 5352	B: A 105 T:13% Cr; St		
	CHECK	FLG	50	400	150 #	RF	BS 1868	B: A 216 Gr WCB T:13% Cr, St		Note-4
	BALL	SW	15	40	800 #		BS 5351/	B: A 105 T:SS304		
	BUTTERFLY	FLG	50	400	150 #	RF	API 6D	B: A 216 Gr WCB T:SS304		
	PLUG	SW	15	40	800 #		API 609	B: A 216 Gr WCB T:13% Cr, St		
BOLTING	STUD/BOLT NUTS						B 18.2	A 193 Gr B7	GALV	Refer General Notes
							B 18.2	A 194 Gr 2H	GALV	Refer General Notes
GASKETS	RING				4 Thk		B 16.20	SS304 SPWG with Graphite Filled		
STRAINER		SW	15	40	800 #	Y TYPE	MNF STD	B: A 105 T:13% Cr; St		
		FLG	50	150	150 #	Y TYPE	MNF STD	B: A 216 GR:WCB T:13% Cr		
		FLG	50	400	150 #	BASKET TYPE	MNF STD	B: A 216 GR:WCB T:13% Cr		
MISC										

NOTES

- BEND/FITTING THK SHALL BE SUIT TO PIPE THICKNESS.
- B : BODY , T : TRIM , St : STELLITED, MNF: MANUFACTURING .
- 3D BENDS TO BE USED FOR CUP PIGGABLE LINES
- Refer respective data sheet for details of valve specifications.
- Jet A1 fuel Pipe & pipe fittings of 6" NB & above, shall be bought internally Epoxy coated. Refer Clause No. 4.2.3 of piping tender for details.



TITLE PIPING MATERIAL SPECIFICATION A21A				 Mott MacDonald		501, Sakar II , Ellisbridge, Ahmedabad-380006 India Tel +91 (79) 26575550 Fax +91 (79) 26575558 Web www.mottmac.com			
Date	Prepared By	Checked By	Approved By	Scale	Document No.	Sheet	Rev.	Status	
16.10.15	SHK	UJ	AKS	NA	322538-MSD-401	2 of 2	P2	APR	



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

ANNEXURE II – DEVIATION SHEET

EXCEPTION AND DEVIATIONS STATEMENT				
S.NO.	PAGE NO. OF TENDER DOCUMENT	CLAUSE NO.	SUBJECT	DEVIATIONS

Bidder shall list all the deviations in the following given format only on their Letterhead. The Deviation sheet should be submitted along with technical bid.

In case no deviation sheet is submitted along with technical bid, it would be concluded that bidder has accepted all specifications, terms and conditions.

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

ANNEXURE III – DECLARATION SHEET

Date:

DECLARATION

We, M/s _____ hereby, unconditionally accept all terms & conditions of TENDER NO.: DAFFPL/MOD/FF/2016-17/13 (JOB: MECHANICAL AND PIPING WORKS as per specification) including Scope of job, quantities, completion period, terms & conditions without any deviations.

Sign & Stamp of Bidder

Note: In case of deviations (whether technical or commercial) the above declaration should not be submitted and the deviations should be mentioned separately on bidders letter head with the heading "DEVIATION SHEET". In absence of "DEVIATION SHEET", it would be concluded that bidder has submitted his offer as per tender specifications, terms & conditions. Corrections in tender booklet will not be accepted.

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

ANNEXURE-IV

PROFORMA OF BANK GUARANTEE (EARNEST MONEY DEPOSIT)

(On Non-Judicial Stamp paper for appropriate value)

BANK GUARANTEE NO. :

BANK GUARANTEE AMOUNT:

CLAIM:

(Till 120 days from date of submission of Proposal)

TENDER NO. /DATE:

JOB DESCRIPTION/

LOCATION:

Tender Security No. [*]

Name and Address of the Beneficiary: Delhi Aviation Fuel Facility (Private) Limited
Aviation Fuelling Station, Shahabad Mohammadpur, IGI Airport, New Delhi – 110 061, India

We [*name and address of the issuing bank*] have been informed that [*Name of the Interested party*] (hereinafter called the “Interested Party”) is submitting a proposal for the Award of the Works in response to a Request for Proposal (“RFP”) by Delhi Aviation Fuel Facility (P.) Ltd. (“DAFFPL” or ‘Beneficiary’) for [*Insert description of work*] (“Works”). The conditions of the RFP, which are set out in a documents entitled Request for Proposal dated [*Please insert*] require its offer to be supported by a Tender Security.

At the request of the Interested Party, we hereby irrevocably undertake to pay you without demur, the Beneficiary, any sum or sums not exceeding Rs. _____ [*Please insert*].

Upon receipt by us of your demand in writing and your written statement (in the demand) stating that:

- 1) The Interested Party has, without written consent of DAFFPL, withdrawn its offer after the latest time specified for its submission and before the expiry of its period of validity; or
- 2) The Interested Party has refused to accept the correction of errors in nits offer in accordance with the instructions to Interested parties contained in the RFP; or

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 3) DAFFPL entered in to the contract with the Interested party but the Interested party has failed to deliver the **COMPOSITE BANK GUARANTEE (SECURITY DEPOSIT & PERFORMANCE)** in compliance with the Contract conditions; or
- 4) The Interested Party has failed to enter into the Contract within 30 (Thirty) days of being required to do so by the Tender Officer.

Any demand for payment must contain your signature(s). The demand must be received by us at this office on or before the expiry of the earliest of the following dates, when this security guarantee shall expire and shall be returned to us:

- a) Date of issue of letter communicating to the Interested Party that it has not qualified for the contract or the Proposal submitted by the Interested Party is unsuccessful or the TENDER is withdrawn and/or cancelled by the Beneficiary; or
- b) 7 (seven) days after the date of delivery of an acceptable performance bond complying with the Contract conditions and execution of the Contract after the award of the works to the Interested Party; or
- c) 120 (One hundred twenty) days from the last date of submission of Proposal in accordance with the TENDER.

Date:

Signature:

Designation:

Name of the Branch

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

ANNEXURE-V

PROFORMA OF COMPOSITE BANK GUARANTEE (SECURITY DEPOSIT & PERFORMANCE)

(On Non-Judicial paper of Rs. 100/-value)

To,

DAFFPL

Dear Sirs,

M/shave taken tender for the workfor DAFFPL,.

The tender Conditions of Contract provide that the Contractor shall pay a sum of Rs. (Rupees) as security deposit & performance guarantee in the form therein mentioned. The form of payment of security deposit & performance guarantee includes guarantee executed by Scheduled Bank at New Delhi, undertaking full responsibility to indemnify DAFFPL, in case of default. The said party have approached us at and their request and in consideration of the premises we having our office at have agreed to give such guarantees as hereinafter mentioned.

1. We -----hereby undertake and agree with you that if default shall be made by M/s. -----in performing any of the terms and conditions of the tender or in payment of any money payable to Daffpl. We shall on demand pay to you, without demur, protest or requiring you to seek recourse to M/s _____, in such matter as to you may direct the said amount of Rupees ----- only or such portion thereof not exceeding the said sum as you may from time to time require.
2. You will have the full liberty without reference to us and without effecting this guarantee, postpones for any time or from time to time the exercise of any of the powers and rights conferred on you under the contract with the said -----and to enforce or to forbear from endorsing any powers of rights or by reason of time being given to the said -----which under law relating to the sureties would but for provision have the effect of releasing us.
3. Your right to recover the said sum of Rs. ----- (Rupees -----) from us in manner aforesaid will not be affected or suspended by reason of the fact that any

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- dispute or disputes have been raised by the said M/s. -----
-----and/or that any dispute or disputes are pending before any officer, tribunal or court.
4. The guarantee herein contained shall not be determined or affected by the liquidation or winding up dissolution or change of constitution or insolvency of the said -----but shall in all respect and for all purposes be binding operative units payment of all money due to you in respect of such liabilities is paid.
 5. Our liability under this guarantee is restricted to Rupees -----our guarantee shall remain in force until -----unless a suit or action to enforce a claim under Guarantee is filed against us within six months from -----(which is date of expiry of guarantee) all our rights under the said guarantee shall be forfeited and we shall be relieved and discharged from all liabilities there under.
 6. NOT WITHSTANDING anything hereinbefore contained our liability under this Bank Guarantee is restricted to Rupees -----(Rupees -----).This Bank Guarantee shall be valid up to -----and we are liable to pay the guaranteed 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.
 7. This guarantee is to be returned to us within fifteen (15) days from the date it ceases to be in force. If the guarantee is not returned to us within the date of aforementioned it shall be automatically cancelled.
 8. We have power to issue this guarantee in your favour under Memorandum and Articles of Association and the undersigned has full power to do under the Power of Attorney dated -----granted to him by the Bank.

Yours faithfully

-----Bank
By its Constituted Attorney
Signature of a person duly
Authorized to sign on behalf of the bank

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

Annexure- VI

Form of Letter of Undertaking

[On the letterhead of the Interested Party]

Letter of Undertaking

Date:

Delhi Aviation Fuel Facility (Private) Limited
Aviation Fuelling Station, Shahabad Mohammadpur,
IGI Airport, New Delhi – 110 061, India

Re:

The undersigned Interested Party acknowledges that the TENDER issued is confidential and personal to the undersigned Interested Party and hereby undertakes and agrees as follows:

1. **“Confidential Information”** means the TENDER and everything contained therein, all documentation, data, particulars of the Works and technical or commercial information made by (or on behalf of) Delhi Aviation Fuel Facility (Private) Limited or obtained directly or indirectly from Delhi Aviation Fuel Facility (Private) Limited or its representatives by the undersigned Interested Party or which is generated by the undersigned Interested Party or any information or data that the undersigned Interested Party receives or has access to, as a result of the TENDER, as being confidential information of Delhi Aviation Fuel Facility (Private) Limited, provided that such term does not include information that (a) was publicly known or otherwise known to undersigned Interested Party prior to the time of such disclosure, (b) subsequently becomes publicly known through no act or omission by undersigned Interested Party or any person acting on its behalf.
2. The undersigned Interested Party shall maintain the confidentiality of Confidential Information in accordance with procedures adopted by the undersigned Interested Party in good faith to protect confidential information of third parties delivered to it, provided that the undersigned Interested Party may deliver or disclose Confidential Information to its authorized representatives who agree to hold confidential the Confidential Information substantially in accordance with the terms of this Undertaking.
3. The undersigned Interested Party shall not at any time whatsoever:
 - (i) Disclose, in whole or in part, any Confidential Information received directly or indirectly from the Delhi Aviation Fuel Facility (P) Limited to any third party.

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

(ii) Reproduce, publish, transmit, translate, modify, compile or otherwise transfer the Confidential Information.

4. In case the Proposal of the undersigned Interested Party is not accepted and immediately upon the acceptance of the Proposal of any of the other Interested Party, the undersigned Interested Party, shall:

(i) Return all Confidential Information including without limitation, all originals, copies, reproductions and summaries of Confidential Information; and

(ii) Destroy all copies of Confidential Information in its possession, power or control, which are present on magnetic media, optical disk or other storage device, in a manner that ensures that the Confidential Information is rendered unrecoverable.

5. The undersigned Interested Party shall certify to Delhi Aviation Fuel Facility (Private) Limited that it has returned or destroyed such Confidential Information to the Delhi Aviation Fuel (Private) Limited within two (2) days of such a request being made by Delhi Aviation Fuel (Private) Limited.

Name of Interested Party's

Signature of Authorized Representative

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

Annexure VII

DECLARATION to be submitted along with Technical Bid

(M/s. _____) hereby declare / clarify that we have not been banned or delisted by any government or quasi Government agencies or Public Sector Undertakings.

Stamp & Signature of the bidder

NOTE: If a bidder has been banned by any Government or quasi Government agencies or PSUs, this fact must be clearly stated with details. If this declaration is not given along with the technical bid, the tender will be rejected as non-responsive.

Sign & Stamp of Bidder



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for supply of items in all respects, inclusive of transportation, handling and safe custody at site & all incidental cost.	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
1	PIPING WORK FOR FAST FLUSHER & SAMPLING SYSTEM (A1M)				
	Supply of Seamless Stainless steel pipe as per ASTM A312 TP 316 with all necessary fittings such as tees, nuts, bolts, gaskets, nipples, expanders complete with adequate no. of supports along with Fast Flusher Sampling System. The pipes shall be fully welded and flanges shall be used as per standard engineering practices. Piping shall be pickled & passivated. Ref. Document No.: 1) 322538-MSD-04 2) 322538-MPE-0106-0				
1.1	Pipes				
	20 NB (SCH 80s)	Meter	5		
	25 NB (SCH 40s)	Meter	140		
	50 NB (SCH 40s)	Meter	68		
1.2	90° Bends (LR Elbow)				
	20 NB (SCH 80s)	Nos	15		
	25 NB (SCH 40s)	Nos	39		
	50 NB (SCH 40s)	Nos	18		
1.3	45° Bends (LR Elbow)				
	50 NB (SCH 40s)	Nos	5		
1.4	Companion Flange (SORF)				
	50 NB (300 #)	Nos	36		
1.5	TEE				
	25 NB (SCH 40s)	Nos	21		
1.6	Sockolet				
	25 NB	Nos	6		
	50 NB	Nos	6		
1.7	Gasket (PTFE)				



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for supply of items in all respects, inclusive of transportation, handling and safe custody at site & all incidental cost.	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
	50 NB	Nos	36		
1.8	Ball Valves (800#)				
	25 NB	Nos	42		
1.9	Ball Valves (300#)				
	50 NB	Nos	6		
1.10	Check Valves (800#)				
	25 NB	Nos	6		
1.11	Gate Valves (800#)				
	20 NB	Nos	15		
1.12	Gate Valves (300#)				
	50 NB	Nos	6		
1.13	Temperature Regulating Valve				
	20 NB	Nos	15		
1.14	Flexible Hose for Sampling Ref. Documents No.: 1) 322538-RSD-104 2) 322538-MSD-0501-01				
	Flexible Hose for sampling (25 NB) (6 Meter Length)	Nos	9		
	Flexible Hose for sampling (25 NB) (3 Meter Length)	Nos	3		
1.15	SS Clamp				
	SS clamp for fixing of 25 NB pipe for sampling of fuel inside the tank	Nos	120		
1A	FABRICATION OF NOZZLE IN EXISTING VERTICAL TANK				
	Supply of nozzle connection in existing vertical Tank for fuel drawing work and Instrumentation.				
	Nozzle Assembly (MOC: CS)				
a	Nozz. - 300NB (150#) - Nozzle with Blind Flange, Gasket and Fasteners (for sampling system on Shell)	Nos	3		



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for supply of items in all respects, inclusive of transportation, handling and safe custody at site & all incidental cost.	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
b	Nozz. - 50NB (150#) (1 No. Pressure Transmitter on Shell & 1 No. Temp. Element on Roof)	Nos	12		
c	Nozz. - 40NB (150#) (Level Switch on Roof)	Nos	6		
d	Nozz. - 100NB (150#) (HOLD) (Servo type Level Transmitter on Roof) (Ref. Note:2)	Nos	6		
2	PIPING WORK FOR DRAIN PIT (A2Z)				
	Supply of the HDPE piping with all necessary fittings such as tees, nuts, bolts, gaskets, nipples, expanders complete with adequate no. of supports. The piping shall be as per specification and standard engineering practices. Reference Documents No.: 1) 322538-MSD-03 2) 322538-PKA-0002-02 3) 322538-MPB-0107-01				
2.1	Pipes				
	15 NB	Meter	1		
	20 NB	Meter	1		
	40 NB	Meter	10		
	50 NB	Meter	3		
2.2	Bends (LR Elbows)				
	15 NB	Nos	2		
	20 NB	Nos	2		
	40 NB	Nos	3		
	50 NB	Nos	1		
2.3	Companion Flange (SORF)				
	50 NB (150 #)	Nos	3		
2.4	Reducer (Eccentric) HOLD				
	HOLD x 50 NB (Ref. Note:1)	Nos	1		



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for supply of items in all respects, inclusive of transportation, handling and safe custody at site & all incidental cost.	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
2.5	Reducer (Concentric) HOLD				
	HOLD x 40 NB (Ref. Note:1)	Nos	1		
2.6	Adapter				
	50 NB	Nos	2		
2.7	Gasket				
	50 NB	Nos	3		
2.8	Ball Valves (PN10)				
	20 NB	Nos	2		
2.10	Butter Fly Valves (PN10)				
	50 NB	Nos	1		
2.11	Basket type Strainer				
	50 NB	Nos	1		
2.12	Centrifugal Pump				
	Design, selection, engineering, obtaining approval from client / consultant, manufacturing, supply, inspection, testing of 10 M ³ /Hr. Oily Water / Strom Water transfer centrifugal pump as per Technical Specification No.: 322538-RSD-103 & Data Sheet No.: DAFFPL-MMD-322538-RSD-03	Nos	1		
3	PIPE SPOOL PIECE (A21A)				
	Supply of CS pipe spool piece to bridge the gap created in piping system due to removal of metallic bellow in Tank Farm Area. Reference Documents No.: 1) 322538-MSD-401				
3.1	Pipes				
	150 NB	Meter	2		
	250 NB	Meter	4		



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for supply of items in all respects, inclusive of transportation, handling and safe custody at site & all incidental cost.	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
	600 NB	Meter	9		
4	PIPING WORK FOR ATF HYDRANT PUMP (A21A)				
4.1	Pipes				
	200 NB	Meter	3		
4.2	Companion Flange (SORF)				
	200 NB	Nos	12		
4.3	Gasket (Non Asbestos Fibre) & Fasteners				
	200 NB	Nos	12		
5	MISCELLANEOUS				
	Supply of Jumpers for earthing of piping	Nos	60		
Sub Total (A)					
VAT *					
% on % of Sub total (A)					
Total Amount (A)(inclusive of taxes - including Freight & Insurance - FOR Site)					
Total Amount in word:					
Notes:					
1	Contractor to confirm the hold size as per pump Inlet / Outlet.				
2	Size to be modified as per vender drawing.				
3	For Radar Type Transmitter, clear distance from RADAR centre nozzle to side wall as per hook-up drawing or (0.15 x Tank Height) divided by 2.				
4	Any additional miscellaneous work at site not mentioned in tender document shall be in the purview of contractor. Contractor shall quote separately for the same and get approval from client.				
Signature of Bidder along with company seal					



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for Installation, Testing & Commissioning	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
1	PIPING WORK FOR FAST FLUSHER & SAMPLING SYSTEM (A1M)				
	Installation, Testing and Commissioning of Seamless Stainless steel pipe as per ASTM A312 TP 316 with all necessary fittings such as tees, nuts, bolts, gaskets, nipples, expanders complete with adequate no. of supports along with Fast Flusher Sampling System. The pipes shall be fully welded and flanges shall be used as per standard engineering practices. Piping shall be pickled & passivated. Ref. Document No.: 1) 322538-MSD-04 2) 322538-MPE-0106-0				
1.1	Pipes				
	20 NB (SCH 80s)	Meter	5		
	25 NB (SCH 40s)	Meter	140		
	50 NB (SCH 40s)	Meter	68		
1.2	90° Bends (LR Elbow)				
	20 NB (SCH 80s)	Nos	15		
	25 NB (SCH 40s)	Nos	39		
	50 NB (SCH 40s)	Nos	18		
1.3	45° Bends (LR Elbow)				
	50 NB (SCH 40s)	Nos	5		
1.4	Companion Flange (SORF)				
	50 NB (300 #)	Nos	36		
1.5	TEE				
	25 NB (SCH 40s)	Nos	21		
1.6	Socket				
	25 NB	Nos	6		
	50 NB	Nos	6		
1.7	Gasket (PTFE)				
	50 NB	Nos	36		



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for Installation, Testing & Commissioning	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
1.8	Ball Valves (800#)				
	25 NB	Nos	42		
1.9	Ball Valves (300#)				
	50 NB	Nos	6		
1.10	Check Valves (800#)				
	25 NB	Nos	6		
1.11	Gate Valves (800#)				
	20 NB	Nos	15		
1.12	Gate Valves (300#)				
	50 NB	Nos	6		
1.13	Temperature Regulating Valve TRV is to be installed in new / existing line, contractor to make puncture, fabrication, installation, testing and other necessary requirements as per site condition.				
	20 NB	Nos	15		
1.14	Flexible Hose for Sampling Ref. Documents No.: 1) 322538-RSD-104 2) 322538-MSD-0501-01				
	Flexible Hose for sampling (25 NB) (6 Meter Length)	Nos	9		
	Flexible Hose for sampling (25 NB) (3 Meter Length)	Nos	3		
1.15	Fast Flusher Sampling System				
	Installation, Testing and Commissioning of Fast Flusher Sampling System (Free Issue Material - FIM) Ref. Document No.: 1) 322538-PKC-0003-01 2) 322538-MPE-0106-01	Nos	6		
1.16	SS Clamp				
	SS clamp for fixing of 25 NB pipe for sampling of fuel inside the tank	Nos	120		
1A	FABRICATION OF NOZZLE IN EXISTING VERTICAL TANK				



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for Installation, Testing & Commissioning	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
	Fabrication, welding, testing of nozzle connection in existing vertical Tank for fuel drawing work and Instrumentation. Fabrication shall be carried out in accordance with code or technical Specifications for Storage Tanks and Scope of Work attached with tender.				
1A1	Nozzle Assembly (MOC: CS)				
a	Nozz.- 300NB (150#) - Nozzle with Blind Flange, Gasket and Fasteners (for sampling system on Shell)	Nos	3		
b	Nozz.- 50NB (150#) (1 No. Pressure Transmitter on Shell & 1 No. Temp. Element on Roof)	Nos	12		
c	Nozz.- 40NB (150#) (Level Switch on Roof)	Nos	6		
d	Nozz.- 100NB (150#) (HOLD) (Servo type Level Transmitter on Roof) (Ref. Note:2)	Nos	6		
e	Modification as per vendor drawing in existing Top Manhole for installation of Radar type Level Transmitter (Ref. Note:3)	Nos	6		
2	PIPING WORK FOR DRAIN PIT (A2Z)				
	Installation, Testing and Commissioning of the HDPE piping with all necessary fittings such as tees, nuts, bolts, gaskets, nipples, expanders complete with adequate no. of supports. The piping shall be as per specification and standard engineering practices. Reference Documents No.: 1) 322538-MSD-03 2) 322538-PKA-0002-02 3) 322538-MPB-0107-01				
2.1	Pipes				
	15 NB	Meter	1		
	20 NB	Meter	1		
	40 NB	Meter	10		
	50 NB	Meter	3		
2.2	Bends (LR Elbows)				
	15 NB	Nos	2		



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for Installation, Testing & Commissioning	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
	20 NB	Nos	2		
	40 NB	Nos	3		
	50 NB	Nos	1		
2.3	Companion Flange (SORF)				
	50 NB (150 #)	Nos	3		
2.4	Reducer (Eccentric) HOLD				
	HOLD x 50 NB (Ref. Note:1)	Nos	1		
2.5	Reducer (Concentric) HOLD				
	HOLD x 40 NB (Ref. Note:1)	Nos	1		
2.6	Adapter				
	50 NB	Nos	2		
2.7	Gasket				
	50 NB	Nos	3		
2.8	Ball Valves (PN10)				
	20 NB	Nos	2		
2.10	Butter Fly Valves (PN10)				
	50 NB	Nos	1		
2.11	Basket type Strainer				
	50 NB	Nos	1		
2.12	Centrifugal Pump				
	Testing, Erection & Commissioning of 10 M ³ /hr. Oily Water / Strom Water transfer centrifugal pump as per Technical Specification No.: 322538-RSD-103 & Data Sheet No.: DAFFPL-MMD-322538-RSD-03	Nos	1		
3	INSTALLATION OF RO SOV FOR EACH TANK	Nos	15		



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for Installation, Testing & Commissioning	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
	Dismantling of existing valves fitted on inlet & outlet nozzles of storage tanks. Installation & Commissioning of Remote Operated Shut Off Valves (ROSOV) (Free issued material) in place of dismantled valves. Changing of existing Sealing material and hardware if any during replacement of valves. Rate for replacement of any relevant items shall be calculated as actual.				
4	MAINTENANCE OF EXISTING MOTORIZED BUTTER FLY VALVES	Nos	12		
	Dismantling, service, maintenance, overhauling, inspection & performance checking and re fitting of existing Motorized Butter Fly Valves (24" 6 Nos. & 10" 6 Nos., MOC: CS). Changing of existing Sealing material and parts if any during maintenance of valves. Rate for replacement of parts shall be calculated as actual.				
5	FABRICATION & INSTALLATION OF PIPE SPOOL PIECE (A21A)				
	Dismantling of existing metallic bellows, fabrication, aligning, welding, testing of CS pipe spool piece to bridge the gap created in piping system due to removal of metallic bellow in Tank Farm Area. Reference Documents No.: 1) 322538-MSD-401				
5.1	Pipes				
	150 NB	Meter	2		
	250 NB	Meter	4		
	600 NB	Meter	9		
6	INSTALLATION & PIPING WORK FOR ATF HYDRANT PUMP (A21A)				
6.1	Installation of 6 Nos. ATF Hydrant Pump (Free issued Material-FIM) including fabrication, aligning, welding, testing of CS piping and to be connected to existing suction and discharge pipe line. Reference Documents No.: 1) 322538-MSD-401		6		
6.2	Pipes				
	200 NB	Meter	3		
6.3	Companion Flange (SORF)				



SCHEDULE OF QUANTITY-MECHANICAL & PIPING

Sr. No.	Item Description	Unit	Qty.	Bidder Name :	
				Unit Rate for Installation, Testing & Commissioning	Total Amount for Supply (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)=(4) x (5)
	200 NB	Nos	12		
6.4	Gasket (Non Asbestos Fibre) & Fasteners				
	200 NB	Nos	12		
7	MISCELLANEOUS				
7.1	Installation of Jumpers for earthing of piping	Nos	60		
Sub Total (A)					
Service Tax *		% on		% of Sub total (A)	
Total Amount (A)(inclusive of taxes)					
Total Amount in word:					
Notes:					
1	Contractor to confirm the hold size as per pump Inlet / Outlet.				
2	Size to be modified as per vender drawing.				
3	For Radar Type Transmitter, clear distance from RADAR centre nozzle to side wall as per hook-up drawing or (0.15 x Tank Height) divided by 2.				
4	Any additional miscellaneous work at site not mentioned in tender document shall be in the purview of contractor. Contractor shall quote separately for the same and get approval from client.				
					Signature of Bidder along with company seal