



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/2021-22/06

INVITING TENDER FOR
INSTALLATION/REPLACEMENT OF FUEL HYDRANT
CENTRIFUGAL PUMPSETS WITH ALLIED MECHANICAL, CIVIL
AND ELECTRICAL WORKS

BID DUE DATE & TIME: 1500 Hrs. IST on 29th November 2021

OPENING OF TECHNICAL BIDS: 1100 Hrs. IST on 30th November 2021



Contents

CHAPTER 1: Introduction (COVERING NOTE) 4

CHAPTER 2: INSTRUCTIONS TO BIDDERS.....11

CHAPTER 3: BID-QUALIFICATION CRITERIA16

CHAPTER 4: PERFORMANCE OF WORK20

CHAPTER 5: SCOPE OF WORK36

CHAPTER 6: GENERAL TERMS & CONDITIONS37

Annexure I – Technical Specifications/Material Requisition

Annexure II – DEVIATION SHEET TO BE SUBMITTED ALONGWITH Technical BID

Annexure III – DECLARATION SHEET TO BE SUBMITTED ALONGWITH Technical BID

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

Annexure VIII – STATEMENT OF CEREDENTIALS TO BE SUBMITTED ALONGWITH Technical BID

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 TERMS.

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.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

TENDER NOTICE DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

INVITING TENDER FOR INSTALLATION/REPLACEMENT OF FUEL HYDRANT CENTRIFUGAL PUMPSETS WITH ALLIED MECHANICAL, CIVIL AND ELECTRICAL WORKS AS PER SPECIFICATIONS

TENDER NO: DAFFPL/MOD/FF/2021-22/06

Delhi Aviation Fuel Facility (P) Ltd (DAFFPL) invites bids from eligible bidders for supply of Filter Water Separators and Micro Filters.

Brief Scope of work:

We intend to Replace Existing 08 Nos Fuel Hydrant Centrifugal Pumpsets by New Centrifugal Pumpsets with Allied Mechanical, Civil & Electrical Works complete as per specifications.

Bid Security (EMD):	As mentioned in the Tender document
Date, Time & Venue for Voluntary Pre-bid Meeting:	10 th November 2021; 1500 HRS (IST) at DAFFPL, Aviation Fueling Station, Shahabad Mohammadpur, New Delhi-110061
Last Date of Submission of Queries	Upto 18:00 HRS (IST) on 15 th November 2021.
Bid Due Date, Time & Place of Submission:	Upto 15:00 HRS (IST) on 29 th November 2021, at e-Tendering Portal of DAFFPL.

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

Chief Executive Officer
DAFFPL, New Delhi



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 provide 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/ bidder's responsibility to execute the job in all respects as per specification furnished by consultant / owner and as per applicable codes, standards & in line with 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 teamwork, workmanship of the workers and supervisors.

The Contractor/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.

Delhi Aviation Fuel Facility Private Limited (DAFFPL) invites tenders in prescribed tender form under two-bid system. For viewing details including EMD, BID QUALIFICATION CRITERIA etc. please visit our e-Tendering web site <http://daffpl.enivida.com>

The bids are to be submitted on the e-Tendering portal of **Delhi Aviation Fuel Facility Private Limited (DAFFPL)**.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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/uploaded on DAFFPL e-tendering portal.
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. The bids submitted should be valid for **four months** from the due date of bid submission for Owner's acceptance. Once accepted it will remain firm till completion of contracts/orders.
5. 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.
6. The bidders may be invited for a presentation to DAFFPL during Techno-commercial evaluation before price bid opening.
7. The bidders to provide their bank details/ PAN / Goods & 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.
8. Party can quote with the deviations as referred in Point No.5 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 after cutoff date / time mentioned in tender calendar.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

9. Please note that queries related to scope of job, tender specifications, terms & conditions etc., should be submitted on e-tender portal before the query closing date. 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 e-tender portal.

10. 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.

11. EMD & Techno Commercial bid shall be opened on or after the date mentioned on tender opening date on e-tender portal. Price Bid of only those bidders whose offer is found meeting both BQC & techno-commercially acceptable, shall be opened on a later date as decided by DAFFPL.

12. DAFFPL reserves the right to accept any one or more 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. Ajay Sigh, Asst. Manager Projects, ajay.singh@daffpl.in , 9999946309,	Mr. Manish Kumar Project Officer manish.kumar@daffpl.in , 9810640818	vishvajit@daffpl.in
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13. 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.

14. A Pre-bid meeting shall be conducted is scheduled for **10th November 2021 at 1500 Hrs IST** at the office of DAFFPL, New Delhi. All prospective bidders can participate in the same. Any clarification regarding tender shall be sorted out during the pre-bid meeting.

a. The purpose of the pre-bid meeting is to clarify any doubts of the



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

BIDDER on the interpretation of the provisions of tender.

- b. Bidder(s) are requested to submit their queries, mentioning form name, clause no. & clause as per schedule in order to have fruitful discussions during the meeting.
- c. All the Bidder(s) are requested to attend the pre-bid meeting to be held at DAFFPL Office as per schedule.

15. 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 bank transfer (IMPS/RTGS) in favor of Delhi Aviation Fuel Facility Private Limited. 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.

Direct bank transfer for Tender Fee and Earnest Money Deposit to DAFFPL account as detailed below. The UTR Reference and date shall be provided in the Tender portal for DAFFPL verification.

Name of Account	DELHI AVIATION FUEL FACILITY PRIVATE LTD.
Account No.	39040531887
Name of Branch	Corporate Accounts Group-II Branch, New Delhi
IFSC Code	SBIN0017313
SWIFT	SBININBB824
MICR	110002562
PAN	AAACS8577K
TAN	DELS55939C
BSR	0017313

- a. The bidders not submitting EMD by due time & date shall be rejected & their bids shall not be evaluated further.
- b. **The EMD amount shall be 1.0 (One) Lakh INR**
- c. Firms registered with National Small-Scale Industries (NSIC)/MSME of India are exempted from submission of EMD/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 EMD/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.



16. Site Restriction: The job must be done in an 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 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 / limitations 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 must work under restricted conditions. The normal working hours of facility 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.

The tenderer must visit the site of the tender and familiarize himself with location, operating / working conditions as well as any other local factors which could influence the working before quoting for the job. His quote should take care of any such restrictions; conditions etc. and any claim afterwards 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.**

17. Completion Period: Time is the essence of the contract. The time period of contract is **06 (Six) months** from the date of Letter of Intent/notification of award. The time includes necessary time required for mobilizations and demobilizations after the execution of work. Successful bidder is required



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- to provide a bar chart /schedule showing the activities/events with time within 10 days from date of award of work. Also, the jobs may get delayed due to monsoon. Any extra claims on account of the same will not be entertained.
18. The contractual completion period of 06 months is inclusive of all the lead time for procurement of raw materials, inspection / testing, packing or any other activity whatsoever required to be accomplished to complete the work in all respect.
19. 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.
20. **Receipt & storage of material at Site:** Contractor is required to make his own arrangement for unloading and storage of materials at site. Contractor is required to inform us prior to dispatch of materials and his representative required to be available for receipt and unloading of materials at site.
21. The successful vendor has to arrange and submit to fuel facility the proper **POLICE VERIFICATION DOCUMENTS** if required of all the labors, site in charges, supervisors, welders, grinders and all associated workmen who will be coming inside the terminal for carrying out related jobs.
22. For carrying out the jobs inside the depot the vendor must arrange for associated tools, tackles, manpower, machinery of his own and no extra payment will be made to vendor on account of the same.
23. All electrical works shall be carried out by qualified workers under supervision of class-A/valid electrical license holder.
24. For arranging the electricity vendor to note that only Acoustic Proof, box type DG sets will be allowed inside the depot premises. Vendor to also note that proper GI plate type earthing system as per IS 3042 (LATEST) has to be provided by the vendor for DG set and no extra payment will be



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

done for the same. There should be two nos. earthing system connected in a grid at a location as instructed by DAFFPL site in-charge.

25. 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. Scope of Work- CHAPTER: 5
6. General Purchase Conditions- CHAPTER: 6
7. Technical Specifications/Material Requisition Documents - (Attached as Annexure I)
8. 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



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. The bidders should have valid class 3 Digital sign certificate with encryption.
3. Bidders are requested to register on our E-Tendering portal on <https://daffpl.enivida.com>
4. Bidder can contact on e-portal helpdesk numbers 011-49606060, 9355030617 during 9:30 hrs to 18:00 hrs for any query/assistance for registration & tender documents submission.
5. 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 only through e-Tender portal.
6. Owner reserves the right to accept / reject any or all bid qualification documents at their sole discretion without assigning any reason whatsoever.
7. Owner is not responsible for any delays from bidder end.
8. 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.
9. Undertaking by the bidder:
 - a. I/we hereby undertake that the statements made herein/information given in the bids through e-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.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

10. Owner, at its discretion reserves the right to verify information submitted by the bidders.
11. Bidder to submit documents/information to satisfy the bid qualification criteria. Bidders should also be able to produce further information as and when required by DAFFPL with in a time limit as specified by DAFFPL.
12. DAFFPL reserves their right to negotiate the quoted prices with lowest bidder.
13. Bidders would be qualified based on data and documents submitted by them.
14. Owner's decision on any matter regarding short listing of vendors shall be final and no corresponding in this regard will be entertained.
15. The vendors who are on IOCL/BPCL/DIAL holiday list or delisted will not be considered.
16. 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.
17. 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.
18. 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 for e-tender 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

bids, we may, at our discretion, extend the bid due date.

19. 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.
20. 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.
21. 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.
22. 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 e-tendering portal.
23. 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.
24. Telex/ Telegraphic/ Telefax / E-mail/Physical offers will not be considered and shall be rejected.
25. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

Bidder. Withdrawal of a bid during this interval shall result in the forfeiture of Bidder's EMD.

26. 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.
27. 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.
28. 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.
29. 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.
30. 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).
31. 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.
32. 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 between the parties. Within 05 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.
33. Vigil Mechanism: DAFFPL has developed the Vigil Mechanism to deal with references/ grievances, if any, that is received from bidders who



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

participated / intends to participate in the tender. The details of the same are available on our website www.daffpl.in

34. 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.

35. 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 & if they are free of any computational errors, 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, the owner/ may, at its discretion, ask the Bidder clarifications on the bid. The request for such clarifications and the response thereto shall be through the e-tendering portal.
- 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.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- f. A bid determined as substantially non-responsive after final evaluation 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.**

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 "Installation/Replacement of Fuel hydrant Centrifugal Pumpsets with Allied Mechanical, Civil & Electricals Works" at DAFFPL Fuel Farm Facility."

➤ **Technical Criteria:**

The bidder shall have satisfactorily executed either of the following during the last 7 years ending 31/10/2021:

The Bidder should have completed at least **one similar work**, costing not less than **INR 39 Lakhs**.

OR

The Bidder should have completed at least **two similar works**, each costing not less than **INR 25 Lakhs**.

OR

The Bidder should have completed at least **three similar works**, each costing not less than **INR 20 Lakhs**.

Notes:

- a. Similar works means mechanical/mechanical & piping/civil works at petroleum installations.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- b. Bidder shall submit orders w.r.t. above criteria and installation of motor driven fuel pumpsets/fire water pumpsets of minimum 55KW capacity of driver shall be part of minimum one similar completed order.
- c. Construction of RCC foundations/structure shall be part of minimum one similar completed order.
- d. The copy of work orders and completion certificates/proof w.r.t. above criteria to be submitted along with bids.

FINANCIAL CAPACITY

Bidder shall have minimum average annual turnover of **Rs. 40.00 Lakhs** 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"

Note: Turnover for this purpose should be as per audited P&L statement including Balance Sheet/ Published Account/ Profit & Loss Account Statement of the tenderer. However, if the tenderer is not required to get its accounts audited under Section 44AB of the Income Tax Act, 1961, certificate from a practicing Chartered Accountant towards the turnover of the tenderer along with copies of its income tax return should be obtained.

Total revenue as per schedule III of companies' act, 2013 (earlier revised schedule VI of companies Act, 1956) shall be considered as Turnover. Audited balance sheet / published accounts on calendar year basis shall also be acceptable. The financial statements copy must bear the registration number of the authorised chartered accountant and its seal. (This is not applicable for published annual reports).

- Both the above criteria (Technical & Financial) to be met for acceptance of the bid.

OTHER INFORMATION OF BQC

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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

consortium, and in which case the conditions applicable to a consortium shall apply to them. "Affiliate" of a Party shall mean any company or legal entity which:

- a. Controls either directly or indirectly a Party, or
 - b. Which is controlled directly or indirectly by a Party; or
 - c. Is directly or indirectly controlled by a company, legal entity or Partnership which directly or indirectly controls a Party. "Control" means actual control or ownership of at least a 50% voting or other controlling interest that gives the power to direct, or cause the direction of, the management and material business decisions of the controlled entity.
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:



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 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;
 - 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. Entities which are affiliates of one another are allowed to bid either as a sole bidder or as a consortium only;
 - XII. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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. 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 and to the entire satisfaction of the DAFFPL.
- 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. MATERIALS TO BE SUPPLIED BY CONTRACTOR:

- a. The contractor shall procure and provide the whole of the materials required to complete the job including tools, tackles and equipment etc. The materials procured by the contractor shall be DAFFPL approved/specified quality.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- b. All materials procured/used 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. 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.

3. 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.

4. COORDINATION AND INSPECTION OF WORK:

The coordination and inspection of the day-to-day work under the contract shall be the responsibility of the Engineer-in-Charge. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

the contractor shall not preclude the contractor from complying with the instructions.

5. 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.

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

7. 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.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 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 preforma of the report will mutually be agreed after the award of contract.
8. 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 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.
9. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.
- d. Pillars bearing geodetic marks located at the site of work under construction should be protected and fenced by the contractor.
- e. On completion of works, the contractor must submit the geodetic documents according to which the work was carried out.

10. 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.

11. MATERIALS TO BE SUPPLIED BY CONTRACTOR:

- d. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

transport thereof. The materials procured by the contractor shall be DAFFPL approved/specified quality.

- e. 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.
- f. 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.

12. 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 stores or at a place



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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

13. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.

14. MATERIALS PROCURED WITH ASSISTANCE OF OWNER:

Notwithstanding anything contained to the contrary in any or all the clause of this document where any materials for the execution of the contract are procured with the assistance of Owner either by issue from Owner's stock or purchase made under orders or permits or licences issued by Government, the contractor shall hold the said materials as trustee for the Owner and use such materials economically and solely for the purpose of the contract and not dispose them off without the permission of the owner and return, if required by the Engineer-in-Charge, all surplus or unserviceable materials that may be left with him after the completion of the contract or at its termination for any reason, whatsoever on his being paid or credited such prices as the Engineer in-Charge shall determine having due regard to the condition of the materials. The price



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

allowed to the contractor however, shall not exceed the amount charged to him excluding the storage charges if any. The decision of the Engineer-in-Charge shall be final and conclusive in such matters. In the event of breach of the aforesaid condition, the contractor shall in terms of the licenses or permits, and/or for criminal breach of trust, be liable to compensate the Owner a double rate or high rate, in the event of those materials at that time having higher rate or not being available in the market, then any other rate to be determined by the Engineer-in-Charge and his decision shall be final and conclusive.

15. MATERIALS OBTAINED FROM DISMANTLING:

If the contractor in the course of execution of the work is called upon to dismantle any part for reasons other than those stipulated in clauses 64 & 68 hereunder, 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.

16. 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.

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

18. ALTERATIONS IN SPECIFICATIONS AND DESIGNS AND EXTRA WORK:

- a. The Engineer-in-Charge shall have power to make any alterations in, omissions from, additions to or substitutions for, the schedule of rates, the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

such altered / extra / new items of work in accordance with any instructions which may be given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions or substitutions shall not invalidate the contract and any altered additional or substituted work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respect on which he agree to do the main work. The time for completion of work may be extended for the part of the particular job at the discretions of the Engineer-in-Charge, for only such alteration, additions or substitutions of the work, as he may consider as just and reasonable. The rates for such additional, altered or substituted work under this clause shall be worked out in accordance with the following provisions:

- If the rates for the additional, altered or substituted work are specified in the contract for the work, the contractor is bound to carry out the additional, altered or substituted work at the same rates as are specified in the contract.
- If the rates for the additional, altered or substituted work are not specifically provided in the contract for the work, the rates will be derived from the rates for similar class of works as specified in the contract for the work. The opinion of the Engineer-in-Charge as to whether the rates can be reasonably so derived from items in the contracts will be final and binding on the contractor.
- If the rates for the altered, additional or substituted work cannot be determined in the manner specified in sub-clause (a) and (b) above, then the contractor shall inform the Engineer-in-Charge of the rate which is his intension to charge for such class of work supported by analysis of the rate or rates claimed, and the Engineer-in-Charge shall determine the rates on the basis of the prevailing market rates of materials, labour cost at schedule of labour plus 10% to cover contractor's supervision, overheads and profit and pay the contractor accordingly. The opinion of the Engineer-in-Charge as to the current market rates of materials and the quantum of labour involved per unit of measurement will be final and binding on the contractor.
- Provisions, contained in sub-clause mentioned above shall not, however, apply: Where the value of alterations / additions / deletions or substitutions exceeds beyond plus or minus 25% of the estimated contract value (i.e. quoted item



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

rates of contractor shall hold good for variations etc. within plus or minus 25% of estimated contract value)

- b. In the event and as a result of such alternatives / additions / substitutions / deletion, the scope of contract work exceed the value stipulated in the contract by more than the limits given in clause above, the Contractor shall claim revision of the rates supported by the proper analysis in respect of such items for quantities in excess of the above limits, notwithstanding the fact that the rates for such items exist in the tender for the main work or can be derived in accordance with the provision of sub-clause (b) of Clause 61 A, and the Engineer-in-Charge may revise their rates having regard to the prevailing market rates, and the contractor shall be paid in accordance with the rates so fixed. But, under no circumstances the contractor shall suspend / stop / slowdown the work on the plea of non-settlement of rates of items falling under this clause.

19. 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.

20. 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.

21. INSPECTION OF WORK:

- a. The Engineer-in-Charge 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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

22. 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.

23. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.

24. SAMPLES:

The contractor shall furnish to the Engineer-in-Charge for approval when requested or if required by the specifications, adequate samples of all materials and finishes to be used in the work. Such samples shall be submitted before the work is commenced and in ample time to permit tests and examinations thereof. All materials furnished and finishing applied in actual work shall be fully identical to the approval samples.

25. 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 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.



26. 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.

27. 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.

28. POSSESSION PRIOR TO COMPLETION:

The Engineer-in-Charge shall have the right to take possession of or use any completed or partially completed work or part of the work. Such possessions or use shall not be deemed to be an acceptance of any work completed in accordance with the contract agreement. If such prior possession or use by the Engineer-in-Charge delays the progress of work, suitable adjustment in the time of completion will be made and contract agreement shall be deemed to be modified accordingly.

29. PERIOD OF LIABILITY FROM THE DATE OF COMPLETION OF WORK:

- a. The contractor shall guarantee the installation/site work for a period of 12 (twelve) Months from the date of completion of work, unless otherwise specified. Any damage that may lie undiscovered at the time of issue of completion certificate, connected in any way with the equipment or materials supplied by him or in the workmanship



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

shall be rectified or replaced by the contractor at his own expense as deemed necessary by the Engineer-in-Charge or in default, the Engineer-in-Charge may cause the same made good by other workmen and deduct expenses (for which the certificate of Engineer-in-Charge shall be final) from any sums that may be then or at any time thereafter, become due to the contractor or from his security deposit.

- b. If the contractor feels that any variation in work or in quality of materials or proportions would be beneficial or necessary to fulfill the guarantee called for, he shall bring this to the notice of the Engineer-in-Charge in writing. The work will not be considered as complete and taken over by the Owner until all the temporary works etc., constructed by the contractor is removed and work site cleaned to the satisfaction of Engineer-in-Charge.
- c. Care of Works:
From the commencement to completion of works, the contractor shall take full responsibility for the care of all works including all temporary works, and in case any damage, loss or injury happens to the works or to any part thereof or to any temporary work, from any cause whatsoever, he shall at own cost repair and make good the same, so that at completion, the work shall be in good order and in conformity in every respect with the requirements of the contract and the Engineer-in-Charge's instructions.
- d. Effects prior to taking over: If at any time, before the work is taken over, the Engineer-in-Charge shall
- Decide that any work done or materials used by the contractor or any sub-contractor is defective or not in accordance with the contract or that the works or any portion thereof are defective or do not fulfill the requirements of contract (all such matters being herein after called 'Defects' in this clause) and
 - As soon as reasonably practicable, notice given to the contractor in writing of the said decisions specifying particulars of the defects alleged to exist or to have occurred, then the contractor shall at his own expenses and with all speed make good the defects so specified. In the case contractor shall fail to do so, the Owner may take, at the cost of the contractor, such steps as may in all circumstances, be reasonable to make good such defects. The expenditure, so incurred by the Owner shall be recovered from the amount due to the contractor. The decision of the Engineer-in-Charge with regard to the amount be recovered from the contractor



will be final and binding on the contractor. As soon as the works have been completed in accordance with the contract and have passed the tests on completion, the Engineer-in-Charge shall issue a certificate (hereinafter called completion certificate) in which he shall certify the date on which the work have been so completed and have passed the said tests and the Owner shall be deemed to have taken over the works on the date so certified. If the works have been divided into various groups in the contract, the Owner shall be entitled to take over any group or groups before the other or others and thereupon the Engineer-in-Charge shall issue a completion certificate which will however, be for such group or groups as taken over only.

- e. Defects after taking over: In order that the contractor could obtain a completion certificate, he shall make good with all possible speed, any defect arising from the defective materials supplied by the Contractor or workmanship or any act of omission of the contract that may have been noticed or developed after the works or group of the works has been taken over. The period allowed for carrying out such work will be normally one month. If any defect be not remedied within a reasonable time, the Owner may proceed to do the work at the contractor's risk and expense and deduct from the final bill such amount as may be decided by the Owner. If by reason of any default on the part of the contractor a completion certificate has not been issued in respect of every portion of the work within one month after the date fixed by the contract for the completion of the works, the Owner shall be at his liberty to use the works or any portion thereof in respect of which a completion certificate has been issued provided that the works or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completing these works for the issue of completion certificate.
- f. The Security Deposit/retention money deducted / furnished shall be retained for the period of liability as given in clause above. This Retention amount or Bank Guarantee furnished against Security Deposit/retention money shall be released only on expiry of the period of liability and also based on the certification of the Engineer-in-charge that no defect/damage has been reported / observed during the stipulated period of liability for the contract.
- g. Performance of contractor shall be evaluated on each job by Engineer-in-Charge and recorded. Review of performance will be carried out at appropriate intervals by DAFFPL.



CHAPTER 5: SCOPE OF WORK

- a) Scope includes replacement of Eight (08) Nos existing 275 m³/hr capacity pumpsets by new pumpsets of same capacity with allied mechanical, civil & electrical works. Supply of consumables/materials for successful installation, testing, commissioning of new pumpsets for door delivery basis at DAFFPL Fuel Farm in New Delhi is in the scope of bidder.
- b) New 08 Nos new pumpsets will be issued to contractor as free issue item. The shifting of same from their current location in fuel farm to installation location (product hydrant pumphouse) is in the scope of bidder.
- c) Seven (07) Nos pumpsets out of Eight (08) Nos pumpsets will be installed on existing foundations and balance one (01) Nos pumpset will be installed on new foundation.
- d) Construction of new foundation after demolishing existing foundation is in scope of bidder.
- e) Removal of ATF from pipelines, blinding etc. with all required tools, tackles, manpower, materials, consumables, safety equipments etc. are in scope of bidder.
- f) Scope includes installation, testing & commissioning of new pumpsets after disconnecting (mechanically, electrically and/or as required as per site condition) existing pumpsets and shifting the same to desired location in/around fuel farm in line with specifications mentioned in Annexure-I (technical specifications/material requisition) or anywhere else in tender documents.
- g) Levelling, aligning & vibration analysis of the pumpsets is in the scope of bidder.
- h) All required associated mechanical, civil, electrical including power, control, signal & earthing works etc. are in scope of bidder.
- i) All necessary safety precautions, fire screen and any other safety equipment including PPE to complete the job is in the scope of bidder.
- j) Any works/activities which are not mentioned in tender document but necessary to complete the job are in scope of bidder without any additional financial implication to DAFFPL.
- k) The offer/quoted amount should also include all other elements like Custom Duties (if any), Insurance charges, approval charges, testing charges, transportation etc for door delivered price of equipment at DAFFPL Fuel Farm, New Delhi in India.



CHAPTER 6: 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 affected or that a particular work is to be carried out, it shall be understood that the same shall be affected / 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. 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.

3. Construction Program:

A detailed bar chart showing various activities shall be prepared by the tenderers. The work shall be executed strictly as per the agreed time schedule. The period of completion shall include, the time required for mobilization and testing as well as rectification, if any, testing & completion in all respects to the entire satisfaction of the consultant.

A joint programme of execution programme shall be prepared by the contractor.

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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

deployed along with the progress of the work done on previous day, for each category of work.

4. Construction Water and Power:

- ✓ The contractor has to make necessary arrangement for metering and further distribution for water & power both required for job at no extra cost. All arrangement/material shall be as per electrical rules/standards/Approved makes.
- ✓ Electricity will be provided by DAFFPL @ Rs. 18.00 per unit.
- ✓ Water will be provided based on monthly consumption as follows :
 - upto 6KI-INR 20/KI
 - 06-15KI-INR 30/KI
 - 15-25KI-INR 40/KI
 - 25-50KI-INR 100/KI
- ✓ All above water tariffs are subjected to change as per government revisions.
- ✓ The DAFFPL shall not take any guarantee for the supply of water & electricity and will not relieve the contractor of his responsibility in making his own arrangement and for the timely completion of the various works as stipulated.

5. 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.

6. 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.

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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

completion documents.

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

7. 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.

8. 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.

9. 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.

10. 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 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 Vendor's proposal and interpretation by any tax/assessing (or similar) authorities, on the



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

rate or terms and conditions related to taxes and duties etc., owner's 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.

11. 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.

12. Bidder shall quote considering the cost of all approvals, insurances and other applicable charges; nothing shall be paid/reimbursed additionally on any account.

13. Goods & Services Tax (GST): -The tenderer should have valid Goods & Service Tax registration. Tenderer should enclose the copy of the registration (GST) /copy of acknowledgement along with the tender. The Parties without valid Goods & Service Tax number need not quote. As per Section 171 of CGST/SGST Act, "Any reduction in rate of tax on any supply of goods or services or the benefit of input tax credit shall be passed on to the recipient by way of commensurate reduction in prices.

14. TAXES & DUTIES:

a) Bidder(s) quoted prices shall be exclusive of all taxes, duties, cess, levies etc.,

b) The invoice should clearly mention 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/GST 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

towards payment of Excise Duty, Education Cess, GST 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 included in the quoted prices and no separate reimbursement shall be made by DAFFPL.

15. 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 deducted before releasing any payment to the Bidder and a TDS (Tax deducted at source) certificate will be furnished to the Bidder.
- c) Bidder may note that where the responsibility to deduct TDS under section 194Q of Income Tax Act is on DAFFPL, bidder shall not collect any TCS under section 206C(1H) of the Income Tax Act from DAFFPL.**
- d) Accordingly, Bidder shall have the responsibility to check and include such provision of taxes in the prices.
- e) 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.

16. 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.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 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.
 - iii. Detection of submission of false / forged documents and fraud.
- h) 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.

17. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 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 all contractual obligations by the Bidder. The bank guarantee shall have a claim period of 06 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 warranty / guarantee.

18. PRICE REDUCTION FOR DELAY IN DELIVERY/WORK COMPLETION:

The inability of successful bidder to execute orders in accordance with the agreed completion schedule will entitle DAFFPL, at its options, to:

- a) Accept delayed work completion at prices reduced by a sum equivalent to half percent (0.5%) of the total order value (i.e. sum of amount of purchase order for supply part and amount of work order for installation part) of material not delivered/work not completed for every week of delay or part thereof which is to be considered as a week, limited to a maximum of 10% of the total order value (supply part and installation part). Date of completion of work at



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

DAFFPL site shall be considered for calculation of price reduction.

19. Purchase order for supply part will be placed by DAFFPL and work order for installation part will be placed by fuel farm operator M/s IOSPL on behalf of DAFFPL. The billing by contractor shall be done on DAFFPL only on both the cases.

20.INSURANCE

Contactora 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.

TRANSIT & COMPREHENSIVE INSURANCE

The vendor shall arrange transit Insurance for door delivery of equipments to DAFFPL Fuel Farm, New Delhi for delivery.

21.INSPECTION:

- a) Material / construction/Fabrication 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 commissioning or start up 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 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.

22. GUARANTEE/WARRANTY:

- a) Materials/workmanship shall be guaranteed against manufacturing defects, materials, workmanship, and design for a period of 12 months from the date of completion of work at DAFFPL site. 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 subcontracted 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/MAT 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.

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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

24. Construction power, water, loading and boarding, Site Storage with watch and ward, receipt, unloading, shifting material to store and internal shifting to site shall be included in Vendor's scope.
25. The unit rates as quoted to arrive at a total price shall be firm and inclusive of all duties, levies, transportation etc. No separate payment shall be made for site mobilization / demobilization, insurance etc.
26. The Schedule of Rates should be read with all other sections of the tender documents.
27. The tenderer shall be deemed to have studied the drawings, specifications and the details of work to be done within the time schedule and to have acquainted with the conditions prevailing at site. Site visit is strongly recommended.
28. All supply and work shall be in line with tender specifications, drawings and instructions of the Engineer-in-Charge.
29. The quantities shown against the various items are only indicative of the quantum of work and it may vary to any extent. Billing/payment will be done as per actual. Vendor to make measurements at site before dispatch of any material.
30. The rate quoted shall be inclusive of all work as mentioned in the scope of work in tender documents.
31. In case of any rework due to faulty workmanship or any defects occur or modifications are required no extra claims for such works/supply shall be entertained.
32. **PAYMENT TERMS:** The payment will be made after making necessary deductions as applicable & stipulated elsewhere in the tender document for materials, security deposit or any moneys due to the Owner etc.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- Advance Payment is not permissible in this contract.
- Contractor should submit PBG equal to 10% of Total Order Value within 30 days of issue of LOI/PO.
- If PBG is not submitted by contractor then 10% amount shall be deducted from running bills of contractor as retention amount.
- PBG/retention amount will be released after completion of guarantee/warranty/defect liability period.
- Payment will be released within 30 days from the receipt and acceptance of Invoice.

The following payment terms shall be applicable:

For Supply Part:

- 80% will be released within 30 days after receiving invoice after the receipt and acceptance of material at site adjusting deductible if any.
- Balance 20% of material consumed after completion of replacement/installation, testing & commissioning of each pumpset and certification by site engineer/PMC on prorata basis.

For Installation Part:

- 100% will be released after completion of replacement/installation, testing & commissioning of each pumpset and certification by site engineer/PMC on prorata basis.

Note: Payment will be done on actual consumption of material & works carried out. Amount for unused material will be adjusted in final billing.

Arrangement for Transit e-way Bill under the GST Act for all the purchases is the responsibility of the tenderer.

33. 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.



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

34. 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 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.
35. Repeat Order: DAFFPL reserves the right to place repeat order up to the order quantity within One Year from the date of original order on mutual agreement basis.
36. 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.
37. 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.
38. 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.



39. **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 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 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.
40. **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.
41. **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/purchaser. The Purchaser 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 Purchaser for such disposal shall be to the account of the vendor. The freight paid by the purchaser, if any, on the inward journey of the rejected materials shall be reimbursed by the vendor to the purchaser before the rejected materials are removed by the vendor. The vendor will have to proceed with the replacement of the Equipments without claiming any extra payment if so required by the purchaser. The time taken for replacement in such event will not be added to the contractual



delivery period.

42. 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.

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

44. 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-



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.

45. 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.
46. 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.
47. GOVERNING LAW: These General Purchase Conditions shall be governed by the Laws of India.
48. 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.
49. The following expressions used in these terms and conditions and in the purchase order shall have the meaning indicated against each of these:
- a) **OWNER**, Client, Purchaser, buyer means DAFFPL
 - b) **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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

shall include its successors and assigns.

- c) **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.
- d) **GOODS / MATERIALS:** means any of the articles, materials, machinery, equipment's, 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.
- e) **SITE / LOCATION:** means any Site where DAFFPL desires to receive materials anywhere in India as mentioned in tender.
- f) **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 time on mutually agreed terms and conditions.
- g) 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.
- h) 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.

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

51. 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.
- 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

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.

Technical Specifications

1.0 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 of pumpsets (free issue) i.e., electric motor duly coupled to Centrifugal Pumps for its installation, testing, commissioning with allied mechanical, civil, electrical works and modification of Jet A1 fuel piping if required within the Fuel Farm of DAFFPL.

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.

▪ 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

1.1 Environmental Conditions

1.1.1 Location

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

1.1.2 Topography

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

1.1.3 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%.

1.1.4 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:

1.1.4.1 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

1.1.5 Design Temperature

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

1.1.6 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.

2.0 Scope of Work

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.

Contractor shall arrange temporary power requirement for the job work, Cranes, transportation of material or any other requirement shall be fulfilled by contractor.

Contractor shall be responsible for the compliance of OSID norms, safety norms and other Indian norms during execution of the job.

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

- a. Installation of 08 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 contractor.
- c. It includes installation / erection & Commissioning of pump on foundation, positioning, levelling, and aligning as per required specifications.
- d. It shall be contractor's responsibility for dynamic balancing (alignment) of rotating Equipment.
- e. Civil works like excavation, concrete work, PCC works, concrete chipping, wall breaking, laying of pipe conduits for cables etc., shall be in scope of Contractor.

- f. Providing & fixing of saddles and steel structure supports for cables.
- g. Supply, laying and termination of 1100 V grade power and control cables with aluminium / copper conductor XLPE insulated, extruded PVC sheathed, armoured power cable with cable glands, lugs, straight through joints etc. for all cabling up to the loads. The cabling system comprises of above ground or underground cables. The cables shall be laid either on cable trays or through GI pipes / concealed conduits or underground trenches or through RCC pipes at road / drain crossings.
- h. Removal & reconnection of earthing system for pumpsets.
- i. Supply of Consumable items like welding rods, electrode, Teflon tape, glands, lugs, ferrule with proper identification of tags.
- j. Supply and installation of cable glands (double compression type), junction boxes, hardware items, etc.
- k. Supply and installation of Fire sealing compound is to be used at cable cellar / gland plate area so that fire in cellar is not extended to panel room area and vice versa.
- l. It also comprises testing, inspection, commissioning and handing over of complete work including all allied mechanical, civil, electrical works.
- m. Clearing of site after completion of work and housekeeping of work site (each day) is in bidder scope.
- n. 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.

2.1 SPECIFICATION FOR ERECTION OF PUMPS

2.1.1 Erection

- Casting of concrete foundation of the 01 Nos pump set and installation of 07 Nos pump sets on existing foundations 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.

2.1.2 Testing

- The contractor shall follow good engineering practice and / or the testing manuals supplied by the pump manufacturer for the testing.
- 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.

2.1.3 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.

2.1.4 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/standard codes. To ensure the above requirements, all piping material supplied shall have proper identification marks as per relevant standards /certificates. 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.

2.1.5 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.

2.1.5.1 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.

2.1.5.2 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.

2.1.5.3 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.
- 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.

2.1.5.4 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

3.0 Reinforcement Steel

Reinforcement bars, if supplies are arranged by contractor, shall be either plain round mild steel bars grade I as per IS 432 (part I) or medium tensile steel bar as per IS 432 (Part I) or hot rolled mild steel and medium tensile steel deformed bars as per IS 1139 or cold twisted steel bars as per IS 1786, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with IS 1566. Substitution of reinforcement will not be permitted except upon written approval from Engineer.

Plain round mild steel bars grade II as per IS:432 (part I) may be used with prior approval of Engineer in writing and with 10% increase in the reinforcement area but its use shall not be permitted in structures located in earthquake zones subjected to severe damage (as per IS:1895) and for structures subject to dynamic loading (other than wind loading), such as frames supporting rotary or reciprocating machinery etc.

All reinforcement shall be clean, free from grease, oil, paint, loose mill scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used.

3.1 Binding Wire

The mild steel wire shall be of 1.63 mm. or 1.22 mm. (16 or 18 gauge) diameter and shall conform to IS : 280-1972.

The use of black wire will be permitted for binding reinforcements bars. It shall be free from rust, oil paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

3.2 Plain Cement Concrete (PCC) Including Shuttering

3.2.1 Materials

Water, Sand, Cement, Stone aggregate 40 mm nominal size shall conform to above material list, and foam work to in item of foam work.

3.2.2 Workmanship

3.2.2.1 General

Before commencing concreting, the bed of foundation trenches shall be cleared off of all loose materials, levelled, watered and rammed, as directed.

3.2.2.2 Proportion of mix

The proportion of cement, sand and coarse aggregate shall be one part of cement, 4 parts of sand, 8 parts of stone aggregates and shall be so measured by volume or Control concrete grade as mentioned in BOQ.

3.2.2.3 Mixing

The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing, may however be allowed for smaller quantity of work, if approved by the Architect and Engineer-in-charge. When hand mixing is permitted by the Architect and Engineer in-charge, in case of breakdown of machineries and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that the mixing is continued until the mass is uniform in colour and consistency. However in such cases, 10% more cement than otherwise required, shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period 1.5 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

3.2.2.4 Transporting & placing the concrete

The concrete shall be handled from the place of mixing to the final position within 15 minutes by the method, as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

The concrete shall be laid in layers of 15 cm. to 20 cm.

3.2.2.5 Compacting

The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

3.2.2.6 Curing

After the final set, the concrete shall be kept continuously wet, if required by ponding, for a

period of not less than 7 days from the date of placement.

3.2.3 Mode of Measurements and Payment

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

The rate shall be for a unit of one m³ including cost of Shuttering work.

3.3 M20 / M25 / M30 Controlled Grade Concrete

3.3.1 Mix Design

All concrete in the works shall be of design mix as defined in IS 456, unless it is a nominal mix concrete such as 1:3:6, 1:4:8 or 1:5:10. Whether reinforced or otherwise, all design mix concrete works to be carried out under this specification.

All reinforced concrete in the works shall be "Design Mix Concrete" as defined in I.S. 456-2000.

This is to investigate the grading of aggregates, water cement ratio, workability and the quantity of cement required to give works cubes of the characteristic strength specified. The proportions of the mix shall be determined by weight. Adjustment of aggregate proportions due to moisture present in the aggregate shall be made.

Mix proportioning shall be carried out according to the ACI standard designation ACI- 613 or Design of concrete mixes - Road research Note No.4, Department of Scientific and Industrial Research U.K. or I.S. 10262 - 1982.

After award of the work, if so desired by the contractor, he/they may be allowed by the Engineer-in-Charge, till the designed mix is obtained, to carry out the reinforced concrete work in foundation and plinth as per equivalent nominal mix against the specified design mix concrete as per I.S. Codes. However, all other specification for design mix shall govern for nominal mix also and nothing extra shall be paid for use of extra cement or else on this account whether the cement is supplied by the Department or procured by the contractor. Where the quantity of RCC is very small, under such circumstance equivalent nominal mix can also be permitted by the Engineer-in-Charge. The concrete shall be in grades designated as below.

Table 3.5: Concrete Grade designation

Group	Grade Designation	Specified Characteristic compressive strength of 150 mm cube at 28 days (N/mm ²)
Ordinary concrete	M10	10
	M15	15
	M20	20
Standard Concrete	M25	25
	M30	30
	M35	35
	M40	40
	M45	45
	M50	50
	M55	55

High strength concrete	M60	60
	M65	65
	M70	70
	M75	75
	M80	80

NOTE:

The characteristic strength is defined as the strength of material below which not more than 5% of the test results are expected to fall.

5. In the designation of a concrete mix, letter "M" refers to the mix and the number to the specified characteristic compressive strength of 150 mm. size cubes at 28 days expressed in N / mm².
6. Minimum Cement Content, Maximum Water Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum size.

Table 3.6: Different Exposures

Sl. No.	Exposure	Plain concrete			Reinforced concrete		
		Minimum Cement Content Kg/m ³	Maximum Free Water Cement Ratio	Minimum grade of concrete	Minimum Cement Content Kg/m ³	Maximum Free Water Cement Ratio	Minimum Grade of concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	-	300	0.55	M - 20
ii)	Moderate	240	0.60	M-15	300	0.50	M - 25
iii)	Severe	250	0.50	M-20	320	0.45	M -30
iv)	Very severe	260	0.45	M-20	340	0.45	M -35
v)	Extreme	280	0.40	M25	360	0.40	M- 40

Note:

Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of additions mentioned in mineral admixtures. The additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do not exceed the limit of pozzolona and slag specified in IS 1489 (Part 1) and IS 455 respectively.

Minimum grade for plain concrete under mild exposure condition is not specified.

Table 3.7: Nominal cover to meet Durability Requirements

Exposure	Nominal concrete cover in mm not less than
Mild	20

Moderate	30
Severe	45
Very severe	50
Extreme	75

NOTES

For main reinforcement up to 12 mm diameter bar for mild exposure the nominal cover may be reduced by 5mm.

Unless specified otherwise, actual concrete cover should not deviate from the required nominal cover by + 10mm

For exposure conditions 'severe' and 'very severe', reduction of 5 mm may be made, where concrete grade is M 35 and above.

Table 3.8: Nominal cover to meet specified period of fire resistance

Fire Resistance	Nominal cover						COLUMNS
	BEAMS		SLABS		RIBS		
	Simply Supported	Continuous	Simply Supported	Continuous	Simply Supported	Continuous	
H	mm	Mm	mm	Mm	mm	mm	mm
0.5	20	20	20	20	20	20	40
1	20	20	20	20	20	20	40
1.5	20	20	25	20	35	20	40
2	40	30	35	25	45	35	40
3	60	40	45	35	55	45	40
4	70	50	55	45	65	55	40

NOTES

The nominal covers given relate specifically to the minimum member dimensions as per drawing

Cases that lie below the bold line require attention to the additional measures necessary to reduce the risks of spalling.

Adjustments to Minimum cement contents for Aggregates other than 20 mm Nominal Maximum size:

Sr No	Nominal maximum Aggregate size mm	Adjustments to minimum cement content kg/ m3
(1)	(2)	(3)
i)	10	+40
ii)	20	0
iii)	40	-30

For concrete of compressive strength greater than M55 design parameters given in the standard may not be applicable and the values may be obtained from specialized Literatures and experimental results.

The mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than appropriate values given in the table above.

It shall be very clearly understood that whenever the class of concrete such as M 20 is specified it shall be the Contractor's responsibility to ensure that minimum crushing strength stipulated for the respective class of concrete is obtained at works. The maximum total quantity of aggregate by

weight per 50 kg of cement shall not exceed 450 kg except when otherwise specifically permitted by Engineer-In-Charge.

To fix the grading of aggregates, water cement ratio, workability and the quantity of cement required giving preliminary and works cubes of the minimum strength specified, the proportions of the mix shall be determined by weight. Adjustment of aggregate proportions due to moisture present in the aggregate shall be made. Mix proportioning shall be carried out according to Indian Standard Specifications.

Whenever there is a change either in required strength of concrete or water cement ratio or workability or the source of aggregates and/or cement, preliminary tests shall be repeated to determine the revised proportions, of the mix to suit the altered conditions.

While fixing the value for water cement ratio for preliminary mixes, assistance may be derived from the graph (appendix IS 456 showing the relationship between the 28 day compressive strengths of concrete mixes with different water cement ratios and the 7 days compressive strength of cement tested in accordance with IS 269.

3.3.2 Preliminary Test

Test specimens shall be prepared with at least two different water / cement ratios for each class of concrete, consistent with workability required for the nature of the work. The materials and proportions used in making preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of these tests is to determine the proportions of cement, aggregates and water necessary to produce concrete of required consistency and to give the specified strength. It will be the Contractor's sole responsibility to carry out these tests and he shall therefore furnish to Engineer a statement of proportions proposed to be used for the various concrete mixes.

Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water, cement and aggregates for each mix shall be determined by weight/volume to an accuracy of 1 part in 1000 parts.

Mixing shall be done by a mixer machine as per IS 516 in such a manner as to avoid loss of water. The cement and fine aggregate shall first be mixed dry until the mixture is uniform in colour. The coarse aggregate shall then be added, mixed and water added and mixed thoroughly for a period of not less than minutes until the resulting concrete is uniform in appearance. Each mix of concrete shall be of such a quantity as to leave about 10% excess concrete after moulding the desired number of test specimens.

The consistency of each mix of concrete shall be measured immediately after mixing, by the slump test in accordance with IS 1199. If in the slump test, care is taken to ensure that no water or other materials is lost, the materials used for the slump test may be re-mixed with the remainder of the concrete for making the specimen test cubes. The period of re-mixing shall be as short as possible yet sufficient to produce a homogeneous mass.

Compression tests of concrete cubes shall be made as per IS 516 on 15 cm cubes. Each mould shall be provided with a metal base having a plane surface so as to support the mould during filling without leakage. The base plate shall be preferably attached to the mould by springs or screws. The parts of the mould when assembled shall be positively and rigidly held together. Before placing concrete the mould and base plate shall be cleaned and oiled. The dimensions and internal faces of the mould shall be accurate within the following limits.

Height and distance between the opposite faces of the mould shall be of specified size $\pm 0.2\text{mm}$. The angle between the adjacent internal faces and between internal faces and top and bottom planes of mould shall be $90\text{ Deg.} \pm 5\text{ Deg.}$ The interior faces of the mould shall be plane surfaces with a permissible variation of 0.03mm .

Concrete test cubes shall be moulded by placing fresh concrete in the mould and compacted as specified in IS 516.

Curing shall be as specified in IS 516. The cubes shall be kept in moist air of at least 90% relative humidity at a temp. of $27\text{ Deg. Cent.} \pm 2\text{ Deg. Cent.}$ for 24 hours \pm half hour from the time of adding water to the dry ingredients. Thereafter they shall be removed from the moulds and kept immersed in clean, fresh water and kept at $27\text{ Deg. Cent.} \pm 2\text{ Deg. Cent.}$ temp. until required for test. Curing water shall be renewed every seven days. A record of maximum and minimum temperatures at the place of storage of the cubes shall be maintained during the period they remain in storage.

3.3.3 Testing of specimens

The strength shall be determined based on not less than five cubes test specimens for each age and each water cement ratio. All these laboratory test results shall be tabulated and furnished to Engineer. The test result shall be accepted by Engineer if the average compressive strengths of the specimens are tested subject to the condition that only one out of the five consecutive tests may give a value less than the specified strength for that age. The Engineer may direct the Contractor to repeat the tests if the results are not satisfactory and also to make such changes as he considers necessary to meet the specified requirements. All these preliminary tests shall be conducted by the Contractor at his own cost in an approved laboratory.

3.3.4 Proportioning Consistency, Batching and Mixing of Concrete

3.3.4.1 Aggregate

The proportions which shall be decided by conducting preliminary test shall be by volume. These proportions of cement, fine and coarse aggregates shall be maintained during subsequent concrete mixing. The supply of properly graded aggregate of uniform quality shall be maintained over the period of work, the grading of aggregates shall be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions. The different sizes shall be stocked in separate stock piles. The grading of coarse and fine aggregate shall be checked as frequently as possible as determined by Engineer, to ensure maintaining of grading in accordance with the samples used in preliminary mix design. The material shall be stock piled well in advance of use.

3.3.4.2 Cement

The cement shall be measured by volume in normal cases. However in case of central weight batching plants. Cement may be weighed for each batch if so desired by engineer in charge.

3.3.4.3 Water

Only such quantity of water shall be added to the cement and aggregates in the concrete mix as to ensure dense concrete, specified surface finish, satisfactory workability, consistent with the strength stipulated for each class of concrete. The water added to the mix shall be such as not to cause segregation of material or the collection of excessive free water on the surface of the concrete.

The water cement (W/C) ratio is defined as the volume of water in the mix (including the surface moisture of the aggregates) divided by the volume of cement in the mix. The actual water cement ratio to be adopted shall be determined in each instance by the Contractor and approved by the Engineer.

3.3.4.4 Proportioning by water/Cement ratio

The W/C ratio specified for use by Engineer shall be maintained. The Contractor shall determine the water content of the aggregates as frequently as directed by Engineer as the work progress and as specified in IS 2386 (Part-III) and the amount of water added at the mixer shall be adjusted as directed by Engineer so as to maintain the specified W/C ratio. To allow for the variation in volume of aggregates due to variation in their moisture content suitable adjustments in the volume of aggregates shall also be made.

3.4.1.1 Consistency and slump

Concrete shall be of a consistency and workability suitable for the conditions of the job. After the amount of water required is determined, the consistency of the mix shall be maintained throughout the progress of the corresponding parts of the work and approved tests e.g. slump tests, compacting factor tests, in accordance with IS 1199 shall be conducted from time to time to ensure the maintenance of such consistency.

The following tabulation gives a range of slumps which shall generally be used for various types of construction unless otherwise instructed by the Engineer.

3.4.2 Slumps for Various Types of Construction

Only sufficient quantity of water shall be added to concrete during mixing to produce a mix of sufficient workability to enable it to be well consolidated, to be worked in to the corners of the shuttering and around the reinforcement, to give the specified surface finish, and to have the specified surface strength.

3.4.3 Sampling and Testing Concrete in the Field

Facilities required for sampling materials and concrete in the field shall be provided by the Contractor at no extra cost. The following equipment with operator shall be made available at Engineer's request (all must be in serviceable condition) :

- a. One concrete cube testing machine suitable for 15 cm cubes of 100 tonnes capacity with proving calibration ring.
- b. Twelve cast iron cube moulds of 15 cm size.
- c. One Lab. balance to weigh up to 10 kg with sensitive of 10gm.
- d. One set of sieves for coarse and fine aggregates.
- e. One set of slump cone complete with tamping rod.
- f. A set of measures from 0.1 litres to 5 litres.
- g. One electric oven with thermostat up to 120 Deg. Cent.
- h. One flakiness gauge.
- i. One elongation index gauge.
- j. One sedimentation pipette.
- k. One Pyconometer.
- l. Two calibrated glass jar of 1 litre capacity.

Arrangement can be made by the contractor to have the cubes tested in an approved laboratory in lieu of a testing machine at site at his expense, with the prior consent of the Engineer.

At least 6 test cubes of each class of concrete shall be made for every 15.0 Cu.M. of concrete or part thereof. Such samples shall be drawn on each day for each type of concrete of each set of 6 cubes; three shall be tested at 7 days age and three at 28 days age. The laboratory test results shall be tabulated and furnished to Engineer. Engineer will pass the concrete if average strength of the specimens tested is not less than the strength specified, subject to the condition that only one out of three consecutive tests may give a value less than the specified strength but this shall not be less than 90% of the specified strength. The cubes shall be tested on 7th and 28th day from the day of casting of the cubes.

3.4.4 Admixtures

Admixtures may be used in concrete only with the approval of Engineer based upon evidence that, with the passage of time, neither the compressive strength nor its durability reduced. Calcium chloride shall not be used for accelerating setting of the cement for any concrete containing reinforcement, or embedded steel parts. When calcium chloride is permitted to be used, such as in mass concrete works, it shall be dissolved in water and added to the mixing water in an amount not to exceed 1.5% of the volume of the cement in concrete. When admixtures are used, the designed concrete mix shall be corrected accordingly. Admixtures shall be used as per manufacturer's instructions and in the manner and with the control specified by Engineer.

3.4.4.1 Air entraining agents

Where specified and approved by Engineer, neutralised vinyl resin or any other approved air-entraining agent may be used to produce the specified amount of air in the concrete mix and these agents shall conform to the requirements of ASTM standard 6260 air entraining admixtures for concrete. The recommended total air content of the concrete is 4% plus minus 1%. The method of measuring air content shall be as per IS 1199.

3.4.4.2 Water reducing admixtures

Where specified and approved by Engineer water reducing lignosulfonate mixture shall be added in quantities specified by Engineer. The admixtures shall be added in the form of a solution.

3.4.4.3 Retarding admixtures

Where specified and approved by Engineer, retarding agents shall be added to the concrete mix in quantities specified by Engineer.

3.4.4.4 Water proofing agent

Where specified and approved by Engineer, water proofing agent conforming to IS: 2645 shall be added in quantities specified by Engineer.

3.4.5 Optional tests

Engineer may order tests to be carried out on cement, sand, coarse aggregate and water in accordance with the relevant Indian Standards.

Tests on cement shall include

- Fineness test
- Test for normal consistency
- Test for setting time
- Test for soundness
- Test for tensile strength
- Test for compressive strength
- Test for heat of hydration by experiment and by calculations in accordance with IS: 269.

Tests on sand shall include

- Sieve test
- Test for organic impurities
- Decantation test for determining clay and silt content
- Specific gravity test (v) test for unit weight and bulkage factor .

Tests on coarse aggregate shall include

- Test for sieve analysis
- Specific gravity and unit weight of dry loose and rodded aggregate
- Soundness and alkali aggregate reactivity
- Petrography examination
- Deleterious materials and organic impurities
- Test for aggregate crushing value.

Any or all these tests would normally be ordered to be carried out only if Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by contractor at site or at an approved test laboratory. If the tests are successful, Owners shall pay for all such optional tests otherwise the Contractor shall have to pay for them.

If the works cubes do not give the stipulated strengths Engineer reserves the right to ask contractor to dismantle such portions of the work, which in his opinion are unacceptable and re-do the work to the standard stipulated at contractor's cost in the manner and schedule approved by Engineer.

Load test on members or any other tests

- m. In the event of any work being suspected of faulty material or workmanship or both, Engineer requiring its removal and reconstruction may order the contractor that it should be load tested in accordance with the following provisions.
- n. The test load shall be 125 % of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of the concrete. During the test, struts strong enough to take the load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.
- o. If within 24 hours of the removal of the load, the structure does not show a recovery of at least 75 percent of the maximum deflection shown during the 24 hours under load the test loading shall be repeated after a lapse of at least 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75 percent of the maximum deflection shown during the second test. If the structure is certified as failed by Engineer, the cost of the load test shall be borne by the contractor.
- p. Any other tests e.g. taking out in approved manner concrete cores, examination and tests on such cores removed from such parts of the structure as directed by Engineer, sonic testing etc. shall be carried out by contractor if so directed.
- q. Should the results of any test prove unsatisfactory, or the structure shows signs of weakness, undue deflection or faulty construction the contractor shall remove and re build

the member or members involved or carry out such other remedial measures as may be required by Owner. The Contractor shall bear the cost of so doing, unless the failure of the member or members to fulfil the test Conditions is proved to be solely due to faulty design.

3.4.6 Concrete in alkali soils and alkaline water

Where concrete is liable to attack from alkali salts or alkaline water, special cements containing low amount of tri-calcium aluminates shall be used, if so specified in the drawings. Such concrete shall have a minimum 28 days compressive strength of 250 kg per sq. cm and shall contain not less than 370 kg of cement per cubic metre of concrete in place. If specified, additional protection shall be obtained by the use of a chemically resistant stone facing or a layer of plaster of Paris covered with suitable fabric, such as jute thoroughly impregnated with tar.

3.4.7 Preparation prior to concrete placement

- r. Before the concrete is actually placed in position, the insides of the form work shall be inspected to see that they have been cleaned and oiled. Temporary openings shall be provided to facilitate inspection, especially at bottom of columns and walls forms to permit removal of saw dust, wood shavings, binding wire, rubbish dirt etc. Openings shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be later suitably plugged.
- s. The various agencies shall be permitted sample time to install drainage and plumbing lines infloor and trench drains, conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedment's to be cast in the concrete as indicated on the drawings or as is necessary for the proper execution of the work. Contractor shall co-operate fully with all such agencies and shall permit the use of scaffolding form work etc. by other agencies at no extracost.
- t. All embedded parts, inserts etc. supplied by Owner or Contractor shall be correctly positioned and securely held in the forms to prevent displacement during depositing and vibrating of concrete.
- u. Anchor bolts shall be positioned and kept in place with the help of proper manufactured templates. The use of all such templates, fixture etc.. shall be deemed to be included in the rates. No extra payment will be made for making or providing templates.
- v. Slots, openings, holes, pockets etc. shall be provided in the concrete work in the positions indicated in the drawings or as directed by Engineer.
- w. Prior to concrete placement all work shall be inspected and approved by Engineer and if found unsatisfactory, concrete shall not be poured until after all defects have been corrected at Contractor's cost. Cat ladders shall be provided on the reinforcement to facilitate labour movement.
- x. Approval by Engineer for all materials and work as required herein shall not relieve contractor from his obligation to produce finished concrete in accordance with the drawings and specifications.
- y. No concrete shall be placed in wet weather or on water covered surface. Any concrete that has been washed by heavy rains, the work shall be entirely removed, if there is any sign of cement and sand having been washed from the concrete mixture. To guard against damage which may be caused by rains, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted. Any water accumulating on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid flow of water over/around freshly placed concrete, suitable drains and sumps shall be provided.

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

3.4.8 Transportation

All buckets, containers or conveyors used for transporting concrete shall be mortar tight. Irrespective of the method of transportation adopted, concrete shall be delivered with the required consistency and plasticity without segregation or loss of slump. However, chutes shall not be used for transport of concrete without the written permission of Engineer and concrete shall not be re handled before placing.

Concrete must be placed in its final position before it becomes too stiff to work. On no account, water shall be added after the initial mixing, concrete which has become stiff or has been contaminated with foreign materials shall be rejected and disposed off as directed by Engineer.

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

3.4.9 Procedure for Placing of Concrete

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

Concrete shall replace in its final position before the cement shall normally be compacted in its final position within thirty minutes of leaving the mixer and once compacted it shall not be disturbed.

Concrete, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be re handled or caused to flow in a manner which will cause segregation, loss of materials, displacement of reinforcement, shuttering or embedded inserts or impair its strength. For locations where direct placement is not possible, and in narrow forms, contractor shall provide suitable drop and elephant trunks to confine the movement of concrete. Special care shall be taken when concrete is dropped from a height especially if reinforcement is in the way, particularly in columns and thin walls.

Except when otherwise approved by Engineer, concrete shall be placed in shovels or other approved implements and shall not be dropped from a height more than 1 M or handled in a manner which will cause segregation.

The following specification shall apply when placing of concrete by use of mechanical equipment is specifically called for while inviting bids or is warranted considering the nature of work involved. The control of placing shall begin at the mixer discharger, concrete shall be discharged by a vertical drop into the middle of the bucket or hopper and this principle of a vertical discharge of concrete shall be adhered to throughout all stages of delivery until the concrete comes to rest in its final position. Central bottom dump buckets of a type that provides for positive regulation of the amount and rate of deposition of concrete in all dumping position shall be employed.

In placing concrete in large open areas, the bucket shall be spotted directly over the position

designated and then lowered for dumping. The open bucket shall clear the concrete already in place and the height of drop shall not exceed 1 M. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing or in any manner which results in separation of ingredients or disturbance of previously placed concrete will not be permitted.

Concrete placed in restricted forms by wheel barrows, buggies, cars, short chutes or hand shovelling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position.

Where it is necessary to use transfer chutes, specific approval of Engineer must be obtained to the type, length, slopes, baffles, vertical terminals and timing of operations, the discharge and without segregation. To allow for the loss of mortar against the sides of the chutes, the first mix shall have less coarse aggregate. During cleaning of chutes the waste water shall be kept clear of the forms. Concrete shall not be permitted to fall from the end of the chutes by more than 1 M. Chutes when approved for use shall have slopes not flatter than 1: 3 and steeper than 1: 2 chutes shall be of metal or metal lined and of rounded cross section. The slopes of all chutes sections shall be approximately the same. The discharge end of the chutes shall be maintained above the surface of the concrete in the forms.

Concrete may be conveyed and placed by mechanically operated equipment e.g. pumps or pneumatic placers only with the written permission of Engineer. The slump shall be held to the minimum necessary for conveying concrete by this method.

When pumping is adopted, before pumping of concrete is started, the pipeline shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. The concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started. When pneumatic placer is used, the manufacturer's advice on layout of pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provided at the discharge box to cater for the reaction at this end. Manufacturer's advice shall be followed regarding concrete quality and all other related matters when pumping or pneumatic placing equipment's are used.

Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 to 90mm as directed by Engineer. These shall be placed as rapidly practicable to prevent the formation of cold joints or planes of weakness between each succeeding layer within the pour. The thickness of each layer shall be such that it can be deposited before the previous layer has stiffened. The bucket loads or other units of deposit shall be spotted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum of shovelling. Any tendency to segregation shall be corrected by shovelling stones into mortar rather than mortar on to stones. Such a condition shall be corrected by redesign of mix or other means, as directed by Engineer.

The top surface of each pour and bedding planes shall be approximately horizontal unless otherwise instructed.

3.4.10 Compaction

Concrete shall be compacted during placing the approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregate and fits tightly against all form surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the forms faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be

consistent with the concrete mix and caution exercised not to over-vibrate the concrete to the point that segregation results.

Vibrators shall conform to IS specifications. Type of vibrator to be used shall depend on the structure where concrete is to be placed. Shutter vibrators, to be effective, shall be firmly secured to the formwork which must be sufficiently rigid to transmit the vibration and strong enough not to be damaged by it. Immersion vibrators shall have no load frequency, amplitude and acceleration as per IS 2505 depending on the size of vibrator. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.

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

When placing concrete in layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending and mixing of the concrete between the succeeding layers.

The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below with the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints. Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.

Form attached vibrators shall be used only with specific authorisation of Engineer.

The surface vibrators will not be permitted under normal conditions. However for thin slabs vibration by specially designed vibrators may be permitted upon approval of Engineer.

The formation of stone pockets or mortar bondage's in corner and against faces of forms shall not be permitted. Should these occur, they shall be dug out, reformed and refilled to sufficient depth and shape through bonding, as directed by Engineer.

3.4.11 Placement interval

Except when placing with slip forms each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.

3.4.12 Special provision in placing

When placing concrete in walls with openings and in floors of integral slab and beam construction and other similar conditions, the placing shall stop when the concrete reaches the top of the opening in walls and bottom horizontal surface of the slab, as the case may be. Placing shall be resumed before the concrete in place takes initial set, but not until it has time to settle as determined by Engineer.

3.4.13 Placing concrete through reinforcement steel

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

3.4.14 Bleeding

Bleeding of free water, on top of concrete, being deposited in to the forms, contractor shall be asked to stop the concrete pour. The conditions causing this defect are corrected before any further concreting is resumed.

3.4.15 Curing, Protecting, Repairing and Finishing

3.4.15.1 Curing

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

Certain types of finish or preparation for overlaying concrete must be done at certain stage of the curing process and special treatment may be required for specific concrete surface finish.

Curing of concrete made of high alumina cement and super sulphated cement shall be carried out as directed by Engineer.

Fresh concrete shall be kept continuously wet for a minimum period of 10 days from the date of placing of concrete following a lapse of 12 to 14 hours after laying of concrete. The curing of horizontal surfaces exposed to the drying winds shall however begin immediately after the concrete has hardened. Water shall be applied uniformly to concrete surfaces within 1 hour after concrete has set. Water shall be applied to formed surfaces immediately upon removal of forms. Quantity of water applied shall be controlled so as to prevent erosion of freshly placed concrete.

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

Whenever, by the judgement of Engineer, it may be necessary to omit the continuous spray method, a covering of clean sand or other approved means such as wet gunny bags which will prevent loss of moisture from the concrete, may be used. No covering will be approved which would stain or damage the concrete during or after the curing period. Covering shall be kept continuously wet during the curing period.

For curing of concrete in pavements, side-walks floors, flat roofs or other levelled surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded area shall be kept continuously filled with water during the curing period.

Surface coating type compounds shall be used only by special permission of Engineer. Curing compound shall be liquid type white pigmented. Other curing compound shall be used on surfaces where future blending with concrete, water or acid proof membrane or painting is specified.

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

3.4.15.2 Protecting fresh concrete

Fresh concrete shall be protected from defacements and damage due to construction operation by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun and winds. Steps as approved by Engineer shall also be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion or contact with other materials etc., that may impair the strength and/or durability of the concrete. Workmen shall be warned against and prevented from disturbing green concrete during its setting period. If it is necessary that workmen enter the area of freshly placed concrete, Engineer may require that bridges be placed over the area.

3.4.15.3 Repair and replacement of unsatisfactory concrete

Immediately after the shuttering is removed, the surface of concrete shall be very carefully inspected and all defective areas called to the attention of Engineer who may permit patching of the defective areas or also reject the concrete unit either partially or entirely. Rejected concrete shall be removed and replaced by contractor at no additional expense to owner. Holes left from bolts etc. shall be filled up and made good with mortar composed of one part of cement to one and half parts of sand passing 2.36 mm IS sieve after removing any loose stones adhering to the concrete and shall be finished as described under the particular items of work. Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering in the presence of Engineer and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with a wooden float. Excess water shall be avoided. Unless instructed otherwise by Engineer, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other irregularities and necessary care being taken to avoid damage to the surface. Surface irregularities shall be removed by grinding.

If reinforcement is exposed or the honeycombing occurs at vulnerable positions e.g. ends of beams or columns it may be necessary to cut out the member completely or in part and reconstruct. The decision of Engineer shall be final in this regard. If only patching is necessary, the defective concrete shall be cut out till solid concrete is reached (or to a minimum depth of 25mm), the edges being cut perpendicular to the affected surface or with small undercut if possible. Anchors, tees or dovetail slots shall be provided whenever necessary to attach the new concrete securely in place an area extending several centimetres beyond the edges and the surfaces of the prepared voids shall be saturated with water for 24 hours immediately before the patching material is placed.

The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer. Epoxy shall be applied in strict accordance with the instructions of the manufacturer.

Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of form bottom, grout insert holes and slots cut for repair of cracks shall be repaired as follows:

- aa. The hole to be patched shall be roughened and thoroughly soaked with clean water until absorption stops. A 5mm thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched, followed immediately by the patching

concrete which shall be well consolidated with a wooden float. The concrete patch shall be built up in 10 mm thick layers. After an hour or more, depending upon weather conditions, it shall be worked off flush with a wooden float and smooth finish obtained by wiping with Hessian. A steel trowel shall be used for this purpose. The mix for patching shall be of same material and in the same proportions as that used in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible.

- bb. Mortar filling by air pressure (grouting) shall be used for repairing of areas too large and/or too shallow for patching with mortar. Patched surfaces shall be given a final treatment to match the colour and texture of the surrounding concrete. White cement shall be substituted for ordinary cement, if so directed by Engineer, to match the shade of the patch with original concrete.

The patched area shall be covered immediately with an approved non-staining water saturated material such as gunny bag which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by fine spray of sprinkling for not less than 10 days.

All materials, procedures and operations used in the repairing of concrete and also the finished repair work shall be subject to the approval of Engineer. All fillings shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks after the fillings have been cured and finished.

3.4.15.4 Finishing

The type of finish for formed concrete surface shall be as follows, unless, otherwise specified by the Engineer:

- cc. For surfaces against which backfill or concrete is to be placed, no treatment is required except repairing of defective areas.
- dd. For surface below grade which will receive waterproofing treatment the concrete shall be free of surface irregularities which would interfere with proper application of the waterproofing material which is specified for use.
- ee. Unless specified, surfaces which will be exposed when the structure is in service shall receive no special finish, except repairing of damage or defective concrete removal of fins and abrupt irregularities, fillings of holes left by form ties and rods and clean-up of loose or adhering debris.

Surfaces which will be exposed to the weather and which would normally be level, shall be sloped for drainage. Unless the drawing specifies such as stair treads, walls shall be sloped across the width approximately 1 in 30 broader surface such as walkways, roads, parking areas and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete sub floors to be covered either concrete topping, terrazzo or quarry tile and similar surfaces shall be smooth screened and levelled to produce even surfaces. Surface irregularities shall not exceed 6mm. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside decks, floors of galleries and sumps, parapets, gutters, sidewalks floors and slabs shall be consolidated, screened and floated. Excess water and laitance shall be removed before finishing. Floating may be done with hand or power tools and started as the screened surface has attained a stiffness to permit finishing operation and these shall be the minimum required to produce a surface uniform in texture and free from screed marks or other imperfections. Joints edges panels and forms linings shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms the joint marks shall be smoothed off and all blemishes, projections etc., removed leaving the surfaces reasonably smooth and unmarred.

3.4.15.5 Integral cement concrete finish

When specified on the drawings and integral cement concrete finish of specified thickness for floors and slabs shall be applied either monolithic or bonded as specified on the drawing as per IS 2571. The surface shall be compacted and then floated with a wood float or power floating machine. The surface shall be checked with a straight edge and any high and low spots eliminated. Floating or trowelling of finish shall be permitted only after all surface water has evaporated. Dry cement or a mixture of dry cement and sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.

3.4.15.6 Exposed Concrete finish/Rendering

A rubbed finish shall be provided only on exposed concrete surfaces as specified on the drawings. Upon removal of forms, all fins and other projections on the surfaces shall be carefully removed, off-sets levelled and voids and damaged sections be immediately saturated with water and repaired by filling with a concrete or mortar of the same composition as was used in the surface. Then surface shall be thoroughly wetted and rubbed with carborundum or other abrasive. Cement mortar may be used in the rubbing, but the finished surface shall be brush coated with either cement grout after rubbing. The finished surfaces shall present a uniform and smooth appearance.

3.4.16 Mode of Measurement

The unit rate for concrete work under various categories shall be all inclusive and no claims for extra payment on account of such items as leaving holes, embedding inserts, bolts etc. shall be entertained unless separately provided for in the schedule of quantities. No extra claim shall also be entertained due to change in the number, position end/or dimensions of holes slots or openings sleeves, inserts or on account of any increased lift or scaffolding etc. All these factors should be taken into consideration while quoting the unit rates. Payments of concrete will be made on the basis of unit quoted for the respective items in the Schedule of Quantities. No deduction in the concrete quantity will be made for reinforcements, inserts, Sleeves etc. and openings less than 0.05 Cu.M. where concrete is measured in cum. Where no such deduction for concrete is made, payment for shuttering work provided for such holes, pockets etc. Will not be made. .

Payment for beams will be made for the quantity based on the depth being reckoned from the underside of the slabs and length measured as the clear distance between supports. Payment for columns shall be made for the quantity based on height reckoned upto the underside of slabs.

3.5 Formwork

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

3.5.1 Codes, Standard and Rules

IS 4014-1967(Part I &II): Code of practice for steel tubular scaffolding (I: Definition / Material: II: Safety Regulations) 4990-1981 Specifications for plywood for concrete shuttering work
IS 1200: Method of Measurement

3.5.2 Material specification

3.5.2.1 Steel props, Acrow H frames wooden planking:

The shuttering shall be of ply wood of 12mm minimum thickness. The shuttering shall be supported on battens and beams and props of vertical steel pipe columns / props, frames, Acrow spans shall be of MS pipe materials as per IS 1161, structural grade.

3.5.2.2 Concrete Shuttering Plywood:

It shall be made from strong and selected hard-woods. It shall be bonded with high quality Phenol Formaldehyde synthetic resin adhesive, hot pressed and then shall be further treated with a permanent type of preservative by vacuum-cum-pressure impregnation.

Due to the bonding with Phenol Formaldehyde, it shall be moisture and weather proof. The use of selected hard-woods renders hard and wear-resistant faces and thereby it shall be reusable several times. It shall be highly resistant to rot, termites and other wood inhabiting insects. Due to complete penetration of the preservative, it shall be exceedingly durable.

It shall have high impact strength and therefore shall be used successfully in place of timber planks and steel sheets. It shall protect the concrete from rapid temperature changes and shall provide optimum conditions for setting of the concrete. As it shall possess remarkable design flexibility, it shall be ideal for curved formwork.

For the concrete with fair finish (form finish with no other enclose like plaster, cladding etc.) especial type of plywood with plastic coating shall be used.

For plywood of all shuttering maximum six repetitions shall be allowed provided the EIC is fully satisfied about the surface condition of the shuttering ply.

All Formwork shall be supported with pipe adjustable props, acrow spans, steel staging and top and side of concrete shall be of good quality ply wood of appropriate thickness. Sliding forms and slip forms may be used with the approval of EIC.

3.5.3 Design of formwork

The design of the formwork as well as its construction shall be the responsibility of Contractor. If so instructed, the drawings and/or calculation for the design for the formwork shall be submitted to Engineer for approval before proceeding with work, at no extra cost. Engineer's approval shall not however relieve Contractor of the full responsibility for the design and construction of the formwork. The design shall take into account the entire load vertical and lateral that the forms will be carrying live and vibration loading.

3.5.4 Form work requirements

Forms shall conform to the shapes, lines, grades and dimensions including camber of the concrete as called for on the drawings. Ample studs, braces, ties, straps, etc. shall be used to hold the forms in proper position without any distortion whatsoever until the concrete is set sufficiently to permit removal of forms. Forms shall be strong enough to permit the use of immersion vibrators. In special cases form vibrators may also be used. The shuttering shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps or other surface defects in contact with concrete. Faces coming in contact with the concrete shall be free from adhering grout, plaster, paint, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss

of water or any fine material from concrete.

Plywood shall be used for exposed concrete surfaces, where called for. Swan and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces which are to be rubbed finished shall be planned to remove irregularities or unevenness in the face. Formwork with linings shall be permitted.

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

Shores supporting successive members shall be placed directly over those below or be so designed and placed that the load will be transmitted directly to them. Trussed supports shall be provided for shores that cannot be secured on adequate foundations.

Formwork, during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contours indicated on the drawings, shall be repositioned and strengthened. Poured concrete affected by the faulty formwork, shall be removed completely and the formwork be corrected prior to placing of new concrete at contractor's own cost.

Excessive construction camber to compensate for shrinkage, settlement may impair the structural strength of members and shall not be permitted.

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

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

3.5.5 Formwork for Slope Surfaces

Forms for sloped surfaces shall be built so that the formwork can be placed board-by-board immediately ahead of concrete placement so as to enable ready access for placement, vibration inspection and repair of the concrete.

The formwork shall also be built so that the boards can be removed one by one from the bottom up as soon as the concrete has attained sufficient stiffness to prevent sagging. Surfaces of construction joints and finished surfaces with slopes steeper than 4 horizontal: 1 vertical shall be formed as required herein.

3.5.6 Formwork for Curved Surfaces

The contractor shall interpolate intermediate sections as necessary and shall construct the forms so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form timber shall be built up of laminated splines cut to make tight, smooth form surfaces.

After the forms have been constructed, all surface imperfections shall be corrected and all surface irregularities at matching faces of form material shall be dressed to the specified curvature.

3.5.7 Formwork for Exposed Concrete Surfaces

Where it is desired, directed or shown on the drawings to have original fair face finish of concrete surface without any rendering or plastering, formwork shall be carried out by using wood planks, plywood or steel plates of approved quality size and pattern as per direction of the Engineer.

The contractor shall use one type of material for all such exposed concrete faces and the forms shall be constructed so as to produce uniform and consistent texture and pattern on the face of the concrete. Patches or forms for these surfaces will not be permitted. The formwork shall be placed so that all horizontal formworks are continuous across the entire surface.

To achieve a finish which shall be free of board marks, the formwork shall be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features, cills, window heads or change in direction of the surface. All joints between shuttering plates or panels shall be vertical or horizontal unless otherwise directed. Suitable joints shall be provided between sheets. The joints shall be arranged and fitted so that no blemish or mark is imparted to the finished surfaces.

To achieve a finish which shall give the rough appearance of concrete cast against sawn boards, formwork boards unless otherwise stated shall be of 150 mm wide, securely jointed with tongue and grooved joints if required to prevent grout loss with tie rod positions and direction of boards carefully controlled. Sawn boards shall be set horizontally, vertically or at an inclination shown in the drawings. All bolt holes shall be accurately aligned horizontal and vertical and shall be filled with matching mortar recessed 5mm back from the surrounding concrete face.

Forms for exposed concrete surfaces shall be constructed with grade strips (the underside of which indicate top of pour) at horizontal construction joints, unless the use of groove strips is specified on the drawings. Such forms shall be removed and reset from lift to lift, they shall not be continuous from lift to lift.

Sheeting of reset forms shall be tightened against the concrete so that the forms will not be spread and permit abrasion irregularities or loss of mortar. Supplementary form ties shall be used as necessary to hold the reset forms tight against the concrete.

For fair faced concrete, the position of through bolts will be restricted and generally indicated on the drawings.

Chamfer strips shall be placed in the corners of forms for exposed exterior corners so as to produce 20mm bevelled edges except where otherwise shown in the drawings. Interior corners and edges at formed joints shall not be bevelled unless shown on the drawings for grooves, drip courses and bands shall be made in the form itself.

The wood planks, plywood and steel plates used in formwork for obtaining exposed surfaces shall not be used for more than 3 times in case of wood planks, 6 times for plywood and 10 times for steel plates respectively. However, no forms will be allowed for reuse, if in the opinion of the Engineer it is doubtful to produce desired texture of exposed concrete.

In order to obtain exposed concrete work of uniform colour it shall be necessary to ensure that the sand used for all exposed concrete work shall be of approved uniform colour. Moreover the cement used in the concrete for any complete element shall be from single consignment.

No exposed concrete surface shall be rendered or painted with cement or otherwise. Plastering

of defective concrete as a means of achieving the required finish shall not be permitted, except in the case of minor porosity on the surface, the Engineer may allow a surface treatment by rubbing down with cement and sand mortar of the same richness and colour as for the concrete. This treatment shall be made immediately after removing the formwork.

The contractor shall also take all precautionary measures to prevent breaking and chipping of corners and edges of completed work until the building is handed over.

3.5.8 Bracings struts and props

Shuttering shall be braced, strutted, propped and so supported that it shall not deform underweight and pressure of the concrete and also due to the movement of men and other materials. Bamboo's shall not be used as props or cross bearers.

The shuttering for beams and slabs shall be so erected that the shuttering on the sides of the beams and under the soffits of slabs can be removed without disturbing the beam bottoms. Re propping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated to be in excess of the design load. Vertical props shall be supported on wedges or other measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering. If the shuttering for a column, is erected for the full height of the column, one side shall be left open and built up in sections as placing of concrete from the sides to limit the drop of concrete to 3M or as directed by engineer.

3.5.9 Mould Oil

Care shall be taken to see that the faces of form work coming in contact with concrete are perfectly cleared and two coats of mould oil or any other approved material applied before fixing reinforcement and placing concrete. Such coating shall be insoluble in water, non-staining and not injurious to the concrete. It shall not become flaky or be removed by rain or wash water. Reinforcement and/or other items to be cast in the

concrete shall not be placed until coating of the forms is complete; adjoining concrete surface shall also be protected against contamination from the coating material.

3.5.10 Chamfers and fillets

All corners and angles exposed in the finished structure shall be formed with moulding to form chamfers or fillets on the finished concrete. The standard dimension of chamfers and fillers, unless otherwise specified shall be 20 mmx20 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the mouldings shall be planned or surfaced to the same texture as the forms to which it is attached.

3.5.11 Wall ties

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

3.5.12 Reuse of forms

Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary, repaired and the inside retreated to prevent adhesion, to the satisfaction of Engineer. Warped lumber shall be resized. Contractor shall equip himself with enough shuttering material to complete the job in the stipulated time.

3.5.13 Removal of forms

Contractor shall record on the drawings and in a special register the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from. The Contractor shall remove the shuttering after obtaining the approval of the Engineer.

In no circumstances shall forms be struck until the concrete reaches strength of at least twice the stress due to self-weight and any construction/erection loading to which the concrete may be subjected at the time of striking formwork.

In normal circumstances (generally where temperatures are above 20 Deg. Cent.) forms may be removed after expiry of the following periods:-

Table 3.10: Removal of Form

Sr. No.	Description	Ordinary Portland cement concrete	Rapid hardening Portland cement concrete
a)	Walls columns and vertical sides of beams	24 to 48 hrs as directed by the Engineer	24 hrs.
b)	Slabs left under	3 days	2 days
c)	Beam soffits props left under	7 days	4 days
d)	Removal of props to slabs:	7 days	4 days
	i) Spanning up to 4.5 m	14 days	8 days
	ii) Spanning over 4.5 m		
e)	Removal of props to beams & arches		
	i) Spanning up to 6 m	14 days	8 days
	ii) Spanning over 6m	21 days	12 days

Striking shall be done slowly with utmost care to avoid damage to rises and projections and without shock or vibration, by gently easing the wedges. If after removing the form work, it is found that timber has been embedded in the concrete, it shall be removed and made good as specified earlier.

Reinforced temporary openings shall be provided as directed by Engineer to facilitate removal of formwork which otherwise may be inaccessible.

Tie rods, clamps, form bolts etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than neither 24 hours nor later than 40 hrs after the concrete has been deposited. Ties except those required to hold forms in place, may be removed at the same time. Ties withdrawn from wall & grade beams shall be pulled towards the inside face. Cutting ties back from the surface of wall & grade beams will not be permitted.

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

3.5.14 False staging

The additional height for which it is required shall be as specified in the item specification.

The item of staging will be operated if the work is at height more than specified in item description and the contractor has erected extra staging.

3.5.15 Mode of Measurement

It shall be measured in Sq.M. The actually shuttered area shall be measured and paid for. The rate shall include providing and erecting formwork in position as per drawings, applying oil, removal of form after the specified period.

False staging shall be measured and paid for in Sq.M. The plan area of the structure shall be measured for payment.

3.6 TMT Reinforcement Steel Bar

3.6.1 Material

The contractor (**if material not supply by Client**) shall make his own arrangement for procurement of Reinforcement steel bars and wires for use in Reinforced Cement Concrete works. Unless otherwise specified in drawings / Schedule of quantities, the steel bars shall be of —High strength deformed steel bars and wires conforming to the IS 1786 (latest revision), in the following strength grades:

- a) Fe 415, Fe 415D;
- b) Fe 500, Fe 500D;
- c) Fe 550, Fe 550D; and
- d) Fe 600.

Where “**Fe**” stands for specified minimum 0.2% proof / yield stress in N/mm² and “**D**” stands for same specified minimum 0.2% proof / yield stress but with enhanced specified minimum percentage elongation.

3.6.2 Terminology

Elongation: The increase in length of a tensile test piece under stress, expressed as a percentage of the original gauge of a standard piece.

Longitudinal Rib -A uniform continuous protrusion, parallel to the axis of the bar/wire (before cold-working, if any).

Nominal Diameter or Size- The diameter of a plain round bar/wire having the same mass per meterlength as the deformed bar/wire.

Nominal Mass -The mass of the bar/wire of nominal diameter and of density 0.00785 kg/cum per meter.

Nominal Perimeter - 3.14 times the nominal diameter of a deformed bar/Wire.

Percent Proof Stress -The stress at which a non-proportional elongation equal to 0.2% of the original gauge length takes place.

Uniform elongation - The elongation corresponding to the maximum load reached in a tensile test (also termed as percentage total elongation at maximum force).

Tensile Strength - The maximum load reached in a tensile test divided by the effective cross-sectional area of the gauge length portion of the test piece (also termed as ultimate tensile stress).

Transverse Rib - Any rib on the surface of a bar/wire other than a longitudinal rib.

Yield Stress - Stress (that is, load per unit cross sectional area) at which elongation first occurs in the test piece without increasing the load during the tensile test. In the case of steels with no such definite yield point, proof stress shall be applicable.

The high strength deformed steel bars and wires for concrete reinforcement shall be hot rolled steel without subsequent treatment or hot rolled steel with controlled cooling and tempering and cold worked steel, and reinforcing bars and wires which may be subsequently coated.

Steel bars shall be supplied from M/s. Steel Authority of India Ltd. (SAIL) or M/s. TATA Steel (TISCO) or M/s. Rashtriya Ispat Nigam Ltd (RINL) or M/s. Indian Iron & Steel Co. (IISCO) Ltd., from their own plants rolled from virgin material, and shall be procured directly or from their authorized dealers and not from re- rollers or conversion agents.

The contractor shall supply copy of Documentary evidence of purchase of steel from the specified manufacturers.

3.6.3 Tests

The contractor shall submit the test certificate of manufacturer. Regular tests on steel supplied by the contractor shall be performed by the contractor at the approved lab, in presence of the Departmental Engineers as per relevant Indian Standards. Engineer-in-charge may require Contractor to perform necessary tests of samples at random as per relevant B.I.S. All cost of such tests and incidentals to such tests shall be borne by the Contractor. The quality, grade, colour coding embossing marks etc. all shall be

to the entire satisfaction of the Engineer-in-Charge. Steel not conforming to above test criteria shall be rejected.

The Chemical, Physical & Mechanical properties of the steel reinforcement bars shall be as per IS 1786. Unless otherwise specified, Selection and Preparation of Test Sample shall be as per the requirements of IS 2062

All test pieces shall be selected either from the cuttings of bars / wires; or from any bar/wire after it has been cut to the required or specified size and the test piece taken from any part of it. In neither case, the test piece shall be detached from the bar/wire except in the presence of the EIC or his authorized representative.

The test pieces shall be full sections of the bars/wires and shall be subjected to physical tests without any further modifications. No reduction in size by machining or otherwise shall be permissible, except in case of bars of size 28 mm and above. No test piece shall be annealed or otherwise subjected to heat treatment. Any straightening which a test piece may require shall be done cold.

For the purpose of carrying out tests for tensile strength, proof stress, percentage elongation and percentage elongation at maximum force for bars 28 mm in diameter and above, deformations of the bars only may be machined. For such bars, the physical properties shall be calculated using the actual area obtained after machining. The following IS codes shall be referred for test methods:

Table 3.11: Test Method

SN	Title	IS No	ISO No.
I	Mechanical testing of metals -Tensile testing	1608	6892
ii	Methods for bend test	1599 7438 & 1786	15630-1
lii	Method for re-bend test for metallic wires & bars	1786	15630-1

The Properties as Per IS 1786 – 2008 Are Reproduced Below:

Table 3.12: Chemical Composition of the bars shall conform to the following requirement:

Constituents	Maximum Permissible Percent							Permissible max Variation
	Fe 415	Fe 415D	Fe 500	Fe 500D	Fe 550	Fe 550D	Fe 600	
Carbon	0.300	0.250	0.300	0.250	0.300	0.250	0.300	0.020%
Sulphur	0.060	0.045	0.055	0.040	0.055	0.040	0.040	0.005%
Phosphorus	0.060	0.045	0.055	0.040	0.050	0.040	0.040	0.005%
Sulphur & Phosphorus	0.110	0.085	0.105	0.075	0.100	0.075	0.075	0.010%

Notes:

- i) For welding of deformed bars, the recommendations of IS 9417 shall be followed.
- ii) In case of deviations from the specified maximum, two additional test samples shall be taken from the same batch and subjected to the test or tests in which the original sample failed. Should both additional test samples pass the test, the batch from which they were taken shall be deemed to comply with this standard. Should either of them fail, the batch shall be deemed not to comply with this standard

Table 3.13: Mechanical Properties of High Strength Deformed Bars and Wires

Sl. N	Property	Maximum Permissible Percent						
		Fe 415	Fe 415D	Fe 500	Fe 500D	Fe 550	Fe 550D	Fe 600

Sl. N		Property	Maximum Permissible Percent						
1	2	3	4	5	6	7	8	9	
I	0.2 percent proof stress / yield stress, Min, N/mm ²	415.0	415.0		500.0	550.0	550.0	600.0	
li	Elongation, percent, Min. on gauge length 5.65 ;A, where A is the Cross – sectional area of the test piece	14.5	18.0	12.0	16.0	10.0	14.5	10.0	
lii	Tensile strength, Min	10% more than the actual	12% more than the actual	8% more than the actual	10% more than the actual	6% more than the actual	8% more than the actual	6% more than the actual	
		0.2% proof stress / yield stress but not less than 485.0 N/mm ²	0.2% proof stress/yield stress but not less than 500.0 N/mm ²	0.2% proof stress/ yield stress but not less than 545.0 N/mm ²	0.2% proof stress/yield stress but not less than 565.0 N/mm ²	0.2% proof stress/ yield stress but not less than 585.0 N/mm ²	0.2% proof Stress / yield stress but not less than 600.0 N/mm ²	0.2% proof stress/ yield stress but not less than 660.0 N/mm ²	
iv	Total elongation at maximum force, percent, Min of gauge length 5.65 ;A, where A is the cross sectional area of the test piece	-	5	-	5	-	5	-	

Note: To satisfy Clause 26 of IS 456 -2000, no mixing of different types of grades of bars shall be allowed in the same structural members as main reinforcement, without prior written approval of the Engineer-in- Charge.

3.6.4 Storage

Steel for reinforcement shall be stored in such a way as to prevent distorting and corrosion. The steel for reinforcement shall not be kept in direct contact with ground. Fresh / Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion and deteriorations. Care shall be taken to protect steel from exposure to saline atmosphere during storage, fabrication and use. It may be achieved by treating the surface of reinforcement with cement wash or by suitable methods. Bars of different classifications, sizes and lengths shall be stored separately to facilitate issue in such sizes and lengths to cause minimum wastage in cutting from standard length.

3.6.5 Quality

Steel not conforming to specifications shall be rejected. All reinforcement shall be clean, free from grease, oil, paint, dirt, loose mill, scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used. All bars shall be rigidly held in position before concreting. No welding of rods to obtain continuity shall be allowed unless approved by the Engineer-in-Charge. If welding is approved, the work shall be carried as per I.S. 2751, according to best modern practices and as directed by the Engineer-in-Charge. In all cases of important connections, tests shall be made to prove that the joints are of the full strength of bars welded. Substitution of reinforcement will not be permitted except upon written approval from Engineer-in-charge.

3.6.6 Nominal Sizes

The nominal sizes of bars/wires shall be 4mm, 5mm, 6mm, 8mm, 10mm, 12mm, 16mm, 20mm, 25 mm, 28mm, 32mm, 36mm, 40 mm. (Other sizes viz. 7mm, 18mm, 22 mm, 45 mm and 50 mm may be procured on specific stipulations).

3.6.7 Nominal Mass

For the purpose of checking the nominal mass, the density of steel shall be taken as 0.00785 kg/mm³ of the cross sectional area per metre. Unless otherwise specified, the tolerances on nominal mass shall be as per following Table.

Table 3.14: Tolerances on Nominal Mass

SN	Nominal Size in mm	Tolerance on the nominal mass in Percent		
		Batch	Individual sample	Individual sample for coils only
1	2	3	4	5
i)	Up to and including 10	± 7	- 8	± 8
ii)	Over 10 up to and including 16	± 5	- 6	± 6
iii)	Over 16	± 3	- 4	± 4

3.6.8 Laps

Laps and splices for reinforcement shall be shown on the drawings. Splices in adjacent bars shall be staggered and the locations of all splices, except those specified on the drawings, shall be approved by the

Engineer-in-Charge. The bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site. Not more than 25% to 50% bars shall be lapped at one section.

3.6.9 Bending

All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawing / bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and re-bent in a manner that will injure the materials. Bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 25 mm. in diameter which may be bent hot if specifically approved by the Engineer-in-Charge. Bars that depend for their strength on cold working shall not be bent hot. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 6450C) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only after straightening and re-bending be such as shall not, in the opinion of the Engineer-in-Charge, injure the material. No reinforcement bar shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

Bending At Construction Joints

Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care should be taken to ensure that at no time the radius of the bend is less than 4 bar diameters for plain mild steel or 6 bar diameters for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

3.6.10 Fixing / Placing and Tolerance on Placing

Before cutting, bending and placing, all reinforcement shall be clean and free from pitting, loose mill scales, dust, loose rust and coats of paints, oil or other coatings which may destroy or reduce the bond. Any defective or damaged reinforcement shall be brought to the notice of the Engineer and replaced with good quality bars.

General construction details and workmanship related to reinforcement including bar bends, lap splices and installation shall be in accordance with IS: 2502 and IS: 456.

Contractor responsibility for preparation of —bar bending schedulesll based on structural design drawings. Shown in schedule bars numbers, lengths, and bending details for relevant to the particular drawing. The bar bending schedule shall be approved form Engineer In Charge / Client representative before any cutting or bending of bars.

No reinforcement shall be bent when already in position in the work, without approval of the Engineer, whether or not it is partially embedded in concrete. Bars shall not be straightened in a manner that will injure the material. Re-bending can be done only if approved by the Engineer. Reinforcing bars shall be bent by machine or other approved means producing a gradual and even motion. All the bars shall be cold bent unless otherwise approved. Bending hot at a cherry-red heat (not exceeding 845 °.C) may be allowed under very exceptional circumstances except for bars whose strength depends on cold working. Bars bent hot shall not be cooled by quenching. However, such bending will be allowable only with the approval of the Engineer.

The number, sizes, shape and position of all the reinforcement shall unless otherwise directed or authorised by the Engineer, be strictly in accordance with the drgs. The reinforcement shall be adequately secured and held in position by metal wires, chairs and spacers. Tees at inter-sections shall be made with 16 SWG soft black annealed binding wire (IS: 10632, part II). Whenever conduit, piping inserts, sleeves etc. Interface with placing of reinforcement, proper adjustment in the spacing of bars shall be made as approved by the Engineer. No bars shall be made rest on or against forms nor on or against the earth in excavation.

All the reinforcing bars shall be so tied as to form a rigid cage to prevent displacement before or during concreting. Necessary wooden planks supported independently of the reinforcement shall be provided for the labourers to move. The vertical distance required between successive layers of bars in beams or similar members shall be maintained by the provision of mild steel spacer bars inserted at such interval that the main bars do not perceptibly sag between adjacent spacer bars.

Tack welding may be permitted by the Engineer under certain conditions for fixing reinforcement. Welding shall be done by skilled and qualified welders only. Suitable safeguards shall be taken by the contractor for welding.

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

Tolerance on Placing of Reinforcement

Unless otherwise specified, reinforcement shall be placed within the following tolerances :

Tolerance in spacing

- a) For effective depth, 200 mm or less + /- 10 mm
- b) For effective depth, more than 200 mm + /- 15 mm

3.6.11 Cover to Reinforcement

Nominal cover is the design depth of concrete cover to all steel reinforcements, including links. It is the dimension used in design and indicated in the drawings. It shall be not less than the diameter of the bar. Unless otherwise specified, cover to reinforcement shall be provided generally as per guidelines of IS 456.

Concrete / PVC spacer blocks of same strength as of parent concrete shall be used to ensure correct cover to the reinforcement. The clear cover shall be as shown on the drawings or as per instructions of the Engineer.

Nominal cover to meet durability requirement:

Minimum values for the nominal cover of normal weight aggregate concrete which should be provided to all reinforcement, including links depending on the condition of exposure described in 4.4 above and as per (nominal cover to meet durability requirements).

However for a longitudinal reinforcing bar in a column nominal cover shall in any case not be less than 40 mm or less than the diameter of such bar. In the case of columns of minimum dimension of 200mm or under, whose reinforcing bar do not exceed 12mm, a nominal cover of 25 mm may be used.

For footings minimum cover shall be 50 mm.

Nominal cover to meet specified period of fire resistance

Minimum values of nominal cover of normal-weight aggregate concrete to be provided to all reinforcement

including links to meet specified period of the resistance as per the tables given under clause 4.4.1 of these specifications.

The cover shall in no case be reduced by more than one third of specified cover or 5 mm whichever is less. Unless indicated otherwise on the drawings, clear concrete cover for reinforcement (exclusive of plaster or other decorative finish shall be as follows:

- a) At each end of reinforcing bar not less than 25mm., nor less than twice the diameter of such, bar.
- b) For a longitudinal reinforcing bar not less than 25 mm., nor more than 40 mm., nor less than the diameter of such bar. In the case of column of maximum dimensions of 200 mm. or under, whose reinforcing bars do not exceed 12 mm., a cover of 25 mm. may be used.
- c) For longitudinal reinforcing bar in a beam, not less than 25mm., nor less than diameter of such bar.
- d) For tensile, compressive, shear, or other reinforcement in a slab, not less than 25 mm, nor less than the diameter of such bar, and
- e) For any other reinforcement not less than 15 mm, nor less than the diameter of such bar.
- f) Increased cover thickness may be provided when surfaces of concrete members are exposed to the action of harmful chemicals (as in the case of concrete in contact with earth faces contaminated with such chemicals), acid, vapour, saline atmosphere, sulphurous smoke (as in the case of steam-operated railways) etc. and such increase of cover may be between 15 mm. and 50 mm. beyond the figures given in (a to e) above as may be specified by the Engineer-in-Charge.
- g) For reinforced concrete members, totally immersed in sea water, the cover shall be 40 mm. more than specified (a to e) above.
- h) For reinforced concrete members, periodically immersed in sea water or subject to sea spray, the cover of concrete shall be 50 mm. more than that specified (a to e) above.
- i) For concrete of grade M 25 and above, the additional thickness of cover specified in (f), (g) and (h) above may be reduced to half. In all such cases the cover should not exceed 75 mm.
- j) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing dense impermeable concrete with approved protective coating, as specified on the drawings. In such case the extra cover, mentioned in (h) and (i) above, may be reduced by the Engineer-in-Charge, to those shown on the drawing.
- k) The correct cover shall be maintained by cement mortar briquettes or other approved means. Reinforcement for footings, grade beams and slabs on sub grade shall be supported on precast concrete blocks as approved by the Engineer-in-Charge. The use of pebbles or stones shall not be permitted.
- l) The minimum clear distance between reinforcing bars shall be in accordance with I.S. 456 or as shown in drawing.

3.6.12 The Bars Shall be kept in Correct Position by the Following Methods

- a) In case of beam and slab construction precast cover blocks in cement mortar 1:2 (1 cement: 2 coarse sand) about 4 x 4 cm section and of thickness equal to the specified cover shall be placed between the bars and shuttering, so as to secure and maintain the requisite cover of concrete over reinforcement.
- b) In case of cantilevered and doubly reinforced beams or slabs, the vertical distance between the horizontal bars shall be maintained by introducing chairs, spacers or support bars of steel at 1.0 metre or at shorter spacing to avoid sagging.
- c) In case of columns and walls, the vertical bars shall be kept in position by means of timber templates

with slots accurately cut in them; or with block of cement mortar 1:2 (1 cement : 2 coarse sand) of required size suitably tied to the reinforcement to ensure that they are in correct position during concreting.

- d) In case of other R.C.C. structure such as arches, domes, shells, storage tanks etc. a combination of cover blocks, spacers and templates shall be used as directed by Engineer-in-Charge.

3.6.13 Inspection

The contractor must obtain the approval of the Engineer for the reinforcement laid, before any concrete is placed in the forms. The reinforcement at this time shall be free from loose rust or scale or other coatings that may destroy or reduce bond.

3.6.14 Mode of Measurement for Reinforcement for R.C.C. Works

Reinforcement as detailed in schedule of quantities shall be measured for payment lineally as per the cutting length nearest to a centimetre shown in bar bending schedule submitted by the contractor and approved by the Engineer-in-Charge and weight calculated based on the standard weights as per I.S.1786, as indicated in the following table:

Table 3.15: Standard weight

Nominal size in mm	6	7	8	10	12	16	18	20
Cross Sectional area in mm ²	28.30	38.50	50.30	78.60	113.10	201.20	254.60	314.30
Mass / Weight in Kg / RM	0.222	0.302	0.395	0.617	0.888	1.580	2.000	2.47

Nominal size in mm	22	25	28	32	36	40	45	50
cross Sectional area in mm ²	380.30	491.10	614.00	804.60	1018.30	1257.20	1591.10	1964.30
Mass / Weight in Kg / RM	2.980	3.850	4.830	6.310	7.990	9.850	12.500	15.420

No allowance shall be made/ be measured in the weight for rolling margin. If weight of bar(s) found to be more than the standard weights, the measurement / payment shall be restricted to the standard weights as above. However, if weight of bar(s) found to be less than the standard weights (but within the permissible limit), the measurements / payment for the same shall be as per standard weights.

Only authorized laps shall be measured. The cost of steel used by the contractor in the reinforcement of beams, slabs and columns etc. will be paid as per the rate of reinforcement only up to the extent shown in the drawings. As far as possible laps in bars shall be avoided. Any laps and hooks provided by the contractor other than authorized as per approved bar bending schedule will be considered to have been provided by the contractor for his own convenience and shall not be measured for payment. Pins, chairs, spacers shall be provided by the contractor wherever required as per drawing and bar bending schedule and as directed by the Engineer-in-Charge and shall be measured for payment. Fan hooks as required shall be provided by the contractor under this item and shall be measured for payment. The rate shall include the cost of all materials and labour required for all above operations including transport, wastage, straightening, cutting, bending, binding and the binding wire required.

The wastage as specified in clause of condition of contract shall be recovered at issue rate from the Contractor.

The rate quoted for reinforcement should include cost of receiving, storing, cleaning, cutting, bending, placing, binding, with contractor's own binding wire, including providing, cutting allowance, rolling margin and preparation of bar bending schedules etc. complete including transporting, handling, taxes and levies.

3.8 Plasticizer

3.8.1 Material

The plasticizer to be used shall be of approved make like Conplast of Fosroc, BASF or equivalent as per I.S. The material will be used as per manufacturer's specification.

3.8.2 Mode of Measurement

The payment will be paid in unit of Litre basis of actual material used as per manufacturer's specification.

3.9 Ready Mix Concrete

3.9.1 Scope

Ready mix concrete shall be allowed during pre-construction stage till installation of Batching plant on site. Concrete shall conform to latest revision of IS: 4926 following are the requirement for supply and laying of R.M.C

Concrete delivered at site shall be in a plastic condition and requiring no further treatment before being placed in the position in which it is to set and harden. It should be ensured by the Contractor that any Ready Mix Concrete should be placed in position within a maximum period of two hours from its batching time.

The process of continuing the mixing of concrete at a reduced speed during transportation to prevent segregation should be ensured on truck mounted equipment designed to agitate concrete during transportation to the site of delivery.

Concrete produced by completely mixing cement, aggregates, admixtures if any and water at a stationary central mixing plant and delivered in containers fitted with agitating devices. The concrete may also be transported without being agitated as a special case and as requested.

Concrete produced by placing cement, aggregates and admixtures, if any other than those to be added with mixing water, in a truck mixer at the batching plant, the addition of water and admixtures to be added along with mixing water, and the mixing being carried out entirely in the truck mixer either during the journey or on arrival at the site of delivery. No water shall be added to the aggregate and cement until the mixing of concrete commences.

3.9.2 IS Codes

IS : 4926 – Ready mix concrete

Other Code shall be as per concrete Work Specification.

3.9.3 Material Specification

3.9.3.1 Cement

Cement used shall be of specified grade ordinary Portland cement or low heat Portland cement conforming to IS: 269 ordinary Portland cement shall be used.

3.9.3.2 Fly Ash

Fly ash when used for partial replacement of cement, shall conform to the requirements of IS-3812 (Part I) and as specified by the users.

3.9.3.3 Aggregate

It shall conform to IS: 383. Fly ash when used as fine aggregate shall conform to the requirements of IS 3812 — (Part - II).

3.9.3.4 Water

Water used for concrete shall conform to the requirement of IS 456.

3.9.3.5 The admixtures

It shall conform to the requirements of IS:456 and their nature, quantities and methods of use shall also be specified. Fly ash when used as an admixture for concrete shall conform to IS : 3812 (Part II). However, partial replacement of cement by fly ash shall not be more than 15% of designed requirement. In case if fly ash is used more than 15%, the same shall be guided under table of the IS, and in which case specific care shall be taken in terms of curing, protecting, repairing, finishing, de-shuttering etc. as detailed in the Chapter —Fly Ash Concretell, here in after.

3.9.4 Supply

The ready-mixed concrete shall be manufactured and supplied on either of the following basis:

- Specified strength based on 28-day compressive strength of 15 -cm cubes tested in accordance with IS : 456.
- Specified mix proportion.

NOTE : Under special circumstances and as specified the strength of concrete in (a) above may be based on 28-day or 7-day flexural strength of concrete instead of compressive strength of 15-cm cube tested in accordance with IS : 456.

When the concrete is manufactured and supplied on the basis of specified strength, the responsibility for the design of mix shall be that of the Contractor and the concrete shall conform to the requirements specified.

When the concrete is manufactured and supplied on the basis of specified mix proportions, the responsibility for the design of the mix shall be that of the Contractor and the concrete shall conform to the requirements specified.

1.1.1 Construction Specification

When a truck mixer or agitator is used for mixing or transportation concrete, no water from the truck-water system or from elsewhere shall added after the initial introduction of the mixing water for the batch, when on arrival at the site of the work, the slump of the concrete is less that specified, such additional water to bring the slump within limits shall be injected into the mixer under such pressure and direct flow that the requirements for uniformity specified.

Unless otherwise specified when a truck or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be complete within 1 ½ hour (when the prevailing atmospheric temperature above 20°C) and within 2 hours (when the prevailing atmosphere temperature is at or below 20°C) of adding the mixing water to the mix of cement and aggregate or adding the cement to the aggregate whichever is earlier.

Adequate facilities shall be provided by the manufacturer/supplier to inspect the materials used the process of manufacture and methods of delivery of concrete. He shall also provide adequate facilities to take samples of the materials used.

The tests for consistency or workable shall be carried out in accordance with requirements of IS 1199 by such other method as may be agreed to between the purchaser and manufacturer.

The sampling and testing of concrete shall be done in accordance with the relevant requirements of IS 456, IS 1199 and IS 516.

The compressive strength and flexural strength tests shall be carried out in accordance with the requirement of IS: 516 and the acceptance criteria for concrete whether supplied on the basis of specified strength or on the basis of mix proportion, shall conform to the requirements and other related requirements of IS 456.

The testing shall be carried out in accordance with the requirements and the cost shall be borne by the Implementation Contractor.

The manufacturer shall keep batch records of the quantities by mass all the solid materials, of the total amount of water used in mixing and of the results of all tests. If required insisted, the manufacturer shall furnish certificates, at agreed intervals, giving this information.

3.9.5 Method of Measurement

Ready mixed concrete (RMC) is the same as mode of measurement for concrete work already mentioned.

However, consumption of RMC shall be maintained at site. Wastage, spill over, wastage due to pump blockage etc. shall not be considered for payment.

3.10 CAPCELL-HD-100 joint filler sheet

3.10.1 Material

The Capcell-HD-100 Joint filler sheet shall be as per BS-5628-(part 3),

3.10.2 Workmanship

Boards shall be placed in locations before concreting as instructed by the Engineer. The work shall be done at all levels without any extra cost. The thickness of the board shall be as specified in the item specification.

3.10.3 Mode of Measurement

This shall be measured in Sq. M for actual measured quantities. Payment shall be in Sq.M basis for different thickness as per item description.

3.11 Poly urethane / Silicon sealant

3.11.1 Material

Polyurethane/silicon sealing compound of BASF, Fosroc or equivalent make confirming to ASTM C920:08, Standard Specifications for Elastomeric Joint Sealant as filler material as per manufacturer's specification

3.11.2 Workmanship:

This shall be filled in the expansion joints as directed by the Engineer / shown in the drawings. The joints shall be of uniform width and care shall be taken for proper bonding of the joints.

3.11.3 Mode of Measurement

This shall be measured in RMT for specified width and depth as per the item in the Schedule of Quantities.

3.12 Grouting Cement mortar / GP2

3.12.1 General

The grouting material shall solidly fill the spaces to be grouted and permanently retain its original volume so that the base plate will be held firmly in set position. The amount of water used in mixing shall be kept to a minimum.

All grouting shown on the drawing must be carried out with a pre packed cement based product which is chloride free. It shall be mixed with clean water to the required consistency. The grout must not bleed or segregate. A positive volumetric expansion shall occur while the grout is plastic by means of gaseous hydrogen free system. The grout must also be compensated for shrinkage in the hardened state as per ASTM C 1107-91.

The compressive strength of the grout must exceed 55 N/mm² at 7 days and 65 N/mm² at 28 days. The flexural strength of grout must exceed 9N/mm² @ 28 days. The fresh wet density of the mixed grout must exceed 2200 kg/m³. The storage, handling and placement of the grout must be in strict accordance with the manufacturer's instructions.

3.12.2 Shims

Removal or retaining of the shims or wedges shall be done as per instruction of Engineer-in-Charge. The width of the shims shall be 50 mm less than the space between two adjacent anchor bolts or 75 mm whichever is less. The length of shim shall be same as base plate width and the thickness shall be kept as required, however minimum number of shims in each pocket should be used as far as possible. If wedges are used, they shall preferably be put in between base plate and shims.

For column having erection weight more than 20 tonnes, shims will be provided in every alternate bolt pocket and retained under the grout. Voids formed on removing the shims shall be grouted with the similar grout mixture.

If these are to be removed after the grout has hardened, they should be treated with a thin layer of grease.

3.12.3 Preparation of Foundation

The substrate surface must be free from oil, grease or any loosely adherent material. If the concrete surface is defective or has laitance, it must be cut back to a sound base. Bolt holes and fixing pockets must be blown clean of any dirt or debris.

Several hours prior to placing, the concrete substrates should be saturated with fresh water. Immediately before grouting takes place any free water should be removed with particular care being taken to blow out all bolt holes and pockets.

It is essential that this is clean and free from oil, grease or scale. Air pressure relief holes should be provided to allow venting of any isolated high spots.

3.12.4 Form Construction

In order to obtain a solid layer of grout under the structure the grout shall be held firmly in place by strong, well braced form held tightly around the foundation and all joints shall be tight to prevent leakage. It is preferable to use 40 to 50 mm thick finished lumber, if possible. The form should be at least 100 mm higher than the bottom of the structure to provide a fluid head which will help to force the grout completely under the structure and inside any hollow spaces in its base.

The formwork should be constructed to be leak-proof. This can be achieved by using foam rubber strip or mastic sealant beneath the constructed formwork and between joints. In some cases it is practical to use a sacrificial semi dry sand and cement formwork. The formwork should include outlets for pre-soaking.

This must be kept to a minimum. Generally the gap width between the perimeter formwork and the plate edge should not exceed 150mm on the pouring side and 50mm on the opposite side. It is advisable, where practical, to have no gap at the flank sides.

3.12.5 Cleaning Foundation Top

In addition to the preparation of the foundation top as described herein above, it is also required to clean the Foundation immediately preceding grouting. Also, to promote better bonding, the foundation top shall be wet. After the structure is installed and the form constructed, using compressed air, all dust and foreign matters shall be blown off the foundation top. The foundation top shall be wetted thoroughly, and a slight stream of water shall be kept running on it for a period of two to four hours prior to starting the placing of grout. When ready to grout, again using compressed air all excess water on foundation top and in foundation bolt holes shall be blown off.

3.12.6 Preparation of Grouting Mixture

Grouting of anchor bolts, holes, pockets and under base plates of structure, have been broadly classified into two categories, e.g. non-shrinking grout and ordinary grout.

Non shrinking grout shall consist of 1 part of ordinary Portland cement: 1 part of clean, dry well graded sand: 1 part of Ferro grout or similar additive (as approved by the Engineer-in-Charge). Water should be kept at minimum to make the mix place able/workable.

Non shrinking grout shall be used for all structure frame supports or platform having height more than 6 m.

For best results a mechanically powered grout mixer should be used. When quantities up to 50kg are used, a heavy duty slow speed drill (400-500 rpm) fitted with a paddle is suitable. Larger quantities will require a heavy duty mixer to enable the grouting operation to be carried out continuously, it is essential that sufficient mixing capacity and labour are available. The use of a grout holding tank with provision to gently agitate the grout may be required.

The Mortar mix for ordinary grout shall consist of 1 part of ordinary Portland cement parts of clean dry well graded sand and mixed to the minimum consistency required. Water shall be kept enough to make the mix place able. The mix shall be poured under a suitable head and tamped until the space has been completely filled.

Ordinary grout shall be used for grouting purposes in:

- All structural frames or platforms having height less than 6.0 m.
- All other miscellaneous foundations on piles or paving.

3.12.7 Placing the grout mixtures

Consistency of grout mix GP2

The quantity of clean water required to be added to a 30kg bag to achieve the desired consistency is given below:

Pourable (@ w/p=0.13) : 3.9 litres

Flowable (@ w/p=0.14) : 4.2 litres

The selected water content should be accurately measured into the mixer. The total content of the Conbextra GP3 bag should be slowly added and continuous mixing should take place for 5 minutes. This will ensure that the grout has a smooth even consistency.

At 30 deg. C place the grout within 20 minutes of mixing to gain full benefit of the expansion process. Conbextra GP3 can be placed in thicknesses up to 100mm in a single pour when used as an under plate grout. For thicker sections it is necessary to fill out Conbextra GP3 with well graded silt free aggregate to minimise heat build-up. Typically a 10mm aggregate is suitable. 50 - 100% aggregate weight of Conbextra GP3 can be added.

Pouring should be from one side of the void to eliminate any air or pre-soaked water becoming trapped under the base plate. It is advisable to pour the grout across the shortest distance of travel. The grout head must be maintained at all times so that a continuous grout front is achieved. Where large volumes have to be placed Conbextra GP3 may be pumped. A heavy duty diaphragm pump is recommended for this purpose. Screw feed and piston pumps may also be suitable.

Any bolt pockets must be grouted prior to grouting between the substrate and the base plate. Continuous grout flow is essential. Sufficient grout must be prepared before starting. The time taken to pour a batch must be regulated to the time to prepare the next one.

When the air or contact surface temperatures are 10°C or below on a falling thermometer, warm water (30 – 40 deg. C) is recommended to accelerate strength development. For ambient temperature below 10 deg.

C. the formwork should be kept in place for at least 36 hours. Normal precautions for winter working with cementitious materials should then be adopted.

At ambient temperatures above 40 deg. C, cool water (below 20 deg. C) should be used for mixing the grout prior to placement.

Sufficient equipment, paddles, and rods to force the grout under the base plates, flexible steel strips of 1.5 mm x 12 mm or steel cable of 5 to 10 mm diameter long enough to pass under the base plate structure sufficiently on each side to allow holding at each end while the grout is being poured, the strips shall be dragged back and forth continuously, this will aid to uniform grout distribution. Supply of compressed air, hose and a nozzle with a piece of pipe long enough to reach under the base plate to blow all the dirt and excess water just before grouting.

The grout should be poured into the form on one side of the base plate only. Continuous moving of the steel strips and ramming with rods will carry the grout under the equipment base and through to the other side. After grout has appeared all round the equipment base, and has reached the level of the bottom of the base, it is permissible to pour grout into the form at all points around the equipment. Pouring and agitation of the grout should be continued, until a level is reached about 100mm higher than the bottom of the base. All the steel strips or wires are to be removed and the grout thoroughly packed to fill the voids left by the strips. When the grout has taken an initial set, and further flow is impossible the grout is to be cut from around the outside of the base, down to a level even with the base.

On completion of the grouting operation, exposed areas should be thoroughly cured. This should be done by the use of Concure WB curing membrane, continuous application of water and/or wet hessian.

3.12.8 Removal of shims and wedges and final alignment checking

After completion of grouting as described above the grouting mixture shall be allowed to harden for a period of 5 days. At the end of this period, the wedges or shims may be removed. The anchor bolts are tightened uniformly. The alignment of the structure should now be re-checked. If serious misalignment is indicated, it shows that grouting has not been done properly, and it may be necessary to tear out the grout, realign and grout again. If the alignment is correct, the voids left by the removal of shims (if it is removed) must be filled up with the similar mixture of grout.

Note : Clean-up

- Upon the completion of concrete work, all forms, equipment, construction tools protective coverings and any
- Debris resulting from the work shall be removed from the premises.
- All debris, i.e. empty containers, wooden pieces etc. shall be removed.
- The finished concrete surfaces shall be left in a clean condition satisfactory to EIC.

4.0 Pre-Commissioning

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.

5.0 List of Approved/Recommended Vendors/Makes

5.1 Civil Work

Table 5.1: 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.

5.2 Mechanical/Piping

Table 5.2: 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
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 GujaratStahl, 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, KSBLtd, Niton Valves, Oswal Industries, Econo valves P Ltd, NecoSchubrtSulzer (NSSL), Advance Valves, Tyco valves & Controls, Intervolve 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:

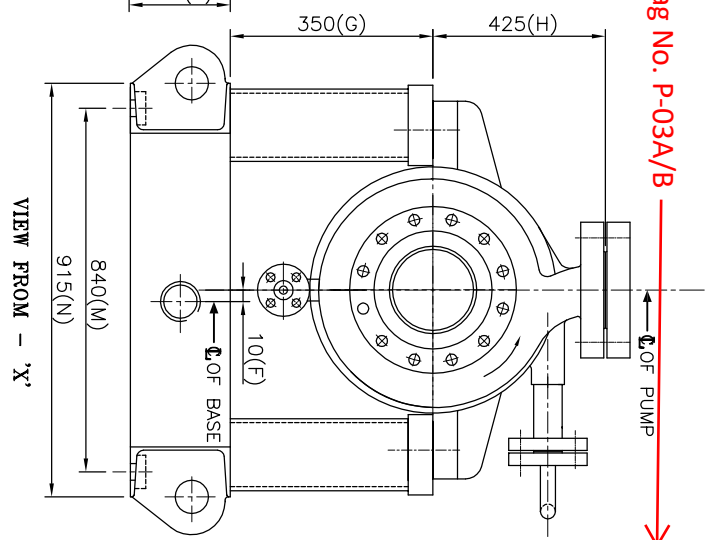
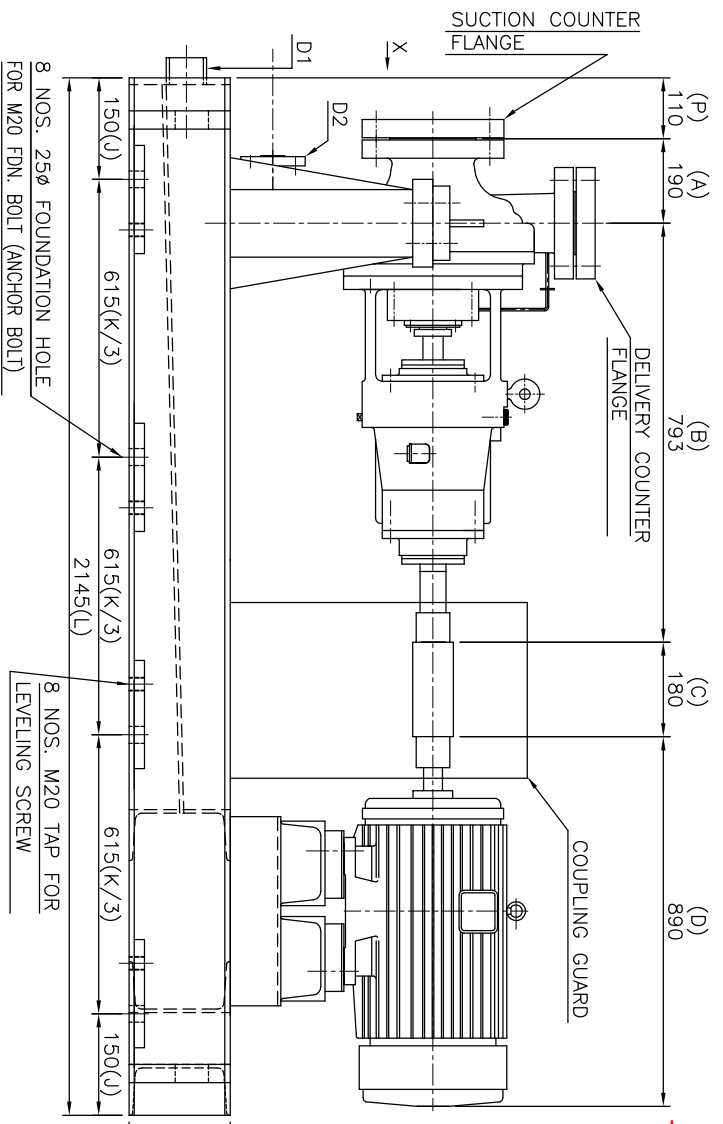
- a) Contractor to follow the above mentioned makes. Makes of Items not listed here or in case none of the above makes are available, Contractor to follow the equivalent makes with prior approval from Owner. No change or introduction of new make shall be permitted during execution of contract.
- b) It 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.

5.3 Electrical

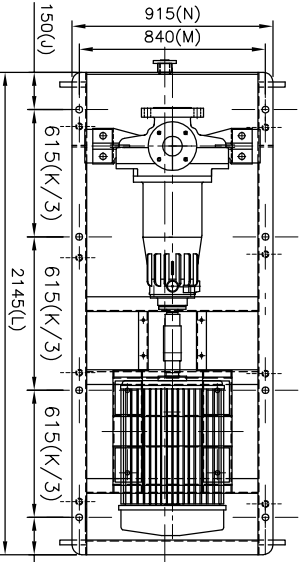
Table 5.3: List of Approved Electrical Equipments Vendors

Sr.	Description	Recommended Make
1	– Air Circuit Breaker (ACB) / Moulded Circuit Breaker (MCCB) / Switch Disconnecter Fuse Units / Contactors and O/L Relay / HRC Fuse with base – LT SWITCHGEAR	– L&T / SIEMENS / ABB / Schneider / C & S
2	– Push Buttons / Indicating lamps	– L&T / SIEMENS / Teknik / Vaisno
3	– Load Manager / Meters / Measuring Instruments	– HPL / Enercon / Conzerv / Rishabh / Trinity/El measure
4	– MCB / ELCB / ELMCB	– Hager / HPL / Indo Asian / Havells
5	– Protective Relays	– Siemens / Alstom / ABB / GE
6	– Timers	– GEC / L&T / SIEMENS / C&S / BCH
7	– Terminals	– Phoenix/Elmex / Connectwell
8	– Wires - FRLS	– Finolex / Havells / Polycab / Avocab
9	– Electrical Cable (L.T.) XLPE / PVC FRLS	– Polycab / Finolex / Gemscab / KEI / Havells / Primecab / Avocab
10	– Flameproof Equipments	– FCG / CEAG / Sudhir / CG / ExEC / SEPL
11	– Lighting Fixtures	– Crompton / Wipro / Philips / Bajaj
12	– Ceiling fan	– Crompton / Usha / Havells / Orient
13	– Flameproof Exhaust Fan	– Crompton / FCG / Sudhir / CEAG
14	– Current Transformer	– AE/ Krishna/Ashmor / Kappa / Indcoil

15	-	Switch Socket & Plugs for offices	-	-	Anchor Roma / Legrand / WIPRO
16	-	Industrial type Switch, Socket and Plug for non hazardous areas	-	-	Legrand / Clipsal / Havells / Hager



Tag No. P-03A/B

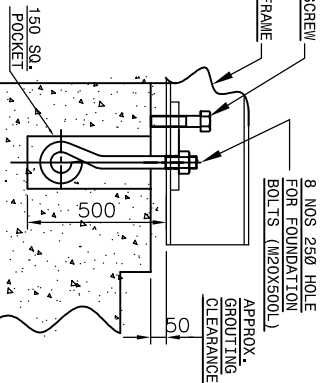
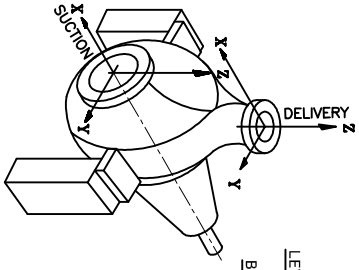


PLAN OF FOUNDATION

NOZZEL LOADING

FORCE	SUCTION DELIVERY
FX	6220 2140
FY	4980 1780
FZ	4100 2860
FR	8960 3860
MOMENT EACH NOZZLE	
MX	4600 1900
MY	2360 940
MZ	3520 1440
MR	6280 2560

FORCE IN NEWTON (N) & MOMENT IN NEWTON METER (N.m.)



FOUNDATION POCKET DETAIL

LOAD IN KG.

PUMP WT.	450 KG.
MOTOR WT.	470 KG.
BASE FRAME + COUPLING	350 KG.
TOTAL WT.	1270 KG.

NOTES :-

- DO NOT SCALE THIS DRAWING
- FOR LIFTING OF THE FULL EQUIPMENT ONLY USE LIFTING LUG
- PROVIDE FOR IT. FOLLOW MANUAL FOR LIFTING OF PUMP.
- ALL PRELIFE OF PUMP MUST BE INDEPENDENTLY HANDLED. THRUST & VIBRATION OF THE SYSTEM.
- THE DESIGN OF PIPING, FOUNDATIONS AND THE TOTAL SYSTEM DESIGN IS NOT THE RESPONSIBILITY OF VARAT PUMP.
- ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED.
- FOUNDATION BOLT M20X300 LG-8 NOS. EACH SET
- COUPLING GUARD : NON SPARKING ALUMINIUM SHEET INSIDE OF STEEL FRAME

SUCTION AND DELIVERY COUNTER FLANGE DETAILS :- (WELD NECK RF TYPE)

ANSI CL 300	FLANGE O.D.	THICKNESS	NO. OF BOLTS	HOLE SIZE	P.C.D.	R.F. DIA.	R.F. THICKNESS	SGH.
150 NB SUCTION FLANGE	317.5mm.	36.5mm.	12 NOS.	22.2mm.	269.9mm.	215.9mm.	1.6mm.	40
80 NB DELIVERY FLANGE	210mm.	28.6mm.	8 NOS.	22.2mm.	168.5mm.	127mm.	1.6mm.	40

VARAT PUMP & MACHINERY (P) LTD.

VARAT PUMP & MACHINERY (P) LTD.
20, NETAJI SUBHAS ROAD,
KOLKATA - 700 001
INDIA

DIMENSIONS VARIABLE ±2% AND FOUNDATION AS PER API 610 8TH EDITION

REV.	DESCRIPTION	DRN	CHKD.	DATE
0	FIRST ISSUE	S.K.D.S.N.		13.09.18

CLIENT : IOCL MUMBAI
CLIENT'S P.O. NO. : 10029468
DATED : 16.07.2018
PROJECT : IOCL MUMBAI(GUNTAKAL)

VARAT PUMP & MACHINERY (P) LTD.

VARAT PUMP & MACHINERY (P) LTD.
20, NETAJI SUBHAS ROAD,
KOLKATA - 700 001
INDIA

DRN.	PUMP MODEL	TYTLE	SCALE
S.K.D.	BOVCP4H-8	GA DRG. WITH FDN. DETAILS FOR CENTRIFUGAL PROCESS PUMP WITH MOTOR	N.T.S.
CHKD.	MOTOR FRAME		A3
APPD.	KF225M		10F1
DSGN.	OUR JOB NO. 140056/18-19		
ITEM NO.	7		
DATE TO ASST.DRG.			
DRG. NO.	VP-GA-VCP-14005-09/0		
REV. NO.	00		
DATE	13.09.2018		



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/2021-22/06 (JOB: TENDER FOR INSTALLATION/REPLACEMENT OF FUEL HYDRANT CENTRIFUGAL PUMPSETS WITH ALLIED MECHANICAL, CIVIL & ELECTRICAL WORKS) including Scope of job, quantities, completion period, terms & condition 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 dispute or disputes have been raised by the said M/s. -----

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 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 IOCL/BPCL/DIAL or any government or quasi Government agencies or Public Sector Undertakings.

Stamp & Signature of the bidder

NOTE: If a bidder has been banned by IOCL/BPCL/DIAL or 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



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/2021-22/06 (JOB: TENDER FOR INSTALLATION/REPLACEMENT OF FUEL HYDRANT CENTRIFUGAL PUMPSETS WITH ALLIED MECHANICAL, CIVIL & ELECTRICAL WORKS) including Scope of job, quantities, completion period, terms & condition 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 dispute or disputes have been raised by the said M/s. -----

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

- 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 IOCL/BPCL/DIAL or any government or quasi Government agencies or Public Sector Undertakings.

Stamp & Signature of the bidder

NOTE: If a bidder has been banned by IOCL/BPCL/DIAL or 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



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

ANNEXURE VIII

STATEMENT OF CREDENTIALS

(A)

1. NAME AND CORRESPONDENCE ADDRESS OF THE TENDERER

PERMANENT ADDRESS OF THE TENDERER

2. TELEPHONE NO. _____

MOBILE NO. _____

3. NAME OF CONTACT PERSON(s): _____

4. NAME OF THE AUTHORISED SIGNATORY: _____

5. E Mail ID: _____

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

(B) TYPE OF BUSINESS ENTITY:

1. YEAR OF ESTABLISHMENT OF THE FIRM: _____

2. SOLE PROPRIETORSHIP: - _____

(Give Name of the Proprietor)

OR

3. PARTNERSHIP FIRM?

(Give names of the Partners and enclose scan copy of Partnership deed)

1. _____

2. _____

3. _____

4. _____

OR

4. PRIVATE OR PUBLIC LIMITED COMPANY?

(Attach list of Directors and copy of Certificate of Incorporation as defined in "Other Mandatory Documents")

(C) Details of Completed Purchase Orders of minimum value as per Pre-qualification criteria (PQC/BQC) during last SEVEN years as specified in PQC/BQC of the tender.

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

Sl. No	Particulars	1	2	3
a	Party's Name to whom supplied, Clear Postal Address, Telephone/Fax Nos and E-Mail Address.			
b	<u>Purchase Order Details-</u>			
	PO Reference No.			
	PO Date			
	PO Value (Rs. in Lakhs)			
c	Quantity & place of supply			
d	Scheduled time of completion as per PO			
e	Date of commencement of supply			
f	Date of completion of supply			
g	Completion certificate reference and date			

Note: a. Tenderer should furnish copy of the above-referred orders (as defined under PQC documents) and

b. Enclose a separate statement if space is not sufficient.

(D) **Annual Turnover (as per Audited Balance Sheet) in following last THREE financial years**

SL No.	Financial Year	Value (Rs. In Lakhs)
1	2018-2019	
2	2019-2020	
3	2020-2021	

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

Note : Tenderer should furnish copy of audited accounts as proof of turnover (as defined under tender documents).

(E) INCOME TAX DETAILS:

i. Income Tax Returns Filed:

ASSESSMENT YEAR	DATE	ACKNOWLEDGEMENT NO
2018-2019		
2019-2020		
2020-2021		

Note: Tenderer should furnish copy of the Income Tax Return filed.

ii. Income Tax Assessment Orders for following three financial years:

ASSESSMENT YEAR	ASSESSMENT ORDER & DATE	REMARKS
2018-2019		
2019-2020		
2020-2021		

Copies of Income Tax assessment orders / return filed / acknowledgement order for the three years as indicated above.

(F) GST Registration Details:

GST Registration no	
---------------------	--

Note: Tenderer should furnish copies of above Tax Registration Certificates.

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

(G) Mode of EMD (Online EMD or BG):

i. If paid Online:

AMOUNT	Rs.
(RTGS/NEFT/NET BANKING)	
Transaction Detail	

ii. If Bank Guarantee submitted (following details to be given) :

Name of the Issuing Bank and Branch Address	Bank Guarantee No and Date	BG Amount Rs.	Date of issuance	Valid Upto

(H) Production Capacity Details: (in case of manufacturer)

S. N	Item	Factory/ Location	Installed/ Capacity	Already Committed Capacity (For current Purchase orders in hand)	Spare Capacity, If Any	Capacity Committed to DAFFPL against this tender
			A	B	C=A-B	

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

Factory License and Address Details:

- (J) **In case the bidder is not a manufacturer, the bidder should submit an undertaking on Letter Head that the bidder is capable of supplying the material / equipment as per tender requirement.**

- (K) **Pan Card Details**

**Relation of Pan Holder to Tenderer
(PROP./PARTNER/COMPANY ETC.)
(Tenderer is required to upload copy of PAN card as detailed in "Other Mandatory documents")**

- (L) **Details of Documents uploaded along with Tender documents in technical bid and confirmation required to be furnished by tenderer.**

Sign & Stamp of Bidder



DELHI AVIATION FUEL FACILITY PRIVATE LIMITED

PAYMENT TO VENDORS THROUGH ELECTRONIC MODE

Tenderers are requested to submit their Consent Letter as per the format given below along with the enclosures as required:

Dated:

To,
M/s DAFFPL.

Dear Sir,

With reference to your advice, we hereby agree to accept the payment of our bills through "RTGS/NEFT/Electronic Mode". The desired bank account details are given below:

1.	Name of Beneficiary	
2.	Name of the Beneficiary's Bank	
3.	Address of the Beneficiary's Bank Branch	
4.	Contact details of Branch with STD Code	
5.	Beneficiary's Bank Account No. (as per cheque copy)	
6.	Beneficiary's Account Type (SB/CC/CA)	
7.	Beneficiary's Bank IFSC Code (11 Digit)	
8.	Mobile No of Beneficiary (One Number only)	
9.	E-Mail Id of Beneficiary (One Mail Id only)	

A blank cancelled cheque leaf relating to the above bank account is enclosed for verifying the accuracy of the bank account details.

I hereby declare that the particulars given above are correct and complete.

(Signature of Account Holder)

Seal of the Vendor

Encl: Cancelled Cheque

Sign & Stamp of Bidder



Delhi Aviation Fuel Facility Private Limited



PRICE BID/BOQ

Tender No: DAFFPL/MOD/FF/2021-22/06

Name of Work: INSTALLATION/REPLACEMENT OF FUEL HYDRANT CENTRIFUGAL PUMPSETS WITH ALLIED MECHANICAL, CIVIL AND ELECTRICAL WORKS

Name of Firm:

Part-A (Supply)

S. No.	Description/Particulars	Qty	Units	Unit rate of supply inclusive of packaging, insurance, freight & all incidental costs for door delivery basis. (Rs.)	Total price of items in Rs.	Taxes %	Taxes Amount (Rs)	Total price of items including taxes in Rs.
1	Supply of material for installation of new pumpsets							
1.1	Concentric Reducer (10" x 06")	8	Nos		0.00		0.00	0.00
1.2	Eccentric Reducer (10" x 06")	8	Nos		0.00		0.00	0.00
1.3	Flange (250mm, 300#)	8	Nos		0.00		0.00	0.00
1.4	Flange (250mm, 150#)	8	Nos		0.00		0.00	0.00
1.5	Gasket (10") 300#	16	Nos		0.00		0.00	0.00
1.6	Gasket (10") 150#	16	Nos		0.00		0.00	0.00
1.7	Gasket (06") 150#	24	Nos		0.00		0.00	0.00
1.8	Stud Bolts with double Nuts including washers (150mm x 22mm)	384	Nos		0.00		0.00	0.00
1.9	Stud Bolts with double Nuts including washers(125mm x 20mm)	96	Nos		0.00		0.00	0.00
1.10	Blind Flange (250mm, 300#)	2	Nos		0.00		0.00	0.00
1.11	Blind Flange (250mm, 150#)	2	Nos		0.00		0.00	0.00
2	Supply/Providing Thermo mechanically Treated deformed steel bars. (TMT) (Having 0.2% proof stress not less than 415 N/mm ²) at all heights for steel reinforcement. For all types of RCC structures as per design including loading transporting steel from markets to the work site and incidental charges for unloading handling cutting, bending, providing & binding with double 18 gauge annealed Iron wires (from Contractor), welding if necessary, wastage etc. complete as directed. Payment will be made on the weight basis for the length converted into weight by using standard IS Coefficient. (Having yield stress not less than 415 N/mm ² .)	1800	KG		0.00		0.00	0.00
3	Supply/Providing Vitrified tiles of 10mm thickness with water absorption less than 0.08% and conforming to I.S. 15622, of approved make, of colors & shade similar to existing foundation tiles, in skirting, riser of steps, pads, sumps etc. over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3 kg/sqm including grouting the joint with white cement & matching pigments etc., including cutting of tiles to suit the site etc. complete.	16	Sq. mm		0.00		0.00	0.00
4	Supply of 3C x 185 Sq.mm XLPE Al. Conductor, Flat strip armoured FRLS cable. The rates shall include the supply of aluminium number tags, Aluminium saddles/clamps, saddle bars, etc, of clamp thickness 3 mm. Cable shall be 1.1KV grade, XLPE insulated stranded Al Conductor, extruded PVC inner sheathed and extruded PVC -FRLS outer sheathed, round / flat steel wire armoured.	2000	Meters		0.00		0.00	0.00
5	Supply of cable gland for termination of 3C x 185 Sq.mm, XLPE insulated, Al conductor, armoured, FRLS cables including supply of flameproof and weatherproof double compression type cable glands with gland cap also including supply of crimped type solderless tinned copper lugs. 1.1KV grade, XLPE insulated stranded Al. / Cu. Conductor, extruded PVC inner sheathed and extruded PVC outer sheathed, round / flat steel wire armoured cables.	32	Nos		0.00		0.00	0.00
Total Amount (A) including taxes								0.00

Part-B (Erection/Installation, Testing & Commissioning)

S. No.	Description	Qty	Unit	Unit rate of supply & Installation, fabrication & completed in all respects, inclusive of transportation, handling, storage and safe custody at site & all incidental costs.	Total price of items in Rs.	Taxes %	Taxes Amount (Rs)	Total price of items including taxes in Rs.
1	Existing 01 Nos Foundation dismantling/breaking upto ground level. Works includes shifting of resulting debris to desired location in/around fuel farm.	2.00	Cum		0.00		0.00	0.00
2	Construction of 01 Nos New Pumpset Foundation (on the location of old dismantled foundation) & Civil works for cable laying for all pumpsets							
2.1	Excavation/dismantling by mechanical or manually in ordinary, hard soil, RCC, PCC, all types of concrete for foundations of column footings, wall, plinth beams, raft, cable trenches, etc. Including shoring & strutting, bailing out surface water, pumping off water if required. Refilling the trenches, foundation pits ramming, watering, consolidating in 150mm to 200mm layers. Rate to include carting away surplus excavated earth/debris, spreading, leveling and compacting, inside/outside the terminal in approved dump yard as directed by Engineer-In-Charge. From existing Ground level up to 1.5 M deep.	35	Cum		0.00		0.00	0.00
2.2	-do- same as per item no.2.1 for excavation Beyond 1.5M to 3 M below the existing ground level.	14	Cum		0.00		0.00	0.00
2.3	Providing and laying in compact manner 230mm thick (average) rubble soling in plinth, foundations, plinth protection, Including filling in the visible voids with largest possible chips, covering and levelling the surface with layer of well watered and consolidated sand, rolling with mechanical plate compactor etc. complete including supply and spreading cost of sand at site.	7.5	Cum		0.00		0.00	0.00
2.4	Providing and laying machine mixed Plain cement concrete of all heights in volumetric proportion 1:4:8 (1 Cement: 4 Sand : 8 Aggregate) with 20mm and down stone aggregates of specified thickness, mix and gradation. Including centering, shuttering if required, laying, spreading, ramming consolidating, finishing, curing etc. complete as directed for all levels & all types of foundations below footings, walls, angle post, roads, rafts, plinth beams, terrace, cable trenches, pile caps. duct, in flooring etc. complete as directed by Engineer-In-Charge.	6.5	Cum		0.00		0.00	0.00
2.5	Providing & laying in position machine mixed and machine vibrated M25 Grade cement concrete of controlled grades for Reinforced cement concrete structural elements, of any shape and size viz. foundation, column, raft slab, plinth beam, retaining wall, staircase, cable trenches, Under-ground water tanks, Tank pads, machine foundations. As per structural design and as directed in specified compressive strength in N/mm ² at 28 days confirming to IS 456-1978 using 20mm maximum size aggregates. Including mix design of concrete, weigh batched proportioning, finishing concrete surfaces, curing, wastage, lead, etc. complete but excluding centering/shuttering and reinforcement for below and up to all height/top level of foundation.	15	Cum		0.00		0.00	0.00
2.6	Fabricating and fixing in position Thermo mechanically Treated deformed steel bars. (TMT) (Having 0.2% proof stress not less than 415 N/mm ²) at all heights for steel reinforcement. For all types of RCC structures as per design including loading transporting steel from markets to the work site and incidental charges for unloading handling cutting, bending, providing & binding with double 18 gauge annealed Iron wires (from Contractor), welding if necessary, wastage etc. complete as directed. Payment will be made on the weight basis for the length converted into weight by using standard IS Coefficient. (Having yield stress not less than 415 N/mm ²).	1800	KG		0.00		0.00	0.00

2.7	Providing and erecting in position Steel plate or Plywood form work shuttering and boxing using shuttering materials of approved quality shuttering, for concrete elements vertical, horizontal or inclined in all shapes except circular shape, column foundations, pedestals, wall footings, plinth beams, cable trenches, compound wall, U.G. water tank, fins, copings, etc. as per drawing. Including necessary Scaffolding, fastener nails, wires, keeping in position till concrete is laid and concrete members have acquired required strength, removal, thereafter, applying de-shuttering oil etc. complete as directed by structural consultant / Engineer-In-Charge. At all levels in foundation and up to top of foundation.	35.00	Sq.M		0.00		0.00	0.00
2.8	Providing and Making Pockets in Equipment foundations for fixing of foundation bolts, with wooden materials, including making templates for except location in concrete works, finishing the surfaces etc. complete. Size upto 130x130x400mm deep	8.00	Nos		0.00		0.00	0.00
2.9	Back filling with available excavated earth or from D-Area to foundation site free from all foreign matters, boulders in excavated area/pits in layers not exceeding 200 mm thick and compacting each deposited layer by ramming and water or as required.	31.5	CuM		0.00		0.00	0.00
3	Laying/fixing Vitrified tiles of 10mm thickness with water absorption less than 0.08% and conforming to I.S. 15622, of approved make, of colors & shade similar to existing foundation tiles, in skirting, riser of steps, pads, sumps etc. over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3 kg/sqm including grouting the joint with white cement & matching pigments etc., including cutting of tiles to suit the site etc. complete.	16	Sq. mm		0.00		0.00	0.00
4	Installation of ATF Hydrant Pump (Free Issue Material) including fabrication, aligning, welding, testing of piping, and to be connected to existing discharge & suction pipeline including all materials/consumables including material supplier under Sr. No-1 (1.1 to 1.11) of Part-A (supply) after dismantling existing Pumpset & shifting to desired location in fuel farm. All necessary safety precautions & fire screen is to be considered in quoted price.	8	Nos		0.00		0.00	0.00
5	Laying (installation, testing & commissioning) of 3C x 185 Sq.mm XLPE Al. Conductor, Flat strip armoured FRLS cable. The rates shall include the supply of aluminium number tags, Aluminium saddles/clamps, saddle bars, etc, of clamp thickness 3 mm. Cable shall be 1.1KV grade, XLPE insulated stranded Al Conductor, extruded PVC inner sheathed and extruded PVC -FRLS outer sheathed, round / flat steel wire armoured.	2000	Meters		0.00		0.00	0.00
6	Erection ((installation, testing & commissioning) of cable gland for termination of 3C x 185 Sq.mm, XLPE insulated, Al conductor, armoured, FRLS cables including supply of flameproof and weatherproof double compression type cable glands with gland cap also including supply of crimped type solderless tinned copper lugs. 1.1KV grade, XLPE insulated stranded Al. / Cu. Conductor, extruded PVC inner sheathed and extruded PVC outer sheathed, round / flat steel wire armoured cables.	32	Nos		0.00		0.00	0.00
7	Existing Old cables (02 runs for each pumpset, average length approx 100 meters per run) removal after disconnecting from both motor & panel side & shifting to desired location in fuel farm	8	Pumsets		0.00		0.00	0.00
8	Shifting of existing control/signal cables (2core 1.5 sqmm Cu cables-05 Nos, 1pair 1.5 sq mm Cu cables-02 Nos) for each pumpsets from MCC panel to VFD Panels including dismantling, reconnection/termination with all required material & consumables.	5	Pumsets		0.00		0.00	0.00
Total Amount (B) including taxes								0.00
Grand Total including taxes (Total Amount A including taxes+Total Amount B including taxes)								0.00
Grand Total including taxes in words: Rs.								

Note: All Yellow colour highlighted cells shall be filled by the bidder.