SBI INFRA MANAGEMENT SOLUTIONS PVT LTD
(WHOLLY OWNED SUBSIDIARY OF SBI)

INVITES TENDERS IN TWO BID SYSTEM (PHYSICAL FORM)

FOR

REVAMPING OF EXISTING HYDRANT SYSTEM (Down Comer)
WORKS OF SBI ADMINISTRATIVE OFFICE BUILDING,
ERNAKULAM (HIGH RISE BUILDING)

Last date for submission of Tender: 3:00P.M. (IST) on 31.12.2019.


Contractors who are in the panel of SBIIMS, Circle Office, Thiruvananthapuram in the category **SITC OF FIXED FIRE SYSTEMS up to** Rs 50 Lacs are only eligible.

NIT No: THI201912012

The Assistant General Manager,
SBI Infra Management Solutions Pvt. Ltd.
4th Floor, SBI LHO Building,
Poojappura,
Thiruvananthapuram – 695012
NOTICE INVITING TENDER

Tenders are invited from empaneled contractors for carrying out SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FIRE SYSTEMS WORKS OF SBI ADMINISTRATIVE OFFICE, MULTISTORIED BUILDING, ERNAKULAM

<table>
<thead>
<tr>
<th></th>
<th>Estimated cost of work:</th>
<th>Rs.5,87,935/- (Estimate value is inclusive of GST)</th>
</tr>
</thead>
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<tr>
<td>2</td>
<td>Time of Completion:</td>
<td>45 DAYS.</td>
</tr>
<tr>
<td>3</td>
<td>Date of download of tender documents from Bank’s website <a href="http://www.sbi.co.in">http://www.sbi.co.in</a> under “procurement news”.</td>
<td>From 17/12/2019 to 31/12/2019.</td>
</tr>
<tr>
<td>4</td>
<td>Last date and time for submission of tender.</td>
<td>Date: 31/12/2019 by 3.00 P.M.</td>
</tr>
<tr>
<td>5</td>
<td>Earnest Money Deposit. (EMD)</td>
<td>Rs. 6,000/- (Rupees Six Thousand Only) in the form of DD in favor of SBI payable at Trivandrum</td>
</tr>
<tr>
<td>6</td>
<td>Tender fees</td>
<td>Rs.1,000/- through SBI e-collect. The procedure for remitting the tender fees is detailed in Annexure – I. Copy of the generated receipt with reference number shall be enclosed with the tender.</td>
</tr>
<tr>
<td>7</td>
<td>EMD in Technical Bid to be submitted at:</td>
<td>EMD &amp; technical bid (in cover - 1) should be submitted physically at SBI Infra Management Solutions Pvt. Ltd. Office, 4th Floor, SBI LHO Building, Poojappura, Thiruvananthapuram – 695012 before 20/12/2019 by 3.00 P.M. Contact: Assistant General Manager. 0471-2419410/2419435.</td>
</tr>
<tr>
<td>8</td>
<td>Date and Time of opening Tenders: (Technical Bid &amp; Price bid)</td>
<td>Date:31/12/2019 at 3.30 P.M. (IST) at above office address. Technical Bid of those firms / contractors who do not submit EMD and Tender fees shall be rejected. Representatives of Bidder may be present during opening of Technical Bids. However Bids would be opened even in the absence of any or all the bidder’s representatives. Price bids (to be submitted in Cover – II) of technically qualified vendors will be opened on the same day.</td>
</tr>
<tr>
<td></td>
<td>Bidder Contact Details.</td>
<td>Bidder to provide following information.</td>
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<tr>
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<td>------------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>1) Name of Company.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Contact Person.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Mailing address with Pin Code.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Telephone number and Fax number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) Mobile Number and E-MAIL.</td>
</tr>
<tr>
<td>10</td>
<td>Minimum value of work</td>
<td>No Interim payment</td>
</tr>
<tr>
<td></td>
<td>to be executed for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>issue of interim</td>
<td></td>
</tr>
<tr>
<td></td>
<td>certificate for payment</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>For any clarifications</td>
<td>AGM (Fire Safety), LHO, Thiruvananthapuram</td>
</tr>
<tr>
<td></td>
<td>and drawings contact</td>
<td>Mob: 9448291308</td>
</tr>
</tbody>
</table>

The SBIIMS reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.
INSTRUCTIONS TO CONTRACTORS.

1. This tender is for the "REVAMPING OF EXISTING HYDRNT SYSTEM (Down Comer) WORKS OF SBI ADMINISTRATIVE OFFICE BUILDING, ERNAKULAM HIGH RISE BUILDING". It is a Two Bid containing Technical and Price Bid (to be submitted in OFFLINE).

In their own interest the contractors are advised to use their own specific seals and desist from using currency coins for the purpose. Tenders with incomplete or broken seals are liable to be rejected, the matter solely resting at the discretion of the SBIIMS. If a Contractor does not quote for one or more items, the Tender will be considered as incomplete and will be rejected.

2. SBIIMS reserve to itself the right to accept or reject any tender without assigning any reason for doing so and does not bind itself to accept the lowest or any other tender.

3. General Specifications are for guidance only. The latest ISI codes and Specifications and mode of measurements will be referred to during execution.

4. Employer or Client shall mean Assistant General Manager, State Bank of India Infra Management Solutions Pvt. Ltd., Thiruvananthapuram and / or AGM (Premises & Estate) SBI, Local Head Office, Poojapura, Thiruvananthapuram.

5. The tender is to be submitted in sealed cover super scribed as “REVAMPING OF EXISTING HYDRNT SYSTEM OF AO BUILDING, ERNAKULAM”. Technical bid containing the tenderer's EMD (in the form of a Demand Draft), Tender cost (in the form of DD) and supporting documents (in cover I) and Price bid as per Bill Of Quantities (BOQ) in standard format (in cover II) shall be submitted in separate sealed cover. All pages should be properly tied and tagged in its order for easy identification during scrutiny. Full address with phone no. of the tender should be written on the sealed covers.

6. All pages should be signed and sealed by the tenderer. No deviations from the tender are acceptable.

7. Bills of quantities in respect of each work and a specification accompany this tender notice. The tenderers must use only the form issued by the SBIIMS to provide the price bid. The Bills of quantities are liable to alternations by omission, deduction or addition at the discretion of the SBIIMS.

8. Income tax (PAN) and GST registration certificate to be enclosed.

9. On the date specified for opening of Tender, Technical Bids will be opened first and after scrutiny of technical bids, price bids of qualified tenderers will be opened on the same day.

Please read the ‘INSTRUCTIONS TO TENDERERS’ thoroughly before submitting the Tenders. Also note to verify the Bank web-site under ‘PROCUREMENT NEWS’ before the last date and confirm that ‘CORRIGEN’ to the Tender Notices issued (if any) has been read and / or complied with.
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1. TENDER FORM

PROJECT : "REVAMPING OF EXISTING HYDRNT SYSTEM (Down Comer) WORKS OF SBI ADMINISTRATIVE OFFICE BUILDING, ERNAKULAM HIGH RISE BUILDING"

Dear Sirs,

I/We the undersigned have carefully gone through and clearly understood after visiting the site and the Tender drawings and tender documents comprising of the tender form, Notice to contractors, and conditions for building contract, Special Conditions, Specifications and Schedule of Probable quantities and Draft Agreement prepared by SBIIMS.

I/We do hereby undertake to execute and complete the whole or part of the work (as desired by you) at the respective rates which/I/We have quoted for the respective items of the Probable Bill of Quantities (BOQ).

I/We are depositing as Earnest Money a sum of Rs.6,000/- (Rupees Six Thousand Only) in favor of the State Bank of India payable at Thiruvananthapuram along with this tender for due execution of the work at my/our tendered rates together with any variations which shall be adjusted by the SBIIMS at prices based on our tendered rates. I/We shall deposit further sum equivalent to 2% of tender amount, less EMD paid in the event of my/our tender being accepted, towards initial security deposit.

In the event of this Tender being accepted I/We agree to enter into an agreement as and when required and execute the contract according to your form of Agreement, within 15 days of receipt of work order, in default thereof, I/We do hereby bind my-self/ourselves to forfeit the aforesaid Earnest Money deposit.

I/We further agree to complete the work covered in the said schedule of quantities within 45 days from the 7th day reckoned from the date of issue of the work order to commence the work or on which contractor is instructed to take possession of the site, whichever is later.

I/We agree not to employ Sub-contractors other than those that may be specifically approved by your SBIIMS for this contract work.
I/We agree to and to get the work, workers, employees (of contractor, SBIIMS & Employer) engaged on the work at site and all materials at site for execution of the work shall be insured comprehensive insurance including fire/accidents/rain/ floods/riots/CAR policy (contractor’s all risk insurance policy) and the insurance shall cover the period from date of start of work to date of actual completion of work plus 3 months. In case part work is taken over by the Employer before final completion of the whole work, such parts may not be covered by the insurance from the date of taking over that part of work by the Employer. Draft Insurance deed will be got vetted by the SBIIMS, before obtaining the same. All the rates quoted by me/us are inclusive of the same in full and nothing extra shall be claimed anytime on account of any of these.

I/We agree to pay Income tax, TDS on GST to be deducted at source, at the rate prevailing from time to time on the Gross value of the work done, and the rates quoted by me/we are inclusive of same.

Yours faithfully,

Contractor’s Signature

__________________________________________________________________

Address: ___________________________ Date: ___________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
2. NOTICE TO CONTRACTOR

PROJECT: "REVAMPING OF EXISTING HYDRNRT SYSTEM (Down Comer) WORKS OF SBI ADMINISTRATIVE OFFICE BUILDING, ERNAKULAM HIGH RISE BUILDING"

REF : REVAMPING FIRE HYDRANT WORKS

Dear Sirs,

1. On behalf of our clients, M/s SBI, AGM (P&E), LHO, POOJAPURA, THIRUVANANTHAPURAM, we have pleasure in inviting you to tender for the aforesaid work.

2. The tenderer must obtain for himself, on his own responsibility and at his own expenses, all the information which may be necessary for the purpose of filling this tender and for entering into a contract for the execution of the same and must examine the drawings and inspect the site of the work and acquaint himself with all local conditions and matters pertaining thereto.

5. Each of the tender documents page is required to be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General conditions etc., as laid down. Any tender with any of the documents not so signed will be rejected.

6. The tender documents must be filled in English and all the entries must be made by hand and written in ink/ball pen. If any of the documents are missing or un-signed, the tender shall be considered invalid.

7. Each and every one of all erasures and additions/alterations made, while filling the tender, must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender void. After submission of the tender no advice or any change in rate or conditions will be entertained. All the rates should be quoted both in figures and words. In-case of any discrepancy in rates quoted in words/figures and the amounts, the rate quoted in words shall be taken as final and binding.

8. The tender shall be valid for a period of 90 days from the date of opening.

9 TOTAL SECURITY DEPOSIT: shall comprise of:

a. Earnest Money deposit
b. Initial Security deposit
c. Retention money
9.1 The intending tenderer shall deposit with SBI Thiruvananthapuram, by Demand Draft a sum of Rs.6,000/- (Rupees Six Thousand Only) as the Earnest Money, as a guarantee of good faith, which amount shall be forfeited as liquidated damages, in the event of any evasive/direct refusal or delay in starting the work and or signing the contract. The deposit of the unsuccessful tenderers will be returned, without interest, immediately after a decision is taken regarding the award of the contract. The Earnest money of the successful tenderer will be adjusted towards Security Deposit. A tender not accompanied by Earnest money deposit will not be considered.

9.2 The successful tenderer will have to pay further sum equivalent to 2% of his contract value, less EMD already paid, as initial Security Deposit (ISD) by means of a D.D./Banker’s cheque in favour of ‘AGM (P&E), SBI, LHO, POOJAPURA, THIRUVANANTHAPURAM. Initial Security deposit thus paid shall be held by the State Bank of India as Security deposit, for due execution and fulfillment of the contract, till the completion of the work and defect liability period in all respects and shall not bear any interest.

9.3 Together with the money paid under above clause, further retention of 10% of the value of the work done will be deducted from every running bill, till total retention, including EMD and initial SD paid earlier, comes to 5% of the contract value, and same shall be held by the Bank as Total Security Deposit. On the SBIIMS certifying the completion of work, 50% of the total security deposit shall be released to the contractor along with the final certificate of payment, and the balance amount will be retained in the manner stated elsewhere for a further period of twelve months after the completion date recorded in completion certificate, issued by SBIIMS.

10. Within 14 days of the receipt of intimation from the SBIIMS of the acceptance of his/their tender, the successful tenderer shall be bound to sign an agreement, on a stamp paper in accordance with the Draft Agreement and conditions of contract attached herewith, but the work order or the written acceptance of a tender by the SBIIMS will constitute a binding agreement between the SBI and the person tendering whether such formal contract is or not signed by the contractor.

11. All compensation or other sums of money payable by the contractors to the clients, under the terms of this contract, may be deducted from the Security Deposit or from any sum that may be or may become due to the contractor on any account whatsoever, and in the event of the Security deposit being reduced by reasons of any such deductions, the contractor shall within 15 days of being asked to do so make good in cash or cheque, any sum which have been deducted from his security deposit.

12. The rates quoted by the Contractor shall include all eventualities, such as heavy rain, sudden floods, accidents, fire, riots etc., which may cause damage to the executed work or which may totally wash out the work. Until the completion certificate is issued to the Contractors, neither the SBIIMS nor the clients will be responsible for such damage or wash out of the construction work.
13. Time is the essence of the contract. The work should be completed **within 45 days from** the date of commencement. The date of commencement shall be within ONE day after confirmation.

14. If the contractor fails to complete the work by the Scheduled date of completion or within any sanctioned extended time, he will have to pay liquidated damages at the rate of ½% of contract amount for each week of delay the work remains incomplete beyond the completion (Original/extended date), subject to maximum of 5% of the contract value (without extra items) as per clause 31 of the General conditions of contract.

15. The quantities contained in the Schedule are only indicative. The work as actually carried out and done will be measured up from time to time, for which payment will be made subject to the terms and conditions of contract.

16. The unit prices shall be deemed to be fixed prices. In case of extra items, a record of labour charges paid shall be maintained and shall be presented every month for extra/substituted items regularly to the SBIIMS for checking. The settlement will be made based on figures arrived at jointly and taking into account unit prices of items of work mentioned in the contract assigned to the successful tenderers. In case of extra items, where similar or comparable items are quoted in the tender, extra rates shall invariably be based on those tender rates to the extent reasonable. In case of extra items where similar items are not available in the tender, the rates for such items shall be derived as per CPWD analysis with taxes as applicable.

17. Our clients/SBIIMS, do not bind themselves to accept the lowest or any tender and reserve to themselves the right to accept or reject any or all tenders, either in whole or in part, without assigning any reason whatsoever for doing so.

18. No employee of the bank or SBIIMS is allowed to work as a contractor for a period of two years of his retirement from bank service, without the previous permission of the bank or SBIIMS. This contract is liable to be cancelled, if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of the bank or SBIIMS as aforesaid before submission of the tender or engagement in the contractor’s service.

19. The tenderer, apart from being a competent contractor must associate himself with (1) Electrical works (2) Civil works (3) Air-conditioning works & (4) Interiors (fixed furniture), as the case maybe.

20. Release of security deposit:

   i) 50% of the total security deposit will be released along with the final certificate of payments as stipulated under para 9 on page 12 of Volume I, Appendix to General Conditions of contract,

   ii) Balance 50% of total security deposit will also be released as noted under (i) above, subject to submission of a Bank Guarantee, to the satisfaction of SBI for an
equivalent amount. This Bank Guarantee shall be valid upto completion of defects/removal liability period plus 3 months. The bank guarantee shall be released after completion of defect liability period provided that there is no defects noticed in the work during defects liability period or defects if any is rectified by the contractor to the entire satisfaction of SBIIMS.
3. ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made the ___________ day of __________ 2019 between
Assistant General Manager, State Bank Of India, Local Head Office, Poojapura,
Thiruvananthapuram (hereinafter called the “Employer”) of the one part and
______________________________________________________________ (hereinafter called “The
Contractor”) of the other part, whereas the Employer is desirous of getting the work of “
"REVAMPING OF EXISTING HYDRNT SYSTEM (Down Comer) WORKS OF SBI
ADMINISTRATIVE OFFICE BUILDING, ERNAKULAM HIGH RISE BUILDING” executed and
has caused drawings, conditions of contract, specifications and schedule of quantities etc.,
describing the works prepared by SBI Infra Management Solutions Pvt Ltd,
Thiruvananthapuram and WHEREAS the SAID DRAWINGS numbered as per list attached
inclusive of and the conditions of contract, specifications and schedule of quantities etc., have
been signed by or on behalf of the parties hereto.

AND WHEREAS THE CONTRACTOR has agreed to execute upon and subject to the
conditions set forth in the Schedule hereto (hereinafter referred to as “Said Conditions”) the
works shown upon the said drawings and described in the same specifications and included in
the said schedule of quantities for such sum as may be ascertained to be payable in terms of the
Bills of Quantities, and which sum is estimated to be Rs. ____________
(Rupees ______________________________) (hereinafter referred to as
“Said Contract Amount”).

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said sum to be paid at the times and in the manner set forth in the
said conditions, the contractor shall upon and subject to the said conditions, execute and
complete the work shown in the said drawings and described in the said specifications.

2. The SBI shall pay the contractor the said sum or such sums as shall become payable
hereunder at the times and in the manner specified in the said conditions.

3. Tender documents containing work order Notice to the Contractor, Conditions of
Contract, Appendix thereto, Special Conditions of Contract, Specifications and Schedule
of Quantities with the rates entered therein, shall be read and studied as forming part of
this agreement and the parties hereto shall respectively abide by and submit themselves
to the conditions and stipulations and perform the agreement on their part respectively
in such conditions contained.

4. The contract is neither a fixed lumpsum contract or a piece work contract, but is a
contract to carry out work in respect of the entire works to be paid for according to
actual measured quantities, including variations from BOQ at the rates contained in the
Schedule of rates and Probable bill of quantities or as provided in the said conditions.

5. The Employer through the SBIIMS, reserves to himself the right of altering the drawings
and natures of the work, of adding/substitution to or omitting any items of work or
having portions of the same carried out through alternate agencies without prejudice to this contract.

6. Time shall be considered a the essence of this agreement and the contractor hereby agrees to commence the work soon after the site is handed over to him but within 5 days reckoned from the date of issue of work order to execute the work, as provided for in the said conditions and complete the entire work in 45 days subject to nevertheless to the provisions for extension of time.

7. This agreement and contract shall be deemed to have been made in Thiruvananthapuram and any questions or dispute rising out of or in any way connected with this Agreement and Contract shall be deemed to have arisen in Thiruvananthapuram and only the courts in Thiruvananthapuram shall have jurisdiction to determine the same. The limitation period will be 90 days from the date of dispute having arisen.

AS WITNESS our hand this _____________ day of ____________ 2019

Signed by the said in the presence of:

WITNESS : SIGNATURE

NAME :

ADDRESS : EMPLOYER

WITNESS : SIGNATURE

NAME :

ADDRESS :
4. APPENDIX TO GENERAL CONDITIONS OF CONTRACT

<table>
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<tr>
<th></th>
<th>Earnest Money Deposit (EMD)</th>
<th>Rs.6,000/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Initial Security Deposit (ISD)</td>
<td>2% of contract value including EMD.</td>
</tr>
<tr>
<td>3.</td>
<td>Period of completion</td>
<td><strong>45 DAYS</strong></td>
</tr>
<tr>
<td>4.</td>
<td>Defects Liability period</td>
<td>12 months after completion as recorded in the completion certificate.</td>
</tr>
<tr>
<td>5.</td>
<td>Minimum value of work to be Executed for issue of interim Certificates for making payment</td>
<td><strong>No interim payment</strong></td>
</tr>
<tr>
<td>6.a)</td>
<td>Retention money from each bill</td>
<td>10% of gross value of each interim bill, subject to 6(b) below.</td>
</tr>
<tr>
<td>6.b)</td>
<td>Total retention money including Earnest money and initial security Deposit</td>
<td>5% of the contract value.</td>
</tr>
<tr>
<td>7.</td>
<td>Release of Security deposit after Virtual completion.</td>
<td>50% of the total security to be released along with final certificate of payment, but only after removing all his materials, equipment, labour, huts/force, temporary sheds/stores, all his installations, machinery etc., from the site. Balance payment to be released on submission of Bank Guarantee on any Scheduled Bank, Other than SBI, in the prescribed manner and valid till the completion of defects liability period of 12 months plus 3 months as per clause no 20.</td>
</tr>
<tr>
<td>8.</td>
<td>Period for honouring certificate</td>
<td>15 working days from date of SBIIMS certificate of payment for interim bills and 20 working days for final certificate from the date of SBIIMS certificate after payment against final bills.</td>
</tr>
<tr>
<td>9.</td>
<td>Secured Advance</td>
<td>Nil</td>
</tr>
</tbody>
</table>

WITNESS :  

DATE : SIGNATURE OF THE CONTRACTOR WITH DATE
5. INDEX TO GENERAL CONDITIONS OF CONTRACT

1. Interpretations
2. Scope of Contract
3. Drawings and Specifications
4. Schedule of Quantities
5. Sufficiency of Schedule of Quantities
6. Errors in schedule of Quantities
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18. Sub contractors
19. Variations not to vitiate contract
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22. Unfixed materials
23. Removal of improper work and materials
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25. Certificate of virtual completion
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32. Damages for Non-completion
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35. Prime cost and provisional sums
36. Certificates and payments
37. Notices
38. Termination of contract by the Employer.
39. Termination of contract by the contractor.
40. Matters to be finally determined by the SBIIMS
41. Settlement of dispute (Arbitration)
6. **CONDITIONS OF CONTRACT**

1. Contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause of the delays may be, including delays arising out of modifications to the work entrusted to him or in any subcontract connected there with or delays in awarding contracts for other trades of the project or in commencement or completion of such works in obtaining water and power connections for construction purpose or for any other reason what so ever and the Employer shall not be liable for any claim in respect thereof. The Employer does not accept liabilities for any sum besides the tender amount, subject to such variations as are provided for herein.

2. The successful tenderer is bound to carry out any items of work necessary for completion of the job if such instructions in respect of such additional items and their quantities will be issued in writing by the SBIIMs with the prior consent in writing of the Employer.

3. a. All unused/unwanted old cables/wiring/Pipes/distribution boards existing in the site should be dismantled and removed from the site by the contractor. If the site is a working branch, required number of Temporary UPS/KSEB power sockets with wiring/lighting using the existing materials at the site shall be arranged by the successful contractor. No separate payment shall be made for dismantling of existing unused cabling/wiring/Distribution boards/clearing of waste materials from the site and also for the arrangement of temporary power sockets/UPS sockets for normal functioning of the branch in working branches/premises. For this purpose, Contractor should visit the site and understand the work.

   b. All debris/waste materials old dismantled material shall be removed and disposed off away from the site at the contractors own risk and cost, the contractor will quote for scrap buyback as item No.23 of BOQ.

4. The contractor must bear in mind that the work shall be carried out strictly in accordance with specifications and instructions of the Employer/SBIIMS.

5. If no power is available at site the contractor shall have to make his own arrangement to obtain power connection and maintain at his expense an efficient service of electric light and power and shall pay for the electricity consumed. The Employer shall give all possible assistance to the contractor to obtain the requisite permission from the various authorities, but the responsibility for obtaining the same shall be that of contractor.

6. a. Contractor shall strictly comply with the provisions of safety code in addition to all local rules and regulations.

   b. The contractor shall be responsible for the observance of all rules and regulations framed by the government under the contract labour act. The Employer shall be entitled to deduct all losses, damages that he might suffer on account of non-observance of these rules by the contractor, from the amount payable to the contractor.

7. Time shall be considered the essence of this contract. The entire work must be completed as given in NIT. If the completion of the work is delayed a penalty at the rate of $\frac{1}{2}$ % per week over the contract value will be imposed subjected to a maximum of 5%.
If the work is delayed beyond 10 weeks after the scheduled date of completion, the remaining work will be carried out through other agencies at the risk and cost of the contractors under the contract with prevailing market rates.

8. The successful tenderer shall submit the phased program of execution of different items of work within a week after receipt of acceptance letter.

9. Payment will be made subjected to clause as stated in the NIT and will be made within a period of TWO weeks after the bill is submitted to the Employer’s Office with SBIIMS Certificate.

10. Before filling in the tender the contractor should visit the site at AO, Ernakulam, will check all the drawings and schedule of quantities and will get an immediate clarification from SBIIMS on item not clearly understood. No claims for any loss or compensation will be entertained on this account.

11. All the work shall be carried out as per detail drawings and specifications or as directed by SBIIMS.

12. The rates quoted in the tender shall be for the finished items of work. They shall include all the charges labour, materials, transportation of material equipment, double scaffolding water and electric charges, tool and plants, marking out and cleaning of site, to do all things necessary to provide complete finished item for work consistent with the specifications attached to this tender document. The rates shall be inclusive of octroi duty, excise duty, packing and forwarding, loading or unloading or any other duties, GST or fees levied by any government, public or local bodies. The rates shall be firm and shall not be subject to exchange variations, labour conditions or any other conditions whatsoever.

13. The calculations made by the tenderer should be based upon the probable quantities of the several items of work which are furnished for the tenderer's convenience in the schedule of quantities, but it must be clearly understood that the contract is not a lumpsum contract, that neither the probable quantities nor the value of individual items nor the aggregate value of the entire tender will form part of the contract and that SBIIMS do not in any way assure the tenderer or guarantee that the work would correspond there to.

14. Adequate engineering and technical staff to be appointed at site. FIRE CONTRACTOR should inform of their number and qualification. An Approval of SBIIMS should be taken prior to appointing such technical staff on site.

15. The contractor shall keep the tender submitted by him open for acceptance for a minimum period of three months from the date of its submission. When once the tender is accepted the rates quoted by the successful tenderer shall be firm and the variation in rates of any one or all the items on any account shall not be allowed during the entire duration of the contract.
16. During the execution of work, contractor must check the work with his drawings. The contractor shall be responsible for all the errors in this connection and shall have to rectify all the defects at his own cost, failing which the client reserves the right to get the same rectified at the risk and cost of contractor.

17. No claim for extra item or deviation from specification shall be entertained unless the same is pointed out and accepted as such before the work is taken in hand or within 15 days of work by the successful tenderer.

18. The contractor shall comply with all bye-laws and tax regulations (including GST) of local and other statutory authorities having jurisdiction over the works and shall be responsible for the payment of all the fees and other charges and for giving and receiving of all necessary notices drawings and test certificates.

19. The successful tenders shall properly safeguard against damage or injury to the public and to any property or thing and shall alone be responsible for any such damage and injury to any person or persons or thing arising in connection with it's execution of work. The successful tenderer shall protect and hold harmless the SBIIMS against any or all claims for any such injury or damage.

20. The work in every respect during the progress and till final acceptance by the SBIIMS, including raw materials delivered at the site to be incorporated or used in fire work by the successful tenderer will be at his own risk. Any loss or damage to any such material or work shall immediately be replaced by the successful tenderer at his own expense.

21. The SBIIMS shall have the right to direct the contractor to purchase and use the materials from any source for proper execution of work.

22. The employer / SBIIMS or their authorized representatives shall have full power for inspecting the contractor's works or at any place from which the material is obtained. Acceptances of any such materials shall no way relieve the contractor of his responsibility for meeting the requirements and/or analysis not called for in the specifications shall be borne by the SBIIMS in case the material or work is found defective or of inferior quality. Tests and/or analysis shall be done in the laboratory approved by the client and the contractor shall permit SBIIMS and/or the client’s or their authorized representative to be present during any of the tests and/or analysis.

23. **INSURANCE**

The contractor shall indemnify SBIIMS up to CAR Policy (Contractor’s All Risk Policy) against all claim which may be made against SBIIMS by any member of the public or the third party in respect of anything which may arise in consequence thereof and shall at his own expense arrange to effect and maintain up to one month after the virtual completion from an office approved by SBIIMS a policy of insurance in the joint names and deposit such policy or policies with SBIIMS from time to time during the currency of this contract. The contractor shall also indemnify SBIIMS against all claims which may be made upon the SBIIMS under the workman’s compensation act or any other statute in
force during the currency of this contract or at common law in respect of any employee of the contractor or any sub-contractor and shall at his own expenses effect and maintain upto one month after virtual completion of the contract from an office approved by SBIIMS a policy or policies of insurance in the joint names of SBIIMS and the contractor as aforesaid. The contractor shall be responsible for any other thing which may exclude from the insurance policies above referred to and also for any other damage to any property arising out of and incidental to the negligent or defective carrying out of this contract.

He shall also indemnify SBIIMS in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any award of compensation or damage arising therefrom. SBIIMS shall be at liberty and is hereby empowered to deduct the amount of any damages, compensation caused, charges and expenses arising or occurring from or in respect of any such claims or damages from any sum or sums due or to become due to the contractor.

24. WORKMAN AT SITE:

The contractor’s workpeople shall not be allowed to live on the site at any time throughout the contract nor to trespass beyond the limits of the site. The contractor will be held responsible for any acts of trespass by his workpeople.

25. DIMENSIONS:

Figures dimensions are to be taken in preference to scaled dimensions in all cases. Before commencing any work the contractor shall verify all measurements. If any discrepancies are found they shall immediately be brought to the notice of the SBIIMS.

26. DISCREPANCIES

All the items shown on the drawings or specifications are taken to be included in both. Any discrepancies, which occur in either the drawings or specifications, shall immediately be brought to the attention of the SBIIMS.

27. CUTTING AND MAKING GOOD

Where it is found necessary to interfere with finished work in order to execute this contract, the contractor will be required to do all necessary work at his expenses. Only approved hangers and bolts or other metal fixing devices shall be used to secure frames panels and other units in position. Wooden plugs will not be permitted. Holes shall be formed with electric drills whenever possible. Structural members shall not be cut or drilled without prior consent of the client.

28. MAINTENANCE AND GUARANTEE

The whole of the work to be performed under this contract shall be completed to the satisfaction of the SBIIMS and EMPLOYER.
The contractor without additional charge to SBIIMS renew or replaces any works which prove faulty from workmanship or materials and fully maintain the whole installations for a period of 6 months after the commencement of defects liability period of the main contract and a sum of 5% of the contract amount shall be retained by SBIIMS for his period.

29. PREVENTION OF SPOIL DUMPING

The contractor shall take all reasonable steps to prevent spoil, rubbish, debris surplus materials etc., arising from a work being dumped on an area other than a recognized or approved tipping area and the Contractor will be held responsible for and shall indemnify SBIIMS against any claim or loss arising therefrom.

30. LEAVE PERFECT:

The Contractor shall remove all rubbish and superfluous material from the site of the works with all reasonable speed from time to time and at completion. On no account shall W.C's or the SBIIMS's receptacles to be used for this purpose.

The client reserves its right to clear contractors un cleared debris at contractors own cost without any reasons & not more than one notice will be given for this.

31. SETTLEMENT OF DISPUTES AND ARBITRATION:

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanship of materials used on the work or as to any other question, claim, right matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions orders or these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereinafter:

If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the Architect or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute to The Assistant General Manager, SBI Infra Management Solutions Pvt. Ltd., Circle Office, 4th Floor, State Bank of India LHO Building, Poojappura, Thiruvananthapuram – 695012 and endorse a copy of the same to the Architect, if any, within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the bank be in any way
liable in respect of any claim by the contractor unless notice of such claim have been
given by the Contractor The Assistant General Manager, SBI Infra Management
Solutions Pvt. Ltd., Circle Office, 4th Floor, State Bank of India LHO Building,
Poojappura, Thiruvananthapuram - 695012 in the manner and within the time as
foresaid. The contractor shall be deemed to have waived and extinguished all his
rights in respect of any claim not notified to AGM (SBIIMS), Circle Office, 4th Floor,
State Bank of India LHO Building, Poojappura, Thiruvananthapuram - 695012 in
writing in the manner and within the time aforesaid.

The Assistant General Manager, SBI Infra Management Solutions Pvt. Ltd., Circle Office,
4th Floor, State Bank of India LHO Building, Poojappura, Thiruvananthapuram -
695012 shall give his decision in writing on the claims notified by the contractor. The
contractor may within 30 days of the receipt of the decision of The Assistant General
Manager, SBI Infra Management Solutions Pvt. Ltd, 4th Floor, State Bank of India LHO
Building, Poojappura, Thiruvananthapuram – 695012submit his claims to the
conciliating authority namely the Circle Development Officer, State Bank of India, Local
Head Office, Thiruvananthapuram for conciliation along with all details and copies of
correspondence exchanged between him and The Assistant General Manager, SBI Infra
Management Solutions Pvt. Ltd., 4th Floor, State Bank of India LHO Building,
Poojappura, Thiruvananthapuram – 695012.

(c) If the conciliation proceedings are terminated without settlement of the disputes,
the contractor shall, within a period of 30 days of termination thereof shall give a notice
to the concerned Chief General Manager of the Bank for appointment of an arbitrator to
adjudicate the notified claims failing which the claims of the contractor shall be deemed
to have been considered absolutely barred and waived.

(d) Except where the decision has become final, binding and conclusive in terms of
the contract, all disputes of differences arising out of the notified claims of the
contractor as aforesaid and all claims of the Bank shall be referred for adjudication
through arbitration by the Sole Arbitrator appointed by the Chief General Manager. It
will also be no objection to any such appointment that the Arbitrator so appointed is a
Bank Officer and that he had to deal with the matters to which the Contract relates in the
course of his duties as Bank Officer. If the arbitrator so appointed is unable or unwilling
to act or resigns his appointment or vacates his office due to any reason whatsoever
another sole arbitrator shall be appointed in the manner aforesaid by the said Chief
General Manager. Such person shall be entitled to proceed with the reference from the
stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes
with amounts claimed in respect of each dispute along with the notice for appointment
of arbitrator.

It is also a term of this contract that no person other than a person appointed by such
Chief General Manager as aforesaid should act arbitrator.
The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules mad thereunder. It is also a term of the contract that if any fees are payable to the arbitrator these shall be paid equally by both the parties. However, no fees will be payable to the arbitrator if he is a Bank Officer.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their settlement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parities. The cost of the reference and of the award (including the fees, if any of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof, shall be paid and fix or settle the amount of costs to be so paid.

32. TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor (being an individual or a firm) commit any “ Act of Insolvency “, or shall be adjudged as insolvent, or shall make an assignment or composition of the greater part in number of amount of his creditors, or shall enter into a Deed of Assignment with his creditors, or (being an incorporated Company) shall have an order made against him or pass an effective Resolution for winding up either compulsorily, or Subject to the supervision of the court or voluntarily, or if the official Assignee of the contractor shall repudiate the Contract, or if the Official Assignee or the Liquidator in any such winding up shall be unable, within seven days after notice to them requiring him to do so, to show to the reasonable satisfaction of the SBIIMS that he is able to carry out and fulfill the Contract and if required by the SBIIMS to give a security there for, or if the contractor shall suffer any payment under this contract to be attached by or on behalf of any of creditors of the Contractor, if the Contractor shall assign or sublet the contract without the consent in writing of the SBIIMS first obtained, or if the contractor shall charge or encumber this Contract for any payments due or which may become due to the Contractor thereunder, or if the SBIIMS shall certify in writing that in his opinion the Contractor:

(a) Has abandoned the Contract, or
(b) Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the work for fourteen days after receiving from the SBIIMS written notice to proceed, or
(c) Has failed to proceed with the work with such due diligence and failed to make such due progress as would enable the works to completed within time agreed upon or
(d) Has failed to remove materials from site or to pull down and replace works within seven days after receiving from SBIIMS written notice that the said...
materials or work where condemned and rejected by the SBIIMS under these conditions or

(e) Has neglected or failed persistently to observe and perform all or any of the acts, matters or things required by this Contract to be observed and performed by the Contractor for seven days after written notice shall have been given to the Contractor requiring the contractor to observe or perform the same, or

(f) Has to the detriment of good workmanship or in defiance of the SBIIMS instructions to the Contrary, submit any part of the contract or has used in the permanent works important materials which are substandard and not as per specification fraudulently making the SBIIMS to believe that it is the specified material.

Then and in any of the said caused the SBIIMS may notwithstanding any previous waiver, after giving seven days notice in writing to the Contractor, determine the contract, but without thereby affecting the obligations and liabilities of the Contractor, the whole of which shall continue to be in force as fully as if the contract has not been so determined and as if the works subsequently executed and being executed by or on behalf of the contractor. And further, SBIIMS may enter upon and take possession of the works and all plant, tools, scaffoldings, shed, machines, steam and other power utensils and materials lying upon premises or the adjoining lands or roads, and use the same as his own property or may employ the same by means of his own servants and workman in carrying on and completing of the works or by employing any other Contractor or any other person or persons to complete the works and the Contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the works, when the work shall be completed, or as soon thereafter as convenient, the SBIIMS shall give a notice in writing to the Contractor, to remove his surplus material and plant and should the Contractor fail to do so within a period of fourteen days after receipt thereof by him, the SBIIMS may sell the same by public auction and shall give credit to the Contractor for the amount so realized. The SBIIMS shall thereafter will assertion and certify in writing under his hand what (if anything) shall be due or payable to or by the SBIIMS, for the value of the said plant and materials so taken possession of by SBIIMS, and the expense or loss which the SBIIMS shall have been put to in getting the works to be so completed, and the amount, if any owing to the Contractor and the amount which shall be so certified shall, thereupon, be paid by SBIIMS to the Contractor or by the Contractor to SBIIMS as the case may be, and the certificate of the SBIIMS shall be final and conclusive between the parties.

33. The mode of measurements shall be as per IS: 1200.

34. The contractor should co-ordinate with other agencies viz., Electrical, INTERIOR, HVAC (Air-Conditioning), Civil, LAN cabling etc.,

35. CONTRACTOR SHOULD WORK AT ODD HOURS, ON HOLIDAYS TO KEEP UP TIME SCHEDULE.

36. The Contractor shall not be eligible for any material advance.
7. SCOPE OF WORK

All materials to be furnished under the scope of this specification are outlined hereinafter. Any additional equipment, material, service which are not specifically mentioned but are required to make the system complete and acceptable to The Client final acceptance shall be deemed to be included in the scope and be provided.

The various systems and the equipment envisaged in this package are as follows:

A) ABOVEGROUND PIPING
B) VALVES & SPECIALITIES
C) ALL RELATED CIVIL WORKS
D) FIRE PUMPING SYSTEM
E) MISCELLNEOUS ITEMS
F) AUTOMATIC RECIRCULATION SYSTEM FOR MINIMUM FLOW.
G) FIRE ALARM SYSTEM
H) RELATED STRUCTURAL WORK
I) MANAGEMENT INFORMATION SYSTEM

The bidders scope includes providing a fully operational and functional FIRE PROTECTION SYSTEM for “SBI AO Ernakulum building” building owned by The Client and acceptable to the Final Acceptance Committee of The Client.

3.1. Scope of Supply by Bidder: The parameters of different equipment as indicated in the specification and various bid drawings enclosed are for Bidder's guidance only. Bidder shall check the adequacy of all parameters of the equipment and indicate if any changes are required in the parameters as specified.

3.2. The extent of supply under the contract includes all items shown in the bid drawings notwithstanding the fact that such items may have been omitted from the specification or schedule. Similarly the extent of supply also includes all items mentioned in the specification notwithstanding the fact that such items may have been omitted in the drawings. All such items which are not specifically mentioned in the specification and drawings but which are required to complete the contract are deemed to be provided by the contractor at the total price offered unless specifically mentioned by the Bidder and accepted by the purchaser.

3.3. All specialized equipment/services necessary for proper erection, commissioning and performance testing of the complete system covered under this contract shall be provided by contractor and as such the cost of such equipment/services shall be included in the quoted prices.

3.4. All bolts, foundation bolts, nuts, gaskets, packing, pipe hangers, support/thrust block etc. as needed for complete erection and commissioning be provided.

3.5. All I types of primer and paints on pipes/equipment/structures. Various cross sectional drawings, Quality Assurance Plan, technical data sheet, test reports, test certificates, erection manual, operation and maintenance manual of Hydrant and medium velocity water spray system.

3.6. Necessary quantities of pressure break down devices for hydrant and medium velocity water spray system,

3.7. All pedestal type reinforced concrete supports for the pipe at various points as necessary.
depending on the earth condition, diameter of piping and route of piping.

3.8. Steel sections, gratings and plates wherever necessary.

3.9. All supports including supply of all auxiliary steel members and special supports from node of space frame as necessary for over ground piping.

3.10. All commissioning spares and special tools and tackles.

4.01.05 Scope of Services by Bidder

4.01.06 Transportation to site, unloading and intermediate storage at site, complete work of erection including final grouting, testing and commissioning and putting into operation of entire fire detection, protection system.

4.01.07 All final dressing of foundations, grouting of equipment and patch work during erection complete with application of cement based paint (Snowcem or equivalent).

4.01.08 The dismantled component shall be given to the bidder and the same should be removed from the site within 15 days of completion. The buyback rate should include all the shifting, removing, transporting and disposing of the material.

4.01.09 Application of primer and final painting for equipment, piping and structure, RCC foundation, sleeper and deluge valve room.

4.01.10 Transportation to site, unloading of free issue materials as indicated in schedule of work and rates, complete work of erection including final grouting, testing and commissioning and putting into operation.

4.01.11 Arranging water for hydro-testing of pipeline segment wise. However water required for flushing, system leak test, commissioning and performance demonstration shall be provided free of cost.

4.01.12 The Building named “SBI AO Ernakulum building” being protected with the fire protection system as detailed in this tender.

4.02.01 FIRE WATER PUMPING SET

a) The design and construction of horizontal centrifugal fire pumps along with drives and accessories are to be in compliance with specification and NFPA recommendation.

b) The technical specification of the electric motor driven fire pumps meets the requirements of the specification and NFPA recommendation.

c) Each pump shall be provided with a name plate indicating delivery head, capacity and numbers of revolutions per minute.

4.02.02 TERACE PUMP

a) The design and construction of horizontal centrifugal jockey pump along with its drive shall be in compliance with specification and NFPA recommendation.

b) The technical specification of the pump shall conform to the requirements of enclosed specification.

c) The general design of the terrace pumping set shall meet the following requirements.

d) The pump set shall have a non-overloading power characteristics preferably.

e) The pump driven motor shall be suitable for frequent start/stop with a minimum of 20-30 starts per hour operation.
4.02.03 **PIPING. VALVES AND SPECIALITIES**

a) Supply, erection, testing and commissioning of all piping, valves, strainers, hydrant valves, hoses, nozzles, branch pipes, hose boxes, etc. shall conform to the requirements of enclosed specification.

b) Test valves shall simulate the operation of hydrant or flow control valves and shall be of quick opening type.

c) All safety valves shall be spring loaded, full discharge, pop type.

4.02.04. **INSTRUMENTATION & CONTROL**

All instruments like pressure indicator, differential pressure indicator, pressure switch, level indicator and level switch, alarm and all other instruments and panel as indicated in the specification and drawings, and as needed for proper operation shall be according to the requirement for satisfactory operation of the system.

5.01 **ELECTRICAL POWER DISTRIBUTION** Electrical power distribution for fire protection system shall be in line with the electrical system available at site after evaluating site condition.

5.02 **UTILITY AVAILABLE** Electrical power at 415V AC, 3-phase, 4-wire 50Hz shall be made available at the incomer of composite Panel and other panels as indicated in the electrical block diagram. Any other voltage, if required for this system shall have to be arranged by the contractor.

5.03 **PERFORMANCE GUARANTEE** The performance and guarantee test shall be conducted in accordance with the condition specified and as per relevant codes/standards. The parameters guaranteed by the Bidder shall have no tolerance values except as permitted by the standards/codes. The fire detection, alarm and protection system offered by the Bidder against this specification shall meet the requirement of the Regional Committee in every respect.

5.04 For details of system performance and guarantee test, the relevant clauses of specification shall be referred to Bidders however have to offer satisfactory performance test of acceptance. Other testing requirements of individual equipment/item as specified elsewhere in this tender document shall also be complied with.

- **QUALITY CONTROL AND SURVEILLANCE**

  The equipment and the installation shall have assured quality and workmanship and the system shall be executed based on the following guidelines. For further details regarding the same please refer to "SPECIAL NOTES TO BIDDER".

- **DRAWINGS AND DOCUMENTS**

  The successful bidder after award of contract shall submit to the Architects / Consultants appointed by Bank, The Client necessary drawings/documents for various equipments for approval.

5.05 The successful bidder after award of contract shall submit the following drawing for approval.
a) Scheme and GA of all panels, motors, pumps engines etc
b) Physical layouts of all detectors, valves etc
c) Sample pipe joints, socket joints, flanged couplings, motor connections etc.
d) Final quantity of all materials to be freed before starting up of the work

5.06 PROCUREMENT OF MATERIALS
5.07 The successful bidder shall approve cross sectional drawing of all equipment complying to specification requirement and forward to CLIENT for inspection along with relevant specification after obtaining approval from The Client.
5.08 The successful bidder shall submit the quality assurance plan of the manufacturer meeting the minimum requirement of the specification to The Client. The document approved by the consultants would be submitted to the CLIENT and the same shall be the basis of carrying out inspection.
5.09 The successful bidder will submit the following documents along with supply for the purpose of claiming payments against supply of materials.
   a) Cross sectional drawing/quality assurance plan duly endorsed by APPROVED AGENCY.
   b) Manufacturer's certificate as indicated in QAP duly APPROVED.
   c) Inspection report/records (in original) specifying the results of the test duly signed by APPROVED AGENCY and manufacturer.
   d) Material release note from the APPROVED AGENCY (in original) specifying co-relating symbol / number for physical verification at site.

6.00 ERECTION OF THE EQUIPMENTS
6.00.01 The successful bidder shall finalise quantity plan of erection with meeting the minimum requirements of The Client as specified hereinafter and submit to The Client for records duly endorsed jointly by the successful bidder and APPROVED AGENCY.
   The minimum requirement is as follows:
   Loop test of the pipeline with all valves and instruments in position at 12 Kgf/Cm2.
   Flushing of pipeline.
   Pneumatic test of the air line up to Buffer air chamber at 6 Kgf/Cm2.
   Pneumatic test of the airline beyond Deluge valves with Q.B. detectors in position at 6Kgf/Cm2.
   Pneumatic loop test with all valves and instruments provided on air line at 5 Kgf/Cm2.
   10% radiography of all joints.
   100% radiography of all joints on buried pipeline.
   Holiday testing of buried pipeline.
   Leveling and alignment of static/dynamic equipment.
   The above documents should be jointly signed by Managing Director The Client and contractor.

6.00.02 PERFORMANCE TEST
6.00.03 Bidders to note that after mechanical completion the system shall be quality audited by system consultant. They would also carryout pre-commissioning check up and full flows tested furnish check list and final acceptance test procedure with acceptable results.
6.00.04 Bidders to note that when the checklist is attended and the system is ready for performance test Acceptance Committee / consultant would visit site to conduct performance test and certify the installation for compliance with design.
6.00.05 The contractor has to arrange inspection by APPROVED AGENCY from raw materials/equipment to final equipment from the following list of approved agency inspection agencies. The scope also includes obtaining TPI clearance for various activities like welder qualification, welding specification, radiography, holiday testing, hydro/pneumatic testing, etc. Necessary expenses for the same to be borne by the contractor.
M/S. ENGINEERS INDIA LTD.
M/S. DIFR/CBRI, Roorkee.
M/S. PDIL
M/S. BUREAUVARITAS
M/S. INDIAN REGISTER OF SHIPPING MIS. LLOYDS

6.00.06 Bidders to note that the installation shall be taken over only after the same has been inspected and acceptance committee. Bidder to note that completion of such tests and issuance of acceptance certificates shall not relieve the bidder/contractor of his ultimate responsibility of guarantee which would be valid for twelve months from the date of taking over the installation.

WORK SCHEDULE
Delivery, erection testing and commissioning of the plant machinery shall have to be completed within One (1) months from the date of issue of letter of intent or date of handing over site whichever is earlier. Bidder in his proposal will indicate the phase wise residual engineering, manufacturing, testing, delivery, erection and commissioning activities for the complete package in the form of a bar chart to match with the project schedule. After contract finalization, detail PERT network shall be furnished by the contractor for purchaser's approval and will subsequently from a part of Contract Document.

7.00 PRICE BASIS
The bidder should quote price for the total scope of work. The bidder may note that the quantities indicated in the 'Schedule of Work and Rate' have been arrived at on the basis of drawing and design. The Bidder may also note that they would be paid for the actual work executed on the basis of the unit rates specified and as such the unit rate multiplied by the quantities shall be equal to the total price. This would be applicable for all equipment for Hydrant system which quantities have been Indicated in the PRICE BID.

The bidder may note that for items where quantities are indicated as lot the prices would be lump sum and would not be subject to any adjustment unless the protected area changes.

The bidders are advised to visit site and get themselves acquainted with the type of structure planned for different risks so that supporting arrangement can be envisaged and included in the price offer. Bidders inability to visit site will not entitle them for any claim whatsoever on this account.

8.00 DOCUMENTATION SCHEDULE
The contractor would submit all documents and cross sectional drawings and QAP for
approval after the award of contract. Submission to commence from 15th day of receipt of LOI and to be completed within 60 days of LOI. Successful bidder/contractor shall submit documentation schedule to purchaser for their approval within 15 days of receipt of Letter of Intent.

Fire alarm system is also provided with Manual call points strategically located along the road. So that anyone noticing a fire can operate the same which will register an alarm in the Fire alarm panel identifying the location and sound a siren (1 KM range) for alerting the plant personnel about the incident. The decibel rating of the siren shall be minimum 90 decibels at 1 meter.

Major Equipment and Material
i) Fire Water Pumping sets
ii) Fire Water Piping
iii) Isolation Valves
iv) Hydrant Valves
v) Hose pipe with couplings
vi) Branch pipes with nozzles/Universal Branch pipe/Dual purpose fog nozzle
vii) Control and Power Cable
viii) Panel
ix) Terrace Pump
x) Buffer air chamber
xi) Recirculation Valve
xii) Instrumentation
xiii) Miscellaneous items.

9.00 System Operation

Normally the pipeline up to the hydrant valve and deluge valve shall be kept pressurized by water at a pressure of 9 Kgf/Cm2 through pressuring system consisting of pump. Similarly the pipeline Buffer air chamber and from HAC to Deluge valve shall be kept pressurized by air at a pressure of 7.0 to 8.0 Kgf/Cm2 through pressurizing system consisting of air compressor. The deluge valve shall remain closed pneumatically or hydro-pneumatically.

Similarly for any external fire immediately after the same has been identified, hose pipes and branch pipes are to be connected to the hydrant valves and the valves are to be opened and the pressurized water jet is to be directed towards the seat of fire. In case of availability of hydrant valves near the fire affected area control valve on the upstream of the Hydrant valve to be opened and water jet to be directed towards the affected area.

9.01 MAINTENANCE FACILITY

All headers would have flange connection at required interval to facilitate erection, dismantling and removal. The location of this maintenance flanges shall be decided at site during construction.
8. SPECIAL CONDITIONS AND SAFETY CONDITIONS

The contractor is hereby advised to read the following conditions carefully before quoting rates and to be strictly adhered during execution of work.

SPECIAL INSTRUCTIONS

a) Contractor should ensure that all of their workmen, engineers, supervisors shall be covered as per ESIC, PF & minimum wages act.

b) All workmen, engineers, supervisors shall undergo pre-employment medical check-up through company recognized medical officer and submit copies of test report.

Contractor to provide proof of monthly remittances with regard to the workmen deployed at the site.

Contractor is responsible to ensure that his workmen are confined to their work area and comply with all safety, security and administrative instructions given by the site engineer.

Contractor shall provide identification badges to all his people.

On completion of day’s work, the entire area shall be kept clean and neat. All debris, surplus material etc., shall be removed immediately from the site.

Any sub-standard material used during execution will be rejected and fully deducted from the bills.

The contractor has to carry out the work in coordination with the other appointed agencies. The contractor should study the situation at site and organize the work accordingly. Whenever work needs to be done in coordination with other agencies, the contractor shall work out the actual time required to complete his part of the job in respects and inform the company.

Revision of rates is not allowed and will be not paid for any reason due to unexpected increase in the cost of the materials or delay in completing the works etc., No labour hutment is allowed inside the premises.

The areas is in “No smoking Zone” therefore smoking is strictly prohibited.
All workmen, Mastri, supervisor and Engineers wearing shoes and safety helmets are only allowed to enter the gate.

Every day contractor / his supervisor should take necessary “ Work permit ” from the Bank/company engineer before starting the job.
Workers are not allowed to sleep during night and cook good inside the premises.

Work to be carried out only under supervision of the qualified engineer who should be always available at site and keep a record of daily work progress in a separate register.

Contractor should strictly following safety guidelines.
Contractor should use only angle/pipe scaffolding. Wooden scaffolding is not allowed.
All contractor’s people need to undergo induction/safety training and formal interview by company selection committee.

Contractor shall submit a copy of competency certificates like wiremen license, supervisor’s license, IBR welder license etc., issued by competent authority before starting the work.

Contractor shall maintain daily master roll book for his people at site. Based on that, ESIC & PF contribution to be made.

**COMPANY SAFETY GUIDE LINES**

**WORKING BELOW GROUND LEVEL:**

Check that there are no underground cables/ water/sewage lines prior to start of work area. If found inform site in-charge. Disconnect power supply to any cables found in work areas with permission.

For pits deeper than 3 feet workmen should be provided with lifelines. Ladders should be provided for quick escape from the pit. Provide firmly supported side shuttering or shoring to prevent accidental collapse of earth into pits; cordon off the area around the pit to prevent accidental falls. (cordon must be at least 3 feet beyond the pit edge) excavated earth from the pit must be stacked only beyond the cordon.

Refill the pit promptly on completion.

Incase pits need to be left open for any reason, ensure proper covers over the pits.

**WORKING AT HEIGHTS :**

All personnel working at heights beyond 1.8M should wear safety belts.

Ensure that safety belts are tied security to anchors while working at heights.

Ensure that rigging is well anchored to solid supports prior to erecting items like trusses at a height.
Ensure that debris is cleared on a daily basis from work spots.

Ensure that a nylon safety net is securely fitted under the trusses to provide safety against accidental falls to personnel (who will need to have safety belts securely fastened) working on the trusses and roofing. Alternatively well-supported platforms with protected railings should be used a height suitable for personnel to work while standing.

Ensure that roof top ladders are used while laying and working on the roof.
Ensure that ladders used for climbing to heights are firmly secured against slippage.
All scaffolding should be in steel frames.

Scaffolding should be provided with 3 feet wide working platforms. The platforms should be provided with protective railings.
WORKING WITH ELECTRICITY
Ensure proper earthing of all electrical machines used.

Ensure that all connections are taken throughout earth leakage’s circuit breakers. Providing ELCB on the main distribution board prevents accidental shocks.

Provide a pair of fire buckets filled with dry sand for fire fighting at site.

Contractor shall get his welding sets certified by inspector of electrical department.

The welding transformer shall be fed through an armored cable.

All connections from main to individual M/C (such as cutter, planer, compressor etc) to be taken through shielded cable and 3-pin plug only. The potable machines should be of fully insulated or plastic body. No metal body is allowed.

During welding the earthling to be provided directly to the member to be welded throughout cable only not using any reinforcement rod/angles.

PERSONAL PROTECTIVE GEAR
Following is a list of items to be provided to workmen by the contractor as and when required the items must be ISI certified.

Safety shoes
Hard hats
Safety belts
Goggles (Welding)
Gloves
Safety nets
Roof top ladder

GENERAL
BREAKING WORKS:
Workmen engaged in breaking stones/chipping of concrete should wear safety goggles.
9. SPECIAL CONDITIONS

1. General:

1.1 These special conditions shall be read in conjunction with the description of the item of work in the Bill(s) of Quantities, the particular Specifications, Local Statutory Regulations, Indian Standards Specifications/Codes and the drawings. All the above quoted documents, shall be considered supplementary to each other. However, in the case of conflict amongst the various provisions the owner's and the consultants opinion will be final and shall be adopted.

1.2 The tenderer is advised to inspect the site to ascertain the nature of site, access thereto, local facilities for procurement of materials and working labour rates prevalent in the area, in fact all matters affecting his prices and execution of the work. The tenderer shall be deemed to have full knowledge of the site and drawings whether or not he actually inspects them.

2. Rates

2.1 The rates quoted shall be deemed to allow for all minor extras and constructional details which are not specifically shown on drawings or given on the specifications but are essential in the opinion of the Engineer-in-charge to the execution of works to confirm to good workmanship and sound engineering practice. The Consultant/SBIIMS reserves the right to make any minor changes during the execution without any extra payment.

2.2 The Consultants/SBIIMS decision to clarify any item under minor changes, minor extras and constructional details shall be final, conclusive and binding on the Contractor.

2.3 The rates quoted by the Contractor shall be net so as to include all requirements described in the contract agreement and no claim whatsoever due to fluctuations in the price of material and labour will be entertained.

2.4 The rates quoted by the Contractor shall include for supplying materials and labour necessary for completing the work in the best and most workmanship like manner to the satisfaction of the Consultant/SBIIMS and which in the opinion of the Consultant cannot be made better, and for maintaining the same. The rates shall be complete in all respects also including cost of materials, erection, fabrication, labour, supervision, tools and plant, transport, GST and other taxes, royalties, duties and materials, contingencies, breakage, wastage, sundries, scaffoldings, etc., on the basis of works contract. The rates quoted shall include all transport, insurance, octroi, or any other levies applicable under the statute.

3.0 Materials:

3.1 The Contractor shall ensure to the satisfaction of the Consultant/SBIIMS that the materials are packed in original sealed containers/packing bearing manufacturer's markings and brands etc., except where the gross quantity required is a fraction of the smallest packings. Materials not complying with this requirement shall be rejected.

3.2 Testing of Materials:

a) When required by the SBIIMS, the Contractor shall provide all facilities at site or at
manufacturer's works or in an approved laboratory for testing the materials and/or workmanship. All the expenditure in respect of this shall be borne by the Contractor unless specified otherwise in the Contract. The Contractor shall, when required to do so by the SBIIMs shall submit at his own cost, manufacturer's certificate of tests, proof sheets, mill sheets etc., showing that the materials have been tested in accordance with requirements of these specifications. The samples for Tests shall be selected by SBIIMS.

4.0 Rectification of Defects:

4.1 Any defect in the work done or materials used in the works pointed out by the SBIIMS shall be rectified within a week or such extended time as may be allowed in this failing which the said defect shall be got rectified by the SBIIMS at the risk and cost of the Contractors.

5.0 Conduit and Cables Layout:

5.1 Prior to the pulling of wires, the Contractor shall verify the conduits laid at site by Civil Contractors and satisfy themselves about the adequacy of the same. The contractors shall prepare Wiring layout along with Conduit layout and submit for approval. Prior to laying of the cables, the Contractor shall submit to the SBIIMS detailed piping layout plans and get the same approved. The layout plans shall contain particulars regarding size and routes of the piping. The Piping shall be procured only after approval of Layout Drawings.

6.0 Regulations & Standards:

6.1 The installation shall conform in all respects to Indian Standard Code of Practice for Fire Hydrant System Installation IS:3844 of 1989. It shall also be in conformity with the current Kerala Fire Safety Rules and Regulations and requirements of the local Authority in so far as these become applicable to the installation. Wherever this specification calls for higher standard of material and/or workmanship than those required by any of the above regulations then this specification shall take precedence over the said regulations and standards.

7.0 Shop Drawings:

7.1 The Contractor shall prepare and submit to the SBIIMS for the approval of detailed fabrication drawings for Hydrant/Down comer System, Control Panels/ Switch Gears/ Hydrant boxes, Hose reel and any other equipment to be fabricated by Contractor within 7 days of signing of the contract.

8.0 Completion Drawings:

8.1 At the completion of the work and before issuance of certificate of virtual completion the contractor shall submit to the SBIIMS layout drawings drawn at approved scale indicating the complete wiring system "As Installed". These drawings shall in particular, give the following information.

(a) Run and size of Piping, conduits, inspection, junction and hose boxes.

(b) Location and rating of sockets and switches, controlling the light and power outlets.
(c) Number and size of conductors in each circuit pump control panel/

(d) Location and details of mains, fire brigade outlet, hydrant point, mains, switches, switchgear and other particulars.

(e) A complete wiring diagram, as installed and schematic drawings showing all connections in the complete Hydrant system.

(f) Layout and particulars of all fire hydrant system.

9.0 Manufacturer's Instructions:

9.1 Where manufacturers have furnished specific instructions, rating to the materials used in this job, covering points not specifically mentioned in the documents, these instructions shall be followed in all cases.

10.0 Completion Certificate:

10.1 On completion of the Hydrant Installation a certificate shall be furnished by the Contractor counter signed by authorized authority, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority. The Contractor shall be responsible for getting the drawings and Installation inspected and approved by the local Authority concerned.

11.0 Qualified Competent Supervision:

11.1 The Contractor shall employ competent fully licensed, qualified full time Engineer to direct the work of installation in accordance with drawings and specifications. The Engineer shall be available at all times on the site to receive instructions from Consultant in the day to day activities, throughout the duration of the contract. The foremen shall co-relate the progress of the work in conjunction with all relevant requirements of the supply authorities.

12. Measurements: It will be the responsibility of the contractor to submit the detailed split up of measurements with drawings during the progress of work so that it will be accessible and easy to verify by the SBIIMS. If the item is not visible for measurements only shortest measurement taken by SBIIMS will be considered.

13. Drawing: The contractor should display one set of laminated drawing with as fitted layout drawing in FCR and submit another three sets along with the final bill.
10 TECHNICAL SPECIFICATIONS

Chapter 1 INTENT OF SPECIFICATION
Chapter 2 SPECIFIC REQUIREMENTS
Chapter 3 ACCESSORIES
Chapter 4 FABRICATION & PIPING
Chapter 5 TESTING OF HYDRANT SYSTEM
Chapter 6 ERECTION OF EQUIPMENTS
Chapter 7 WELDING
Chapter 8 CORROSION PROTECTION OF PIPING
Chapter 9 TESTING & INSPECTION OF PIPING
Chapter 10 PAINTING OF PIPING, EQUIPMENT & STRUCTURE
Chapter 11 STRUCTURE & PIPE SUPPORT
Chapter 12 CONTROL MODULE B. TECHNICAL SPECIFICATION

CHAPTER 1

INTENT OF SPECIFICATION

1.01 INTENT OF SPECIFICATION

The specification covers the design, construction features, manufacturing, performance testing and delivery of horizontal centrifugal pumps to site in good condition, supervision during erection, pre-commissioning check up and commissioning.

In case of any contradiction between the specification clause and the standards specified. Bidder shall follow the specification. In case of contradiction between this specification and data specification sheets. stipulation of the latter shall prevail.

CODES AND STANDARDS

1.02 The design, manufacturing and performance of the horizontal centrifugal pumps as specified hereinafter shall comply with the requirements of the latest editions of the applicable codes and standards, in particular the following:

1S-1520 : Horizontal Centrifugal pumps for clear, cold and fresh water.

1S-5120 : Technical requirement for rotodynamic special purpose pumps.

1S-5120 : Pumps for process water

Pumps for fire fighting system

Code for Acceptance Test for Centrifugal mixed flow and axial flow pumps - Class 'C'.

ISO 3555/BS-5316, Part-2 : Acceptance Test for Centrifugal mixed flow and axial Pumps. Class 'B' tests

PTC 8.2 Power Test Codes - Centrifugal pumps.

ASTM-E-165-65 Standard Method for liquid Penetrant Inspection

NFPA No. 20 Standard for the installation and operation of centrifugal fire pump Standard for the Hydraulic Institute of USA

Fire Protection Manual, latest revision issued by TAC

Other international's standard such as DIN, VOL etc. shall also be accepted subject to the purchaser's approval for which the Bidder shall furnish along with the offer adequate information to justify that these standards are equivalent to or superior to the standards mentioned above. For such alternate standards which are not normally published in English, the Bidder shall also furnish a complete translation for them.

In case of any contradiction with the above standards and data specification sheets the stipulation in the data sheets shall prevail and shall be holding with the supplier.

1.03 PERFORMANCE REQUIREMENT

Performance requirement for the pumps shall be guided by the data specification sheets enclosed. Pumps shall preferably be designed to have the best efficiency at the specified duty point. The pumps shall be suitable for continuous operation at any point within 'Range of Operation' as stipulated in the data specification sheets.

Pumps shall have a continuously rising head characteristic from the specified duty point towards shut-off point, the maximum being at shut-off to enable parallel operation. Fire pumps shall be capable of furnishing not less than 150% of rated capacity at a head of not less than 65% of rated head.

Under all circumstances, the 'Range of Operation' of the pumps shall exclude any unstable operating zone of the head - capacity curve. The power characteristic shall preferably be non over loading type.

Wherever specified in data specification sheet, pumps of each category shall be suitable for parallel operation. The head vs. capacity, the BHP vs. capacity characteristics etc. shall be identical to ensure equal load sharing and trouble free operation of any pump when the other pumps working in parallel with it trip.

The pump set along with the drive motor /diesel engine shall run smooth without undue noise and vibration. Acceptable peak to peak vibration limits shall be generally guided by the hydraulic institute standards of U.S.A.

The manufacturer/contractor under this specification shall assume full responsibility for the operation of the pump and motor as one unit and the set shall be designed in such a manner to prevent any damage due to reverse flow arising out of system mal operation such as loss of power to the drive or failure of non-return valve etc.

The pump shall comply with the regulations of TAC or National Fire Protection Association (NFPA), USA as applicable and approved by TAC (India)

Each pump shall be provided with an internal/ external flow recirculation for maintaining a minimum flow through the pump to prevent any overheating when the pump is running without any discharge through the headers.
DESIGN AND STANDARDS

1.04 Pumps and motors

Pump casing
Pump casing shall be provided with adequate number of vents and priming connections with valves unless the pump is made self-venting and priming. Casing drain, as required, will be provided complete with drain valve. Pump design must ensure that the nozzles are capable of withstanding external reactions not less than those specified in API-510. In case where an expansion joint is located at pump suction, the pump assembly will be subject to an additional thrust which will be transmitted to the foundation. This additional thrust shall be taken into consideration while designing the pump.

1.05 Impeller
The rotor assembly shall be dynamically balanced and designed with critical speed substantially above the operating speed. Impeller shall be of closed type.

1.06 Wearing Rings
Replaceable type wearing rings shall be furnished to prevent damage to impeller and casing. The rings shall be so fitted as to prevent turning while the pump is in operation.

1.07 Shaft
Shaft size shall be selected considering that the critical speed shall be away from the operating speed as recommended in applicable Code Standard. The critical speed shall also be at least 10% away from runaway speed.

1.08 Shaft Sleeves
Renewable type fine finished shaft sleeves shall be provided at the stuffing boxes/mechanical seals. Length of the shaft sleeves must extend beyond the other faces of gland packing or seal end plate so as to distinguish between the leakage past shaft and shaft sleeve and that past the seals glands.

Shaft sleeves shall be properly fastened to the shaft to prevent any leakage or loosening. Shaft and shaft sleeve assembly should ensure concentric rotation.

1.09 Bearing
Bearing shall be easily accessible without disturbing the pump assembly. A drain plug shall be provided at the bottom of each bearing housing.

Heavy duty sleeve ball roller type bearings, shall be provided to take care of the radial loads.

In case of sleeve type radial bearings, axial thrust shall be absorbed in suitable hydraulic devices and I or thrust bearings.

Bearings and hydraulic devices (if provided for balancing axial thrust) shall be of adequate design for taking the entire pump load arising from all probable conditions of continuous operation. Life of the bearings shall be highest possible. Thrust bearing shall be capable of running continuously at maximum load.

The bearing shall be oil grease lubricated. Suitable lubricating arrangement for the bearings shall be furnished completely with all accessories like pump, filters, piping, fittings, valves, interlocking and supervising instruments etc. as necessary and specified.
in the data sheets. The design shall be such that the bearings lubricant does not contaminate the liquid being pumped.

1.10 **Stuffing Boxes**
Stuffing box design shall permit replacement of packing without removing any part other than the gland. Stuffing boxes shall be sealed I cooled by the fluid being pumped I external clear water, as indicated in the Data Sheets, all necessary pumps, piping, fittings, valves, instruments etc. as required for safe and trouble free operation of the pumps and as specified in the Data Sheet shall be included in the pump supplier's scope of supply.

1.11 **Drive Data**
The pump shall be driven by electrical motor or other driving equipment like diesel engine etc. directly coupled as specified in the Data Sheets. A heavy duty coupling along with coupling guard shall be provided between the pump and drive unit.

Unless otherwise specified in Data Sheets, drive unit power rating shall be the maximum of the following requirements:

i) 15% margin over the pump shaft input power at the rated duty point.
ii) 10% margin over the maximum pump shaft input power required within the 'Range of Operation' to take care of system frequency variation.
iii) For Jockey pumps and sump pumps the motors shall be selected for 'run out flow of the pumps.

1.12 **INSPECTION AND TESTING**
The manufacturer shall conduct all tests and inspections (including stage inspections, as necessary) required to ensure that the equipment offered by him conforms to the requirement of this specification, in particular, the data specification sheets. The particulars of the proposed tests and the procedures for the tests shall be submitted to the client I consultant for approval before conducting the tests.

Test certificate for all tests shall be submitted to the APPROVED AGENCY for review and endorsement.

1.13 **Material Test**
All materials used for pump construction shall be of tested quality. Physical and chemical tests on materials shall be done to ensure the quality of the materials offered. Test procedure and sampling shall be guided by the applicable test codes and standards. Components for which material test has been done and approved shall be stamped for identification. Pumps shall be offered for visual inspection and shall not be painted before inspection.

Pump components shall be subjected to non-destructive test (NDT), if asked for in data sheets. Requirements of NDT and acceptable limits shall be guided by relevant standard(s). Components or batch subjected to successful NDT shall be stamped for identification.

1.14 **Hydraulic Test**
All pressure parts shall be subjected to hydrostatic pressure test at a pressure of 150% of shut off head +1.5Kgf/Cm2. or at 200% of the 'rated head' +1.5Kgf/Cm2 whichever is higher for a period specified in testing standard or a maximum period of two (2) hours,
whichever is more.

1.15 Dynamic Balancing

All rotating components of the pumps shall be static and dynamically balanced. Dynamically balancing tests shall be carried out at a speed not less than the rated RPM of the pump. Test procedure and acceptance limits shall be guided by the testing codes and standards.

1.16 Performance tests

Each pump shall be tested at manufacturer's work in presence of purchaser's representative with the prime mover specified in Data Specification Sheets, to determine pump performance. Prior to performance tests, the pump supplier shall furnish the procedure and methods of testing to the purchaser for approval.

Performance tests are to be conducted over the entire 'Range of Operation' of the pump including the shut off condition for minimum one hour. A minimum five sets of reading shall be taken covering the shut off point, rated point and the two extremities of 'Range of Operation', to establish the performance curves.

Tests shall be conducted with actual drive motors and engines being furnished and at the rated speed. Noise and vibration test shall be repeated at site after installation apart from shop testing.

The bidder shall submit in his proposal the facilities available at his works to conduct performance testing. If because of limitations of available facilities, a reduced speed test or model test (subject to purchaser's approval) has to be conducted to establish pump performance, the same has to be highlighted in the offer. In case the same is not highlighted it will be presumed that the bidder has confirmed unconditional acceptance to clause 5.06.03.

In case of prototype or Model testing, the stipulations of Hydraulic Institute standards of USA shall be binding. These tests shall be conducted with the suction condition identical to the field conditions Le. Sigma values of prototype and model is to be kept same.

Prior to conducting model tests, calculations establishing model parameters and test procedure will have to be submitted to the Purchaser / Consultant for approval.

NPSH test at shop shall be conducted in presence of client/consultant. After installation and commissioning pumps shall be offered for performance guarantee test as per agreed procedure. The supplier shall furnish all necessary instruments, accessories and personnel for site testing. The calibration curves of all instruments, permissible tolerance limit of instruments and test procedure shall be mutually agreed between the Purchaser and Supplier/ Contractor. If the site performance test and results are unsatisfactory, the manufacturer/contractor shall rectify the pump at his own cost.

1.17 CLEANING, PROTECTION AND PAINTING

Cleaning Before Shipment:
Surface of all parts shall be cleaned to remove scale, dirt, oil, water, grease and other foreign objects prior to final assembly of the equipment. All openings shall be covered to
guard against damage and entry of foreign objects.

**Painting:**
All external surfaces shall be thoroughly cleaned and shop coats of rust inhibiting paints shall be applied. The colour code and quality of paints shall be subject to the approval of purchaser.

The painting specification is as follows:
- **Interior Surface**
  - To suit fluid handled, as specified
- **External Surface**
  - **a) Surface Preparation**
    - Sand Blasting
  - **b) Primer Coat**
    - **i) Type**: Epoxy based primer suitable for coastal installation, approved by Bank
    - **ii) No. of coat**: Two
    - **iii) Dry Film Thickness**: 100 micron (minimum)
  - **c) Finish Coat**
    - Mfgr's recommendation on corrosion resistant paint suitable for the max. expected operating temperature and other environmental conditions i.e. coastal condition prevailing at the site, and approved by The Client
    - **No. of Coats = 2**
    - 50 micron thickness (minimum) for each coat

**Packing for Shipment**

All parts shall be properly boxed, crated or otherwise protected for transportation to suit the mode of transportation. Exposed finished surfaces shall be thoroughly greased before transportation.

**1.18 DRAWINGS, DATA, CURVES AND MANUALS**
The bidder shall submit the following documents in eight sets to purchaser / consultant for approval after award and manufacturing process shall be initiated only after obtaining approval.

**Drawings:**
Outline drawings showing the principal dimensions, weight and location of the suction and discharge connections of the pumps offered.

Typical cross-section drawing showing various components of the pumps with materials of construction etc.

Pump foundation details along with all design loads, direction and points- of application. Drawing showing the lubrication system and sealing arrangement.

**Data & Curves**

i) Anticipated performance curves showing the following characteristics:
   - Capacity Vs. Head
   - Capacity Vs. Power
   - Capacity Vs. Efficiency
   - Capacity Vs. NPSH required

ii) Speed Vs. Torque curve of the pump corresponding to recommended mode of pump
starting super imposed on Speed Vs. Torque curves of the drive unit corresponding to 80%, 90%, 100% of the rated voltage (applicable only in the cases of pumps with drive motor power rating of 100 KW & above)

iii) Completely filled in Technical particulars enclosed with this specification for final approval.

iv) A comprehensive write-up or brochure on the details of manufacturing and testing facilities in the shop of the manufacturer.

v) Complete descriptive and illustrated literature on the pump and accessories offered.

vi) Any other data I information related to the erection and operation of the pump.

vii) Quality Assurance Plan.

viii) Shop I Site test procedure.

Instruction Manuals:

a) The Instruction Manuals shall present the following basic categories of information in a comprehensive manner prepared for use by operating and I or maintenance personnel:

i) Instruction for erection

ii) Instruction for pre-commissioning check-up, operation, abnormal conditions, maintenance and repair.

iii) Write-up on controls and interlocks provided.

iv) Recommended inspection points and periods of inspection.

v) Schedule of preventive and shut down maintenance indicating activity details, frequency, duration, consumables / spares required, manpower / tools & tackles necessary etc.

vi) Ordering information for all replaceable spare parts with code number of parts etc.

vii) Recommendation for type of lubricating points, frequency of lubricant changing schedule.

viii) Assembly / disassembly sequence for capital maintenance of each component / sub - assembly.

b) The information shall be organised in a logical and orderly sequence. A general description of the equipment including significant technical characteristics shall be included to familiarise operating and maintenance personnel with the equipment.

c) Necessary drawings and / or other illustrations shall be included and copies of appropriate final drawings for the overall assembly as well as all sub - assembly component shall be bound in the manual.

Test, adjustment and calibration information, as appropriate, shall be included and shall be identified to the specific equipment. Safety and other warning notice and installation, maintenance and operating cautions shall be emphasized.
d) A parts list shall be included showing part nomenclature, manufacturer's part number and/or other information necessary for accurate identification and ordering of replacement parts.

e) Instruction Manuals shall be securely bound in a durable folder.

f) If a standard manual is furnished covering more than the specific equipment purchased, the applicable model (or other identification) number, parts number and other information for the specific equipment purchased shall be clearly identified. Sectional drawings to suit must be included in the instruction manual.

g) The instruction Manual shall include the list of spare parts that have to be procured along with the equipments. It shall also include list of all special tools and tackle furnished with complete drawings and instruction for use of such tools tackles.

h) The Instruction Manual will need approval of Purchaser / Consultant in the same fashion as that for drawings.

Copies of documents
a) Four copies of documents and drawings for approval.
b) Two copies of finally approved documents and two reproducible for distribution prior to offering materials for inspection.
c) Two sets of instruction manual along with supply.

1.19 INTENT OF SPECIFICATION & SCOPE
This specification covers the general requirement of the drive motors
Motors shall be furnished in accordance with both this general specification and the accompanying driven equipment specification.
In case on any discrepancy, the driven equipment specification shall govern.

1.20 STANDARDS
All motors shall conform to the latest applicable IS, IEC and CBIP Standards Publications except when otherwise stated herein or in the driven equipment specification.

1.21 SERVICE CONDITIONS
The motors shall be installed in hot, humid, tropical and highly polluted atmosphere.
Unless otherwise stated in the equipment specification the reference ambient temperature shall be taken as 40 °C, relative humidity 100% and altitude above mean sea level less than 1000 mtrs.
For motor installed outdoor and exposed to direct sun rays, the effect of solar heat shall be considered in the determination of the design ambient temperature.

1.22 TYPE AND RATING
A.C. Motors:
Motors shall be general purpose, constant speed, Sq. cage, three phase, induction type.
All Motors shall be rated for continuous duty (S1). They shall also be suitable for long
period of inactivity and intermittent start and stop. Jockey pump and Sump pump motors to be of suitable duty considering its operational requirement. The name plate rating of the motors shall have at least 15% margin over the input power requirement of the driven equipment at rated duty point or 10% above the maximum power requirement for the entire range of operation including voltage and frequency variation whichever is higher.

The motor characteristic shall match the requirement of the driven equipment so that adequate starting, accelerating, pull up, break down and full load torques are available for the service.

Motors below 200 watts, except otherwise required for reversible service, shall be rated for use on a 240V, single phase, 50 Hz, effectively grounded system.

Motors above 200 watts up to 200 KW shall be rated for use on a 415V, 3 Phase 50 Hz effectively grounded system.

1.23 PERFORMANCE
Running requirements:
Motor shall run continuously at rated output with the following variations in voltage and frequency:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>5%</td>
</tr>
<tr>
<td>Combined voltage &amp; frequency</td>
<td>10%</td>
</tr>
</tbody>
</table>

Motor shall be capable of operating satisfactory at full load for 5 minutes without injurious heating with 75% rated voltage at motor terminals.

Starting requirements:

Motor shall be designed for direct on line starting unless specified elsewhere. Starting current shall not exceed 6 times full load current at full voltage for all auxiliaries subject to IS tolerance.

The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage.

Motor shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals.

Intermittent duty motor shall be capable of three equally spread starts in an hour from hot condition, two starts in quick succession from cold condition and one restart form hot condition. Continuous duty motors shall be suitable for two starts in succession under the specified condition of load, torque and inertia with the motor initially at normal running temperature.

Pump motor subject to reverse rotation shall be designed to withstand the stresses encountered when starting with non-energized shaft rotating at 125% rated speed in reverse direction.
**Stress during Bus Transfer:**
The motor may be subjected to sudden application of 150% rated voltage during bus transfer, due to the phase difference between the incoming voltage and motor residual voltage.
The motor shall be designed to withstand any torsional and/or high current stresses which may result, without experiencing any deterioration in the normal life and performance characteristics.

**1.24 Locked Rotor withstand time:**
The locked rotor withstand time under hot condition at 110% rated voltage shall be more than motor starting time by at least 2.5 seconds for motors up to 20 seconds starting time and by 5 seconds for motor with more than 20 seconds starting time.

Starting time mentioned above is at minimum permissible voltage of 80% rated voltage.

If above conditions cannot be met in unavoidable cases, special provisions such as motor shaft speed switch etc. shall be provided subject to the approval of the client.

Hot thermal withstand curve shall have a margin of at least 10% over the full load current of the motor to permit relay setting utilising motor rated capacity as specified in para 4.01.03 earlier.

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**CHAPTER 2**

**SPECIFIC REQUIREMENT**

**Enclosure:**
All motors enclosures shall conform to the degree of protection IP - 55 unless otherwise specified. Motor for outdoor or semi-outdoor service shall be of weather proof construction.

For hazardous area approved type of increased safety enclosure shall be furnished

**Cooling:**
The motor shall be self ventilated type, either totally enclosed fan coiled (TEFG) or closed air circuit cooled (GAGA).

**2.01 Winding and Insulation:**
All insulated winding shall be of copper.
All the motors shall have class-B insulation. Any substitution of class-B insulation must be submitted to the client for approval.
Winding shall be impregnated to make them non-hygroscopic and oil resistant.

**2.02 Tropical Protection:**
All motors shall have fungus protection involving special treatment of insulation and metal against fungus, insects and corrosion.

All fittings and hardwires shall be corrosion resistant.
2.03 **Bearings:**
Motor shall be provided with antifriction bearings, unless sleeve bearings are required for the motor application.

Vertical shaft motors shall be provided with thrust and guide bearings. Thrust bearing of tilting pad type (Mitchell or Kingsbury) are preferred.

Bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matters like dirt, water etc. into the bearing area.

Sleeve bearings shall be split type, ring oiled, with permanently aligned, close running shaft sleeves.

Grease lubricated bearings shall be prelubricated and shall have provisions for in-service positive lubrication with drains to guard against over lubrication.

Oiled bearing shall have an integral self cooled oil reservoir with oil ring inspection ports, oil sight glass with oil level marked for standstill and running conditions and oil fill and drain plugs.

Forced lubricated or water cooled bearing shall not be used without prior approval of client / consultant.

Lubricant shall not deteriorate under all service conditions. The lubricant shall be limited to normally available types.

Bearings shall be insulated as required to prevent shaft current and resultant bearing damage.

2.04 **Noise & Vibration:**
The noise level shall not exceed 85 db (A) at 1.5 meters from the motor.
The peak amplitude of the vibration shall be within I.S. specified limits. Motor shall be capable of withstanding vibration of driven equipment.

2.05 **Motor Terminal box:**
Motor terminal box shall be detachable type and located in accordance with Indian Standards clearing the motor base plate foundation.
Terminal box shall be capable of being turned 360 deg. in steps of 90 deg. for all motors unless otherwise approved.
The terminal box shall be split type with removable cover with access to connections and shall have the same degree of protection as motor.
The terminal box shall have sufficient space inside for termination connection of PVC (415V) insulated armoured aluminium cables. Rating of cables shall be confirmed to the successful bidder while approving the drawings.
Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame.
The terminal shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-driving end of the motor. The terminal box shall be capable of withstanding maximum system fault current for duration of 0.2 secs. Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match purchaser's cable. Lugs shall be crimping type tinned copper lugs and cable glands shall also be of tinned brass.

2.06 **Grounding:**
The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole. GI bolts and washer. Grounding conductor size and material shall be as mentioned elsewhere in this specification. The cable terminal box shall have a separate grounding pad.

2.07 **Rating Plate:**
In addition to the maximum information required by IS, the following information shall be shown on motor rating plate. a) Temperature rise in Deg. C under rated condition and method of measurement. b) Degree of Protection c) Bearing identification No. & recommended lubricant. d) Location of insulated bearings e) Maximum continuous rating.

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**CHAPTER 3**

**ACCESSORIES**

3.01 **General:**
Accessories shall be furnished as listed below, or if otherwise required by driven equipment specification or application.

3.02 **Space Heater**
Motor of rating 30 KW and above shall be provided with space heaters, suitably located for easy removal or replacement. The space heater shall be rated 240V, 1 phase 50 Hz and sized to maintain the motor internal temperature above dew point when motor is idle. For motor below 30KW, the motor winding shall be suitable for continuous heating from 24V phase 50 Hz supply.

3.03 **Accessory terminal Box:**
All accessory equipment such as space heater, temperature detector, current transformers etc. shall be wired to and terminated in terminal boxes, separate from motor (power) terminal box. Accessory terminal box shall be complete with double compression brass glands and pressure type terminals to suit Purchaser's cable connections. 
**Drain plug:**
Motor shall have drain plug so located that they will drain the water, resulting from the condensation or other causes from all pockets of the motor casing.
**Lifting Provisions:**
Motor weighing 25 kg. or more shall be provided with eye bolt or other adequate
provision of lifting.

**Dowel Pins:**
The motor shall be designed to permit easy access for drilling holes through motor feet or mounting flange for installation of dowel pins after assembling the motor and driven equipment.

**Painting:**
Motor including fan shall be painted with corrosion proof paints as per the SHADE 631 of IS: 5.

**3.04 TESTS:**
All shop inspection tests and site test shall be conducted as per the standard.
Six (6) copies of routine test certificate shall be submitted for approval prior to the despatch of the motors from works.
Type test certificate, shall be furnished for approval.

**3.05 SPARES**
Recommended spares for three (3) years operation shall be quoted along with the bid clearly identifying the part nos. with recommended quantities. Also the bidder shall quote for commissioning and O & M spares.

**3.06 DRAWINGS, DATA & MANUALS**
To be submitted with the bid in quantities and procedure as indicated elsewhere in this bidding document.
Along with the Bid
a) List of the motors.
b) Individual motor data sheet as per annexure.
c) Scheme & write-up of forced lubrication system, if any.
d) Type test report.

After Award of the Contract (Eight sets for approval and sixteen sets along with (one Reproducible of finally approved document for distribution)

a) Dimensional General Arrangement drawing
b) Foundation Plan & Loading
c) Cable and Box details
d) Space requirement for motor removal
e) Thermal withstand curves hot & cold
f) Starting and speed torque characteristic at 80% & 100% voltage.
g) Complete Motor data
h) Erection & Maintenance Manual as per Cl. 11.00.00

i) For motors with solid coupling the curves mentioned at 10.02.00 (f) to be furnished for motors coupled with driven equipment. In case motor is coupled with mechanical equipment by fluid coupling, the above curves shall be furnished with and without coupling.
3.07 INSTALLATION AND MAINTENANCE MANUAL (2 SETS)

The installation and maintenance manual of motor shall contain the following:

a) Application of motor
b) Technical Data
c) Salient constructional Features
d) Instructions to be followed on receipt of motors at site.
e) Handling and Slinging
f) Storage and Reconservation
g) Instructions for foundation
h) Erection procedure and checks
i) Earthing
j) Drying out
k) Commissioning procedure and site tests
l) Routine, period and preventive inspection and maintenance procedure
m) Assembly & disassembly of terminal box, motor, stations, bearings.
n) Possible faults, their causes and remedies.
o) Instrumentation
p) Catalogues, literatures and drawings.

3.0 Cable terminations:

Cable entries and terminals shall be provided in the switch board to suit the number, type and size of aluminum conductor power cables and copper conductor control cables as indicated in the schematic diagram.

Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable glands and terminals such that cables can be easily and safely terminated.

Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

Cable riser shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

Cable sockets shall be of copper and of the crimping type/soldering as required.

CHAPTER 4
FABRICATION AND PIPING

Pre-fabrication
The contractor shall fabricate all piping work in conformity with the requirements of pertinent general arrangement drawings and specifications. Where specific details of fabrication are not indicated on the drawings or not specified herein fabrication and erection shall be done in accordance with the code for Petroleum Refinery piping ANSI B 31.3 and ASME B 31.4 latest edition.
The contractor shall be responsible for working to the exact dimensions as shown on the drawings irrespective if individual tolerance permissible. Where errors found it is contractor's responsibility to notify the Engineer-in-charge prior to fabrication or erection.

**Joints-Fit Up & Welding**

All pipes shall have ends beveled for welding. The fit-up of joints for welding shall be made properly and carefully using line-up clamps, with a uniform root spacing to facilitate the production of sound welds "and to avoid misalignment. Tack welds may be used to hold the edge to welded in line.

Welded branch connections shall be used as indicated on the drawings. The center line of the branch shall intersect the centerline of the header. All cuts shall be carefully beveled and accurately matched to form a good V to permit full penetration of weld at all points.

All welding shall be done in accordance with the welding specifications.

The pipes, to be joined by welding shall be aligned correcting the existing tolerance on diameters, wall thickness and out of roundness. The same alignment shall be preserved during welding. For the internal misalignment due to difference in wall the component with higher wall thickness shall be internally machined/ground as per standards so that adjoining surfaces are approximately flushed.

### 4.1 Layout and Cutting of Pipes

For laying out headers, tees, laterals and other irregular details, cutting templates shall be used to ensure accurate cutting and proper fit up.

All cutting shall follow the outline of the templates.

Machine cut levels to form the welding groove are preferred in carbon steel pipe. However, smooth, clean, slag free, flame cut bevels are acceptable.

Tack welds with full penetration shall be used and shall become part of the finished weld. Defective welds with lack of penetration are not acceptable and shall be chipped/ground out.

No temporary weld attachment shall be with the extended clamps/attachment.

All flanges facing shall be true and perpendicular to the axis of the pipe to which they are attached. Flanges bolt holes shall straddle the normal center lines unless different orientation is shown in drawings to match the equipment connections etc.

### 4.2 Pipe Joints

The relevant piping class attached to each line specifics the type of pipe joints to be adopted in construction in all piping systems. In general joining for lines 2" and above by butt welding connections. Pipelines 50mm and below shall have socket welded as specified in the line materials specifications.

Pipe sizes 50mm and below shall not be permitted to BUTT WELD, drop forged fittings shall be used. Provide “Tee” fittings for below 50mm dia pipes instead of direct welded joints wherever “Tee joints” are required.

### 4.3 Cleaning of Piping

On completion of fabrication, all pipes and fittings shall be cleaned inside by suitable means (mechanical cleaning tool, wire brush, etc.) before erection to ensure that assembly is free from all loose foreign materials such as scale, stand, weld, spatter, particles, cutting chips etc.

All field fabricated piping shall also be cleaned at the conclusion of the fabrication. All burs, welding circles and weld spatter shall be removed by any suitable means (mechanical tools, wire brush etc.).

Both shop and field shall be blown out with compressed air at the termination of cleaning and capped.

b) Cleaning requirements for special services, if any, shall be as specified in the piping, material specifications.
Where practicable and except when otherwise in the drawings, valve steam shall be installed in a vertical direction and shall not be installed with stems below the horizontal.

4.4 Lining Up & Welding

a) The ends of the pipes shall be kept securely closed to prevent entry of any foreign material moisture after lowering into the trench.

b) Before making joints the pipe shall be carefully laid so as to be perfectly aligned in both plan and profile and the end closures provided shall be removed.

Free access shall be provided for the welding of the circumferential joints by increasing the width and depth of the trench at these points. There should be no obstruction to the welder from any side so that good welded joint is obtained.

4.5 Erection of Piping

The intent of pre-fabrication at the shop is to accelerate progress of pipe work and to minimise work in the field.

b) All piping shall be grounded and located as shown in piping drawings keeping in view the piping specifications. No deviations from the arrangement shown shall be permitted without the written consent of the Engineer-in-charge. While fitting up mating flanges, care shall be exercised to properly align the pipes and to check the flanges for trueness, so that faces of the flanges can be equipment nozzles. The bolt holes of flanges in the vertical plane shall straddle the vertical center line of the pipe in the erected position and for flanges in the horizontal plane, the bolt holes shall straddle plant north-south axis unless otherwise indicated on the drawings. Flanged connections at the pump, turbines, and compressors shall be made in such a way as not to induce any stressed due to misalignment, excising gap etc. The final tightening shall be redone when the machines are aligned completely and specifically authorised by the Engineer-in-charge. Temporary protective covers shall be provided at all flanges connections of pumps, compressors, turbines and other similar equipment until the piping is finally connected.

c) Slopes specified for various lines in the drawings shall be maintained by the contractor. Vents and drains are intended, for releasing the trapped air and draining out the fluid. The contractor shall provide vents and drains connections even when these are not shown in the drawings and are found necessary by the Engineer-in-charge.

d) After the piping is erected in final position, it shall be cleaned, tested for tightness and kept dry wherever instructed, as described in this specification.

e) The valve spindle positions shall be at accessible location. He shall however, bring it to the notice of the Engineer-in-charge, in case he encounters some difficulty them.

Where practicable and except when otherwise on the drawings, valve stems shall be installed in a vertical direction and shall not be installed with stems below the horizontal.

4.6 Inspection General

Client inspector shall have free access in all places where the work is being done or any other thing and place concerned with the work.

Client is entitled to send his own inspector to field or shops where pre-fabricated and erection of pipe lines being done, with the following functions but not limited to:

i) To check that the welding performance and welding equipment used on the job are suitable and conform to relevant standards.
To supervise welding procedure qualification.
To supervise welder performance qualification.
To check whether welding is conforming to relevant specification and the practice followed is in accordance with good pipeline construction practice.
To check any other performance to ensure quality of work.
Contractor shall notify sufficiently in advance the commencement of qualification tests, welding work and acceptance tests, to enable the Client's inspector to supervise the same.

Contractor shall provide the Client's Inspector with all facilities necessary for carrying out his work at no extra cost to the client.

Approval from the Client's Inspector shall not relieve the contractor partially or fully of his responsibilities and guarantees under this contract.

4.7 **Visual Inspection**

Inspection of all welds shall be carried out as per ANSI B 31.3. Finished welds shall be visually inspected for parallel and axial misalignment of the work, cracks, inadequate penetration, unprepared burn through, dimensions and other surface defects and if may present a neat workman like appearance.

4.8 **Repair of removal of Defects**

a) Defects which are not within the acceptable limits shall be removed from the joint completely by chipping or grinding.

b) When the whole joint is found unacceptable, the ends of the joints shall be restored according to relevant clauses under fabrication.

No repair shall be carried out without prior authorization of the Engineer-in-charge.

4.9 **Pipe drain points**

The pipe drain points shall be provided in the riser system as detailed in the single line drawing to facilitate occasional clean out.

**CHAPTER 5**

**TESTING OF HYDRANT SYSTEM**

**General**

a) All pipes shall be tested for leakage to a hydrostatic test pressure of 15 kgf/cm² unless otherwise specified. The test pressure shall be maintained for 48 hours.

b) The testing shall be carried out in convenient sections approved by the Engineer-in-charge. The joints of the buried pipe shall be 100% radiographed.

c) If some defects are noticed during the hydrostatic testing, the same shall be brought to the notice of Engineering-charge and shall be rectified as per the welding specifications and instructions of Engineer-in-charge and tested to the satisfaction of Engineer-in-charge at no extra cost to the client.

d) The Engineer-in-charge shall be notified in advance by contractor of all testing the hydrostatic testing/flushing of all the piping shall be carried out by the contractor at his own cost.

e) Contractor shall make his own arrangement for flushing at suitable points as per the instructions of the Engineer-in-charge. Any extra modification on this account shall be done by the contractor at his own cost.

5.1 **Test Medium**

Soft water shall generally be used as the testing medium for the hydrostatic testing of piping system.

5.2 **Cleaning**

All systems shall be cleaned and flushed free of all dirt, debris or loose foreign material after testing.

**Temporary Blinds**

Open ends of piping systems such as at pumps or wherever equipment has been removed or disconnected prior to hydrostatic testing, or at termination point of piping branch connection shall be blinded off by temporary blind flange made out of 10 mm thick M.S. Plate.

**Venting**
All piping system and equipment shall be properly vented to remove air from the system during filling.

5.3 **Pressurization**
Pressure shall be applied by means of a suitable test pump which shall not be connected to the system until ready to test. A pressure gauge shall be provided at the pump discharge for guidance in bringing the system up to pressure. The pump shall be attended to constantly during the test by an authorized operator. The pump shall be disconnected immediately after the test pressure is reached.

The test pressure is to be maintained for sufficient time to permit complete inspection of the system under test but in no case shall the time be less than ten minutes. Test shall be considered complete only when approval is given by the Engineer-in-charge.

5.4 **Test gauge**
Contractor's own test gauge shall be installed as close as possible to the lowest point in the system being tested. Prior to installation, the test gauge shall be checked against a standard gauge or calibrated. Calibration of test gauge shall be the responsibility of the contractor.

5.5 **Draining**
All lines and equipment shall be completely drained after the hydrostatic test of a system has been completed. High point vents shall be open to prevent accessing vacuum and permit complete draining.

If it comes necessary to leave the pipe filled with the testing medium for any abnormal length of time suitable arrangement such as venting shall be made to provide for possible liquid expansion with change in ambient temperature.

**Records**
Records in triplicate shall be made by the contractor for each system as follows.

In case of under ground piping, layouts giving actual elevations of pipeline as laid.
Test certificates containing data of test, identification of the piping system, date of flushing and approval by Client's Inspector.

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**CHAPTER 6**

**RECTION OF EQUIPMENTS**

6.1 **TYPE OF EQUIPMENTS**
The type of equipment covered in this specification include but not limited to the following:

i) Pumps with motors

ii) Pumps with diesel engine drives.

iii) Auxiliaries to diesel drive such as starting compressor, Lube oil system, diesel tanks, air receivers etc.

iv) Air compressor

6.2 **PRE-ERECTION ACTIVITIES**
The contractor shall be responsible for checking levels and orientation plan of all foundation, diameter, length and disposition of anchor bolts in accordance with the supplier’s booklet and literature for installation, well in advance of taking up the actual erection of machinery. Contractor shall carry out minor rectification such as chipping of surface of foundation etc., where necessary. After completion of the pre-erection work to the satisfaction of the Engineer-in-charge the contractor shall commence erection of machinery on foundation.

6.3 **ERECTION**
The Erection of machinery shall be such that installation and operation instructions supplied by manufacturers shall be adhered to before final grouting is taken in hand.

In case of vertical pumps, the contractor shall install the casing pipe, bowl assemblies, motor shafts, etc.
true to plumb on M.S. Channels as per approved drawings and direction of the Engineer-in-charge.

After erection and alignment in accordance with the drawing, specifications and instruction the work shall be shown to the Engineer-in-charge for checking and approval before taking up grouting of foundation, dressing of foundation base. Grouting shall be as drawings, specifications and instructions of Engineer-in-charge. Pressure grouting if necessary and as directed by the Engineer-in-charge must be admissible for the grouting work.

Final alignment, as specified by the manufacturers, shall be carried out after all piping connections are made. Tolerances specified by the manufacturers shall be adhered to. To ensure that no stresses are included on the pumps by the piping the contractor shall again check the alignment by disconnecting the piping or in the working condition or in both conditions.

For all machinery, drilling of holes in the base plates for fixing motors fixing of couplings on shafts etc. and doweling including provision of dowel pins or similar arrangements for retaining the alignments shall be carried out by the contractor as a part of retaining the alignment shall be carried out by the contractor as part of erection work.

The contractor may have to open some of the parts of the equipment for cleaning and fitting it in its original condition. No extra payment shall be made for such work.

6.4 GROUTING UNDER BASE PLATES OF EQUIPMENT

Material
i) All the materials required for this item shall be conforming to the relevant Indian Standards where applicable.
Under no condition shall neat cement be used for grouting.
Normal grout shall be prepared using Portland cement and clean fine sand in ratio 1 : 2 or as specified and thoroughly mixed with water.

For critical applications where non-shrinkable grouts are required and called out in drawings, the mixture shall be made up of 1 part of cement, 1 part clean sand and part of ferro grout.

6.5 General

The grouting materials shall solidly fill the spaces to be grouted and permanently retain its original volume so that the base plate will be held firmly in the set position. The amount of water used in mixing shall be kept to a minimum such that the grout shall have a consistency too stiff to flow.

6.6 Preparation of Surface

The top of foundation shall be clean and free of all laitance, loose particles, oil or grease and shall be wetted thoroughly leaving no puddles prior to grounding.
All trapped pockets shall be properly vented to show full penetration of grout.
The grout shall cover all shims which are to be retained.

6.7 Placement

All anchor bolts holes be completed filled with grout.
The finished surface shall be floated smooth and shall slope away from base plate (approx. 1 : 25).
Care is to be taken during grouting so that the base plate level and alignment is not disturbed.

6.8 TRIAL RUNS

The duration of trial run for pumps will generally be 4 hours (continuously), the contractor shall provided at his own cost as part of erection, charge hands fitters mechanics, helpers etc. necessary for maintaining the machinery during the test period. The category and number of such skilled workmen required and duration will be decided by the Engineer-in-charge and the contractor shall be bound by such a decision.

6.9 Painting

After the mechanical completion and testing of the work, painting work shall be done in accordance with the
CHAPTER 7
WELDING

GENERAL

This specification covers field and shop welding for carbon steel piping system in particular, following types of joints bends branch connection, valves etc.

Butt welds, between pipes, flanges, bends branch connection, valves etc.
Fillet welds for junction of slip on flanges and socket weld fittings, reinforcing pads etc.

The following accepted standard and procedure shall be applicable:


In case of any variation between the provision of the codes and the specification given below, the later will prevail.

7.1 WELDING REQUIREMENTS

All welds joining two sections of pipe, a section of pipe to a fitting or fittings shall be performed employing qualified welding procedure and welders in accordance with clause 3 to 12 of this specification.

Before welding, the ends shall be cleaned by wire brushing, filling or grinding. Each weld-run shall be cleaned of slag before the next run is deposited.

Welding shall be done by certified welders only.
Welding at any joint shall be completed uninterrupted.

Welding shall done by manual oxy-acetylene or manual shielded. Metal arc process. Automatic or semi-automatic welding processes may be done only with the specific approval of Engineer-in-charge.
Socket weld joint shall be done with lowhydrogen type covered electrodes with manual shielded metal arc process.
As far as possible welding shall be carried out in flat position. If not possible, welding shall be done in position as close to flat position as possible.

Downward technique is not allowed.

A wire spacer of proper diameter may be used for the weld root opening but must be removed after tack welding and before applying root pass.

As a rule backing ring shall be used for circumferential butt welds.

Tack welding for the alignment of pipe joints shall be done only by qualified welders. Since tack welds form part of final welding, they shall be executed carefully and shall be free from defects. Defective welds shall be removed prior to the welding of joints. Electrodes size for tack welding shall be selected depending upon the roof opening.
Tack should be equally spaced as follows:
For 65 mm NB and smaller pipes For 80 mm NB to 300 mm NB pipes For 350 mm NB and larger pipes 2 tacks 4 tacks 6 tacks

Root run shall be made with respective electrodes/filler wires. The size of the electrodes shall not be greater (12 SWG) and should preferably be 2.64 mm (12 SWG). Welding shall be done with direct current values recommended by the electrodes manufacturers.

Upward technique shall be adopted for welding pipes to horizontally fixed position. For pipes with wall thickness less than 3 mm oxyacetylene welding is recommended.

On completion of each run craters, weld irregularities, slag etc. shall be removed by grinding or chipping.

During the process of welding, all movements, shocks, vibration or stresses shall be carefully avoided in order to prevent weld cracks.

Fillet weld shall be made by shielded metal arc process regardless of thickness and class of piping. Electrodes size shall not exceed 10 SWG (3.25mm). At least two runs shall be made on socket weld joints.

7.2 WELDING PROCEDURE QUALIFICATION
Welding procedure qualification for all piping, shall as per the latest edition of Standard for welding pipelines and related facilities, ASME-Section – IX. It shall be the responsibility of contractor to arrange and carry out such test at his own cost.

7.3 WELDER’S QUALIFICATION
Welder qualification for all piping, shall be in accordance with ASME Sec.IX. Client’s inspector shall witness the test and certify the qualification of each welder. Welders approved by the Client’s Inspector only shall be employed. It shall be the responsibility of the contractor to carry out the qualification test of the welders at his own cost at the job site. All the tools, tackles and auxiliaries required for carrying out welder’s test shall be supplied by the contractor at his own cost.

7.4 WELDING PROCESS
Welding under the process shall be done with the manual shielded metal arc process.
The welding shall conform to the standard codes of welding practice. Welding of carbon steel in general shall be in accordance with IS:823, Code of procedures for manual metal arc welding of mild steel (For structural steel work only).

The welding of pipes shall conform to ANSI B 31.3 (latest edition). The compliance with this specification does not reveal fully or partially the contractor’s responsibilities for piping fabrication and erection of his own responsibilities as well as on any contractual obligations.

7.5 PREPARATION OF WORK PIECES
End Preparation
Preparation of ends to be welded will be made properly.
Cleaning
The ends to be welded shall be properly cleaned. And paint, oil, grease rust and oxide in general shall be removed, as well as all earth, sand or any other material which could be harmful to the welding. Ends shall be totally dry when welded.

No dirt or debris will be permitted in the pipelines.
Alignment and Spacing

Piece to be welded shall be aligned and spaced in a suitable manner, so as to hold the ends during welding at distance to ensure full penetration.

For pipe with thickness 4 mm or larger, the pieces to be butt welded shall be coupled by means of pipe couplers or by yokes or bridge ‘c’ clamps.

7.6 WELDING TECHNIQUE
For Butt Joints
The root pass of butt joints, regardless of the technique used shall be such as to achieve full penetration. After the welding is started and until the joint has been completed, displacements, shocks, vibration or stresses shall be avoided in order to prevent cracks or breaks in the welds.

For Fillet Welds
On completion of the root pass, any visual defect or irregularities shall be ground off to avoid defects or irregularities in next pass.

7.7 JOINT COMPLETION
a) Upward technique shall generally be used for pipe in horizontal and vertical position.
b) When the welding is complete, but joints shall have a cover pass. Welds shall have a regular appearance and shall be free from defects.

7.8 RADIOGRAPHY

10% of the shop joints and 10% of the field joints to be radio-graphically tested size wise. However all joints in buried pipeline shall be radiographed.

CHAPTER 8
CORROSION PROTECTION OF PIPING

GENERAL
The corrosion protection coating for buried M.S. pipes shall consist of coating an wrapping with anticorrosive pipe coat made of polymer bitumen/polyethylene layer/polyester layer.

8.1 PREPARATION & CLEANING OF PIPES
The pipeline shall be cleaned of all rust, grease, dirt, weld burs etc. It shall be scrubbed manually with stiff wire bruised and scrapped where necessary. Pipe coat primer should be applied immediately after the cleaning of pipes. The entire pipe length shall be cleaned but the ends of the pipe shall be left without coating and wrapping for a distance of 230 mm for joints which shall be coated and wrapped manually at site after lying welding and testing of pipes.

8.2 PRIMER
Pipe coat primer shall be fibber an solvent based rubber modified bituminous primer of density 0.92 gm/cm³ and viscosity of 500 to 1000 cps applied at 150 gms per Sq.M. Pipe coat shall be applied by brushing so as to produce effecting bond between metal and subsequently coating of pipe coat memberance. The drying time shall be not less than 24 hours.

8.3 WRAPPING
Pipe coat memberance (wrapping) material shall consist of three layers of high molecular high density polyethylene, three layers of polymerized bitumen and one layer of polysters (total seven layers). The same shall be applied under tension by heating the inner surface of the membrane by means of a blow torch, melting the lower most polyethylene layer and softening the bitumen taking care that the center course is not over heated and pressing the molten bituminous surface onto pipe so that no air is entrapped or voids are found. The resultant coating shall be free or voids are found. The resultant coating shall be free from all bubbles, wrinkles, irregularities, discontinuities. Conventional methods of dwards cloth, tar felt, craft paper, glass wool etc will not be permitted.
CHAPTER 9
TESTING AND INSPECTION OF PIPING

GENERAL
The intent of this specification is to provide a basis and guide for carrying out field testing of piping to assure leak tightness in the piping before the nozzles and whether the nozzles spray covers adequate area as desired.

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

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

9.1 SPECIFIC REQUIREMENT
On completion of the test, the system shall be drained and dried with compressed air (if necessary) at the pressure decided by the Engineer-in-charge and made ready for operation.

After completion of flushing and testing, draining and drying of lines, the permanent strainers screens shall be cleaned and reinstalled.

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

9.2 TEST PREPARATION
All equipment, materials, consumable and services mentioned below but not limited to required for carrying out pressure testing of piping shall be provided by the contractor at his cost.

Pump sets for dwardion, air compressor etc.

9.3 PROCEDURE FOR PRESSURE TESTING
Test Pressure
The minimum hydrostatic/pneumatic test pressure shall be as indicated in the specification. Depending upon the above requirements and based on construction progress, maximum length of dward shall be included in each test.

Pressurisation Inspection & Approval
All vents and other connections used as vent shall be left open while filling the lines with a test fluid for complete removal of air.

Pressure shall be applied only after the system/line is ready and approved by the EIC.

Duration of the test in each case shall be fixed up by the EIC but in no case it will be less than 20 minutes.

No leakage of any kind will be permissible. The glands of the valves in the system being tested shall be tightened by the contractor so as to stop/ minimize to .leakage if any.

Care shall be taken to avoid increase in pressure due to temperature variation during the test.

After completion of hydro test, the pressure shall be released. All the vents and drains shall be kept till the lines and fully drained. After draining lines/systems all be dried by air, if necessary.

Pressure test shall be considered complete only after approval by EIC. Defects, if any, noticed during testing shall be rectified immediately by the contractor at his own cost.
CHAPTER 10
PAINTING
(A) PIPING, EQUIPMENT AND STRUCTURE

GENERAL
This specification describes requirements of supply and application of paints for equipment, piping, structural etc. for over ground surface.

A.1 GENERAL INFORMATION

All external or exposed surface of mechanical & electrical equipment, vessels, tanks, ducts, piping, valves, accessories and surfaces of all structures, platforms, galleries etc. shall be provided with required primer and finish painting after necessary surface preparation.

Quality of primer shall be chosen that they are suitable for withstanding maximum expected surface temperature and they type of atmosphere it is exposed to.

Application of primer and finish paints shall be done at site of far as possible except for finished machine and equipment such as diesel engine, pumps, compressor etc. For such finished equipment and components there of, the painting may be completed at shop and transported to site with paint duly protected. For items such as structures, plates, tank shells, pipe pieces etc. shop coat of protective paint shall be given before dispatch to site.

However, touch-up paints shall be done at site after erection and commission as per the instruction of the purchaser.

The Bidder shall follow the provisions of TAC, Indian Standards or equivalent approved other National Standards in selection of paints, application and surface preparation.

A.2 PAINTING SCHEME

The scheme of painting to be followed for various equipment are furnished hereinafter. The Bidder may suggest any alternative painting scheme if the same is superior to the suggested scheme. The final scheme of painting to adopted shall be subjected to purchaser’s approval.

When material or paint is specified or described by the name of a particular brand, manufacturer or vendor, the specific time mentioned shall be understood as indicating the function and quality desired. Other manufacturer’s product shall be approved provided specific information is given to allow the purchaser to evaluate the product proposed.

Surface Preparation

Anyone of the following surface preparation methods shall be adopted as stated below.

Wire Brushing
All surface shall be manually cleaned of rust/millscale by wire brush, carborundum tips etc. User of chopping hammer, emery paper shall be done to clean pitted areas.

Special care shall be taken to remove grease and oil by means of soluble solvents. In case paint manufacturer’s recommendation dictates any special requirement from surface preparation the same shall also be provided.
(B) MECHANICAL EQUIPMENT / STRUCTURES

Equipment to be painted
Mechanical Equipment
Pumps, Engine, Air Compressor, Buffer Air Chamber
Service
Substrate material
As above
Interior surface
To suit fluid handled subject to approval of purchaser.
Exterior surface
Surface preparation
Wire brushing
Primer Coat
Type
No. of Coat
Dry Film thickness

Epoxy based Zinc Phosphate primer suitable for environment.
Two (2) 50 micron each
Finish Coat a) Type b) No. of Coat c) Dry Film thickness

Signal Red enamel paint suitable for the maximum expected operating temperature and other environmental conditions prevailing at the site.
No. of coat = 2
50 micron thickness for each coat

SPECIFICATION FOR AUXILIARY STRUCTURES, PIPING & FITTINGS

20.00 Equipment to be painted : Auxiliary structure, piping and fitting Service
Supporting structural, frames hangers, supports, piping, valves etc.
Substrate material
Steel
Wire Brushed Surface
Surface preparation Primer Coat
Wire brushing
a) Type
b) No. of Coat
c) Dry Film thickness
Finish Coat
a) Type
b) No. of Coat
c) Dry Film thickness

Epoxy based Zinc Phosphate primer suitable for corrosive environment. Two (2)

50 micron per coat

Signal Red enamel paint suitable for the maximum expected operating temperature and other environmental conditions prevailing at the site.

: No. of coat = 2
  50 micron thickness for each coat

CHAPTER 11
STRUCTURAL PIPE SUPPORT

GENERAL
This specification covers the fabrication, transportation to site and erection of structural steel pipe supports. This specification also covers supply, where supply by contractor is involved as listed. Structural steel work shall be in accordance with IS:800 Code of Practice for the use of Structural steel in General Building Construction and the other Indian Standards referred to therein. Indian Standard referred to in this specification shall be the latest published by Bureau of Indian Standards. In case of conflict between the clauses mentioned here and the Indian Standards, those expressed in this specification shall govern.

11.1 MATERIAL

Steel structural and plates shall conform to IS:2062. All other materials shall conform to their respective standards specification.

Bolts and nuts shall conform to Grade B of IS:1367.

Welding electrodes shall conform to IS:814 and 815.

Washers shall conform to IS:2016.

All materials shall conform to their respective specifications. The use of equivalent or alternate materials will be considered only in very special cases, subject to the approval of the Engineer-In-Charge in writing.

11.2 SPECIFICATION

Fabrication shall in accordance with IS:800 section V and standard fabrication practices as approved by the Engineering-in-charge in addition to the following:

. Fabrication shall be done as per standards/drawings adhering strictly to work points and work lines are the same. The connections shall be welded or bolted as per design drawings.

. Any defective material used shall be replaced by the contractor at his own expenses, care must be taken to prevent any damage to the structure during removal.
Welding shall be done in accordance with relevant procedure as per IS:823 and to the requirement of IS: 108 and IS:816.

Welding should be carried out only by fully trained and experienced welders as tested and approved by the Engineer-in-charge.

Qualification tests for welders as well as tests for approval of electrodes will be carried out as per IS:823.

11.3 EXCLUSION FROM SCOPE OF WORK

Cable trenches inside the pump house.

Erection of underground earthing grid network. However individual equipment earthing with grid is the responsibility of bidder.

Busbars/cabling between the fire fighting panel & LT switch gear. However termination at both ends are included in the scope of bidder

11.4 BATTERY LIMIT

The termination/connections at the equipment terminals being supplied under this Bidding Document for the interconnections are with equipment supplied by others.

Complete interconnections including laying of cables between the equipment/instrument being supplied under this Bidding Document.

SECTION 15 (H) MOTOR CONTROL CENTRE

11.5 Codes and Standards

All equipment & materials shall be designed, manufactured & tested in accordance with the latest applicable Indian Standard (IS) or International Electro-technical Commission (IEC) standard except where modified and/or supplemented by this specifications.

Equipment and materials conforming to any other standard which ensure equal or better quality may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

The electrical installation shall meet the requirement of Indian electricity rules as amended upto date, relevant IS Code of Practice for respective equipment, National Electricity Code of Indian and regulations applicable to the work shall be binding.

11.6 SERVICE CONDITIONS

The equipment will be installed in a hot, humid and tropical atmosphere. All equipment, accessories and wiring shall be provided with tropical finish to suit the environment and to prevent fungus growth.

Unless otherwise stated in the equipment specification, the reference ambient temperature shall be taken as 50 deg. C, relative humidity 100% and altitude above sea level less than 1000 meters.

For equipment installed outdoor and exposed to direct sun rays, the effect of solar heat shall be considered
11.7 **TYPE & RATING**
Equipment shall be rated for the load and duty cycle of the intended service. Circuit breakers and fuses shall be rated to withstand and interrupted the maximum fault current at the point of application in the circuit.

11.8 **ENCLOSURE**
Unless otherwise stated, enclosure of electrical equipment intended for indoor service shall be dust-tight, vermin proof with gasketed doors/covers, generally conforming to degree of protection IP-54. Equipment enclosure intended for outdoor service shall be of weather-proof construction generally conforming to degree of protection IP-55.

For equipment located in hazardous area, increased safety type enclosure such as flame/explosion proof type shall be certified by <name withheld> authority as suitable for use in that particular environment.

11.9 **SITE DATA**
Site data to be considered in design of equipment under the specification are:
- Average grade level to be obtain by bidder after visiting site
- Ambient humidity
- Wind pressure
- Isoceraunic level
- Ambient air temperature
- Seismic zone
Bidder must visit site prior to submitting offer.

11.10 **SPECIFIC REQUIREMENTS SERVICES**

**Responsibility of erection**
The contractor shall be fully and finally responsible for proper erection necessary to ensure safe and satisfaction of the plant & equipment under his scope of work to the entire satisfaction of the Purchaser.

The work shall be executed in accordance with the directions, instructions, drawings and specifications issued, approved by the Purchaser by time to time.

11.11 **GENERAL**
This specification covers general requirements of all electrical switch boards of this specification.

This specification shall be read and construed with other sections of this Bidding Document.

In case of discrepancies, most stringent condition shall govern.

11.12 **SCOPE OF SUPPLY**

One number composite power-cum-control and annunciation panel.
The base channel frame with hardware and lifting angles.
All relevant drawings, data and instruction manuals.

11.13 **GENERAL REQUIREMENTS**

Completeness of supply

It is not the intent to specify completely herein all details of the equipment. Nevertheless, the equipment shall be complete and operate in all aspects and shall conform to highest standard of engineering, design and workmanship.
Any material or accessory which may not have specifically mentioned but which is necessary or usual for satisfactory and trouble-tree operation & maintenance of the equipment shall be furnished without any extra charge.

The contractor shall supply a brand new equipment & accessories as specified herein with such modification and alteration as agreed upon in writing after mutual discussion.

Guaranteed Performance
The performance figures indicated in Technical Particular sheets shall be guaranteed within the tolerance permitted by relevant standards. In case of failure of the equipment to meet the guarantee, the equipment may be liable for rejection.

11.14 DESIGN CRITERIA

The panel will be used to provide power, control & protection for Fire Water Pumps, Jockey pumps, Air compressors, Siren and non-motor loads in Fire Protection system.

The control-cum annunciation panels will be used to dwards the annunciation as given in the list of annunciation mentioned elsewhere of this Bidding Documents as well as to provide manual start-stop facilities of the pump and air compressor.

The fire panels will be used to dwards the annunciation as given in the list of annunciation mentioned elsewhere of this Bidding Documents.

Equipment rating and quantities are to be decided to the bidders in strict compliance with the Operation Philosophy and Details of Panels.

For continuous operation at specified rating, the temperature rise of various equipment/components shall be limited to the permissible values stipulated in relevant standards and/or specification.

All equipment and components thereof shall be capable of withstanding the mechanical forces & thermal stresses of the short circuit currents listed in an annexures without any damage or deterioration of the materials.

11.15 SPECIFIC REQUIREMENTS

Construction

Power/Control-cum-Annunciation panels/Fire panels shall be indoor, metal-clad, air insulated, floor mounting type.

Unless otherwise, noted, panels shall be of single front construction.

Panels enclosure shall be dust and splash proof conforming to a degree of protection IP-54. Minimum thickness of sheet metal shall be 2 mm. Unless specified in the tender drawing.

Panel assembly shall comprise a continuous line up of dead front tree-standing vertical sections housing the control modules in multi-tier formation.

The design shall be fully compartmentalized with metal/insulating partition between compartments. The working height shall be limited within 400 mm to 1800 mm from floor level as per I.E. Rules.

Each control module shall be housed in a separate compartment, complete with an individual front access
door. Each vertical section shall have a removal back cover. 
All doors and covers shall be gasketed.
All push buttons, lamps, indicating instruments shall be flush semi-flush mounted on respective module compartment.
A full height vertical cable chamber with cable supports shall be provided in each section to facilitate unit wiring. The chamber shall be liberally sized to accommodate all cables and shall have removable cover at the front for access.
A horizontal wireway, extending the entire length, shall be provided at the top of each panel for inter panel wiring.

Modules shall be selected in accordance with sound engineering practice.

Bus and Bus Taps
The main buses and connections shall be of High conductivity aluminum/aluminum alloy, sized for specified current ratings.

All bus connection shall be silver plated. Adequate contact pressure shall be ensured by means of two bolt connection with plain spring washers and lock nuts.

Bilmetallic connector shall be furnished for connection between dissimilar metals.

Bus bars and connections shall be fully insulated for working voltage with adequate phase/ground clearances, insulating sleeve for bus bars and shorouds for joints shall be provided.

Bus bars shall be supported and braced to withstand the stresses due to maximum short circuit current and also to take care of any thermal expansion.

Bus bars shall be colour coded for easy identification and so located that the sequence R- Y –B shall be from left to right, to button or front to rear when viewed from the front of the assembly.

CHAPTER 12
CONTROL MODULE
Control module shall have self-alignment power/control disconnects.
All disconnects shall be silver plated to ensure good contacts.

12.1 The design shall be such as to permit easy withdrawal/reinsertion of the unit with guide raise to ensure correct alignment.

Control modules shall house the control components for circuit such as switch, fuse, contractors, relays, push button, lamps etc. as detailed in the single line drawings.

Various module/component sizes shall be multiple of one basic unit to facilitate modifications at site. Suitable provision for this purpose should also be incorporated in the vertical bus bars.

Draw out type control modules of same size and type shall be electrically and physically interchangeable.

Switches
Switches shall be triple pole, air break, AC23 motor duty for motor feeders.

Motor duty switches shall be capable of safety making a breaking the locked motor current of the associated motor circuit.

The switch shall have a quick make, quick break mechanism operation by a suitable external handle complete with position indicator. This handle shall have provisions for padlocking in ON and OFF position.

The compartment door shall be interlocked mechanically with the switch such that the door cannot be opened unless the switch is in OFF position. Means shall be provided for releasing this interlock at any time.

Switches shall be capable of withstanding the let-throughly fault current of back up fuses of circuit breakers.

If two incoming switches are specified for any control cum annunciation panel incomer, these switches shall be mechanical/ key interlocked so as to ensure that only one switch can be closed at a time.

All incoming and outgoing feeders shall be provided with bolted disconnect link for isolation of neutral, if necessary.

**Fuses**

Fuses shall be HRC, preferably link type, with a minimum interrupting capacity equal to the listed short circuit current.

Fuses shall be furnished complete with fuse bases & fittings of such design as to permit easy and safe replacement of fuse element.

Visible indication shall be provided on blowing of the fuse.

Motor fuse characteristic and ratings shall be closer to ride over starting period without blowing. The fuse on incoming feeder, if specified shall be closer to provide discrimination with motor/feeder fuses.

**A.c. Starter Contactors**

The contractor shall be three pole, air break type designed for duty class III – Category AC3 with non bouncing silver / silver alloy contacts.

Each contractor shall be provided with two(2) normally open and two(2) normally closed auxiliary contacts rated 10A at 240V AC.

Reversing contacts shall be electrically and mechanically interlocked. Contactors with delayed dropout features shall be provided some essential auxiliaries if so detailed in the specification. These contacts shall not drop out on power failure if the voltage is restored within 3 seconds.

**Thermal Overload**

Thermal overload relays shall be three element, positive acting, ambient temperature compensated with
adjustable settings.

Single phase preventor relay shall be provided preferably as in-built feature of thermal overload.

Relays shall be manual reset type with one changeover contact. Resetting of relays shall be possible with compartment closed.

Relays may be direct acting or C.T. operated, depending on current rating, C.T shall be included in the scope of supply.

12.2 CONTROL AND INDICATION

Push button shall be heavy duty, oil tight, push to actuate type with integral escutcheon plate marked with its function.

Each Push button shall have one(1) normally open and one (1) normally closed contacts rated 10A at 240v. One(1) NORMAL TRIAL selector switch shall be provided for all motor feeders.

Lamps shall be low-watt, filament type with series resistor and coloured lens. Lens and lamps shall be replaceable from the front.

For Control supply, the contractor shall provide 415/240V control transformers with 100% standby arrangement.

Status indication lamps shall be provided as per Operation Philosophy and Details of Panel mentioned elsewhere in this specification.

Meters

All indicating instruments (96 x 96 mm) shall be switch board type with 240 Deg.C scale, anti-glare glass and accuracy class of +2% full scale. Each meter shall have zero adjusted on the front. Motor ammeter shall have an extended suppressed endscale range to indicate starting current (6 times fullload current).

Current Transformer

Current transformer, if specified, shall be cast resin type rated 10V A, accuracy class 1.0 for metering and 10P10 for relaying.

Secondary Wiring

The panel shall fully wired at the factory to ensure proper functioning control, protection and interlocking schemes.

Fuses and links shall be provided to permit individual circuit isolation from bus wires without distributing other circuits. All separate contacts of relays, P blocks.

Wiring shall be done with flexible, 650V grade, PVC insulated switch board wires with standard copper conductors of 2.5 mm2 for control and current circuits and 1.5 mm2 for voltage circuits.

Each wire shall be identified at both ends with permanent markers bearing wire numbers as contractor’s wiring diagrams.

Wire termination shall be made with crimping type connector with insulating sleeves. Wires shall not be spliced between terminals.
12.3 **Terminal Blocks**
Terminal blocks shall be 660V grade box-clamps type. Terminals for C.T. secondary leads shall have provision for shorting.

Not more than two wires shall be connected to any terminal. Spare terminal equal in number to 20% active terminal shall be furnished.

Terminal block shall be located to allow easy access. Wiring shall be so arranged that individual wires of an external cable can be connected to consecutive terminals.

12.4 **Cable Termination**
Panel shall be designed for cable entry both from top and bottom. Sufficient space shall be provided for ease of termination and connection.

All provisions & accessories shall be furnished for termination and connection of cables including removable gland plates, cable supports, crimp type tinned copper/aluminium lugs, brass compression glands with tapered washers (power cables only) and terminals blocks.

Glands plates shall be minimum 4 mm thick. The plate and supporting arrangement for i/c power cable shall be such as to prevent flow of eddy current.

12.5 **Bus Duct Connection**
Bus duct connections when specified on drawings shall be furnished along with transition panel, if required. Bus duct connection shall be generally from the top. All connecting bus work shall have the same continuous current rating as associated control-cum-annunciation panel bus and shall be fully braced for the listed short circuit current. All provisions such as matching flange and other accessories shall be furnished for connection to bus direct being supplied by others, necessary details for this purpose.

12.6 **Ground Bus**
A ground bus rated to carry the maximum fault current shall extend full length of the panel.

The ground bus shall be provided with two-bold drilling with GI bolts & nuts at each end to receive 50x6mm GI flats.

All stationary structures shall be directly connected to the ground bus for effective grounding. The frame of draw out modules shall be ground at all times except when the power disconnects are separated by a safe distance.

Name Plates
Name plate of approved design shall be provided each control compartment and also at the top of each panel.

The material of the name plate shall be laminoid or approved equal, 3mm thick, with white letter black background. Name plate shall be minimum 20 x 75 mm.

Space Heater
Each panel shall be furnished with thermostat controlled space heater.
In addition, motor feeders 30KW and above all be wired up for feeding motor space heater through starter auxiliary NC contracts.

Local Start-stop push Button Station

Enclosure shall be suitable for mounting on column/wall and complete with push button, downwards aluminium inscription plate earthing terminal and knock-out for cable/conduit entry from top & bottom. The push button station shall be of following basic type:

- One START-STOP push button with start button spring return and stop button stay – put type. – All STOP buttons shall be pressed to latch and key operated to release type.

Push buttons shall be heavy duty two (2) pair of contacts (1 No. + 1 NC) rated 2A at 220V DC and 10A at 240V A.C.

Tropical Protection

All equipment, accessories & wiring shall have fungus protection involving special treatment of insulation and metal against fungus, insects & corrosion. Screen of corrosion resistant shall be furnished on all ventilating downwards to prevent the entrance of insects.

Painting

All steel surface shall be sand blasted, grounded and pickled as required to produce a smooth, clean surface free of scale, grease & rust.

After cleaning, the surfaces shall be given a phosphate coating followed by two coats of high quality primer and stoved after each cost.

Panels shall be finished in light grey (IS:631) with two coats of synthetic enamel paint.

Sufficient quantity of touch-up affixed at the back of each vertical panel.

12.7 TESTS

All equipment shall be completely assembled, wired, adjusted and tested at the factory as per relevant standards.

12.8 Routine Test

The tests shall include but not necessarily limited to the following:

Operation under stimulated service condition to ensure accuracy of wiring correctness of control scheme and proper functioning of the equipment.

All wiring and current carrying part shall be given appropriate high voltage test.

Primary current & voltage shall be applied to all instruments transformers.

Routine test shall be carried out on all equipment such as circuit breakers, switch fuse, contractors, relays, meters etc.

Test Witness
All tests shall be performed in presence of Purchaser’s representative, if so desired by the Purchaser in accordance with the stipulation made else where in the Bidding Documents.

Test Certificate

Certified reports of all tests carried out at the works shall be furnished in six(6) copies for approval of the Purchaser.

The equipment shall be dispatched from works after receipt of purchaser’s written approval of the test reports.

Type test certificate on any equipment, if so desired by the Purchaser shall be furnished. Otherwise, the equipment shall have to be type tested, free of charge, to prove the design. Type test certificates not more than five years old are acceptable.

12.9 SPECIAL TOOLS & TACKLES
A set of special tools & tackles which are necessary or convenient for erection, commissioning, maintenance and overhauling of the equipment shall be supplied.

The tools shall be shipped in separate containers clearly marked with the name of the equipment for which they are intended.

12.10 DOCUMENT TO BE SUBMITTED DURING ‘INSPECTION
Performance Test Certificate.
Warranty Certificate.
### 11. LIST OF APPROVED MATERIAL

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Item Description</th>
<th>Approved Make</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wet Riser System</td>
<td>Kirloskar /Crompton/Siemens/ABB/GrandFos</td>
</tr>
<tr>
<td>2</td>
<td>Motor Driven Pump(Electric)</td>
<td>Kirloskar /Crompton/Siemens/ABB/GrandFos</td>
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<tr>
<td>3</td>
<td>Diesel Driven pump</td>
<td>Kirloskar /Crompton/Siemens/ABB/GrandFos</td>
</tr>
<tr>
<td>4</td>
<td>Terrace pump(Electric)</td>
<td>Kirloskar /Crompton/Siemens/ABB/GrandFos</td>
</tr>
<tr>
<td>5</td>
<td>Motor Control Centre</td>
<td>L&amp;T / Siemens</td>
</tr>
<tr>
<td>6</td>
<td>Switch board</td>
<td>Any CPRI approved vendor</td>
</tr>
<tr>
<td>7</td>
<td>MCCB's</td>
<td>L&amp;T/Legrand / Siemens/GE/Merlin Gerin</td>
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<tr>
<td>8</td>
<td>Cable</td>
<td>L&amp;T/ Finolex/ Havell's/ RR-Kabel/Sark</td>
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<tr>
<td>9</td>
<td>Cable gland</td>
<td>Dowell's/ Jaison</td>
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<tr>
<td>10</td>
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<tr>
<td>11</td>
<td>End Termination</td>
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<tr>
<td>12</td>
<td>Indicating Meters</td>
<td>HPL Socomec/ L&amp;T/ Meco</td>
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<td>13</td>
<td>Indicating lamps</td>
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<td>Power Contactors</td>
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<td>15</td>
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<td>Kappa / Torrid /Intrans/ P G R Powertech</td>
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<td>17</td>
<td>Isolator</td>
<td>L&amp;T / Siemens</td>
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<td>18</td>
<td>MS Pipe</td>
<td>Jindal/Tata/ Zenith</td>
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<tr>
<td>19</td>
<td>Single/ Double Headed Hydrant Valve</td>
<td>Newage / Winco / Zenith / ASCO / Vijay</td>
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<tr>
<td>20</td>
<td>Butterfly Valve</td>
<td>Intervalle / Kirloskar / Zoloto</td>
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<tr>
<td>21</td>
<td>Ball Valve</td>
<td>Zoloto/Leader</td>
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<tr>
<td>22</td>
<td>Non Return Valve</td>
<td>Intervalle / Audco / Kirloskar / B.D.K</td>
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<td>23</td>
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<td>24</td>
<td>HoseBox</td>
<td>Friends</td>
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<td>25</td>
<td>Fire Hose with coupling</td>
<td>Newage/Zenith / ASCO / Vijay</td>
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<tr>
<td>26</td>
<td>Air Release Valve</td>
<td>Newage/Zenith / ASCO / Vijay</td>
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<tr>
<td>27</td>
<td>Hose reel Drum</td>
<td>Mini Max/ Ever safe / Firestone/vilas</td>
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<tr>
<td>28</td>
<td>Branch Pipe</td>
<td>Newage / Zenith / ASCO / Vijay</td>
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<tr>
<td>29</td>
<td>Air Cushion Vessel</td>
<td>Fabricated type</td>
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<tr>
<td>30</td>
<td>Cast Iron Foot valve</td>
<td>Kirloskar / Crompton/ Becon</td>
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<td>31</td>
<td>Wrapping coating</td>
<td>Pipe coat / Rust Fire / Approved equivalent</td>
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<td>32</td>
<td>Sounder with relay module</td>
<td>Notifier / dwards/ simplex / cerebrus</td>
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<td>33</td>
<td>Sprinklers</td>
<td>HD / Tyco / Spraysafe / Monsshersenje</td>
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<td>34</td>
<td>Pressure Switch</td>
<td>Dnfoxx/Indfoss / SWITZER</td>
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<td>35</td>
<td>Pressure Gauge</td>
<td>H Guru / OASIS</td>
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<td>36</td>
<td>Pipe supports</td>
<td>Hi-Tech pipe support system</td>
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<td>37</td>
<td>Flow switch</td>
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<td>38</td>
<td>Monitoring module</td>
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<tr>
<td>39</td>
<td>Paints</td>
<td>Asian paints / Shalimar / Berger / Jenson nicholson</td>
</tr>
</tbody>
</table>

**NOTE:** The contractor shall use only above mentioned material or equivalent make to be approved by the SBIIMS. All other materials shall confirm to the specifications laid down. The tenderer shall take this into account while tendering rates / prices. SBIIMS has got every right to select any of the above Makes for the Project. However, the samples of every material including all fixing accessories shall be got approved by SBIIMS before Execution.

**ALL MAKE SHALL BE CONFIRMING TO BIS ONLY.**
12. **Procedure for payment of TENDER FEE through SBI Collect**

The Vendor needs to use SBI internet banking site [https://www.onlinesbi.com](https://www.onlinesbi.com)

Select "SB Collect" from Top Menu, that will lead to the next page:

“Proceed” will lead to the next page:
Select "All India" in "State of Corporate / Institution " & Select "Commercial Services" in "Type of Corporate / Institution".

"Go" will lead to the next page:
Select "SBI Infra Management Solutions" in Commercial Services Name and “Submit”
Select “Tender Application Fee” in “Payment Category” and enter the “Tender ID” exactly as we preloaded with characters in Uppercase only in place of Circle Codes.

The next Page will be ready with few of the Preloaded Tender Details:
The Vendor will have to fill up the fields properly and upon making the payment a receipt will be generated with a Reference No.
13. **BILL OF QUANTITIES**

<table>
<thead>
<tr>
<th>SL NO</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>UNIT</th>
<th>UNIT RATE RS.</th>
<th>TOTAL AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>TERRACE PUMP</strong>&lt;br&gt;General Maintenance and servicing of Terrace pump and providing suitable cover for protecting the pump from weather</td>
<td>1</td>
<td>Nos.</td>
<td>Rate should be inclusive of GST</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>CONTROL PANEL</strong>&lt;br&gt;Supply, installation testing and commissioning of wall mounted cubicle type switch board of suitable size made out of 2 mm thick MS Sheet totally enclosed, dust and vermin proof with an additional lockable glazed door on the front and consisting of the following items i/c connections with suitable copper conductor cable, earthing, painting (red), lettering with auto starting arrangements etc. as required. a)32 Amps TPN Switch fuse unit with HRC fuses ) - 1 No. b) DOL starter suitable for the pump set-1 No. c)0-30 amps ammeter with CTs, selector switch - 1 set. d)0-500V Voltmeter with selector switch - 1 set e)3 Phase indication lamps 1 set (Suitable audio-visual indicator on the ground floor control room regarding status of the system)</td>
<td>1</td>
<td>No</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Pump Panel Housing for protecting the the panel provided with trifford/metal/plastic to protect the panel from weather.</td>
<td>1</td>
<td>No</td>
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<tr>
<td>4</td>
<td><strong>PIPING</strong>&lt;br&gt;Supply, Installation, Testing and Commissioning of MS pipes of the following sizes &quot;B&quot; class confirming to IS : 1239 with malleable specials confirming to IS:1239 part - II, such as elbows, reducers, flanges etc. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports etc. Make: Jindal/Tata/Equivalent</td>
<td>54</td>
<td>Mtrs</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td><strong>BUTTERFLY VALVE</strong>&lt;br&gt;Supply, installation, testing and commissioning of slim seal type cast iron butterfly valves lever operated type with necessary flanges, nuts, rubber insertion gaskets, nuts and bolts complete. Make : Kartar/ Equivalent</td>
<td>4</td>
<td>Nos.</td>
<td></td>
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<tr>
<td></td>
<td>NON RETURN VALVE</td>
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<td>-------------------------------------------------------</td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of slim seal type cast iron non return valves with flanges, nuts, bolts and rubber gaskets for seating the valves complete. Make : Kartar / Equivalent</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>A.100mm dia</td>
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<td></td>
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<tr>
<td></td>
<td><strong>7 HYDRANT VALVE</strong></td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of single headed valve of 63 mm dia stainless steel with instantaneous hose coupling adaptor Make : ISI / Equivalent</td>
<td></td>
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<tr>
<td></td>
<td>Maintenance and repairing of Single headed hydrant valves</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td><strong>8 HOSE REEL SET</strong></td>
<td></td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of hydraulic hose reel complete with swing type drum, 19mm rigid hose having a length of 25 Mtrs. PVC nozzle on one end and all other necessary fixing materials. Make : Mahavir / Equivalent</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>9 HOSE BOX</strong></td>
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<td></td>
<td>Supply, Installation and testing of Custom made Double Door Hose cabinet to accommodate one piece of Hose pipe along with one pair of male and female coupling and one Branch pipe. The cabinet made of MS/Fibre glass sheet, The cabinet is spray painted to scarlet red color outside to e placed outside the Building</td>
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<tr>
<td></td>
<td>Maintenance and repainting of hose cabinets</td>
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<tr>
<td></td>
<td><strong>10 FIRE HOSE</strong></td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of controlled percolated hose in 15M length of 63 mm dia and tested to bursting pressure of 15kg/sqcm and with SS coupling as per IS:901. Make : Newage/ Equivalent</td>
<td></td>
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<tr>
<td></td>
<td><strong>11 BRANCH PIPE</strong></td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of SS branch pipe with 63 mm male hexagonal base nozzle confirming to IS:903. Make : Newage/ Equivalent</td>
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<tr>
<td></td>
<td><strong>12 FIRE BRIGADE INLET</strong></td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of 3 way Fire Brigade Inlet connection of 63 mm dia. built - in Gun metal Non- return valves instantaneous coupling type arrangement to be connected to wet riser main.</td>
<td></td>
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<tr>
<td></td>
<td><strong>13 PRESSURE GAUGE</strong></td>
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<tr>
<td></td>
<td>Supply, installation, testing and commissioning of pressure gauge with 0 to 7kg range 4&quot; dia.</td>
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<tr>
<td>No.</td>
<td>Item</td>
<td>Details</td>
<td>Quantity</td>
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<tr>
<td>14</td>
<td>PRESSURE SWITCH</td>
<td>Supply, installation, testing and commissioning of Pressure switch.</td>
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<tr>
<td>15</td>
<td>BALL VALVE</td>
<td>Supply, installation, testing and commissioning of Ball valve of following dia</td>
<td>11</td>
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<tr>
<td></td>
<td></td>
<td>a. 25mm dia</td>
<td>Nos.</td>
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<td>16</td>
<td>AIR RELEASE VALVE</td>
<td>Supply, installation, testing and commissioning of Air Release valve of 25mm dia</td>
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<tr>
<td>17</td>
<td>POWER CABLEING</td>
<td>Supply and laying of 3*16 Sqmm Aluminum armored cable</td>
<td>35</td>
<td></td>
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<tr>
<td>18</td>
<td></td>
<td>Supply, Installation, Testing and commissioning of water inlet to the Overhead fire tanks with Overflow cut off using Float valve</td>
<td>1</td>
<td></td>
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<tr>
<td>19</td>
<td>FIRE ALARM PANEL</td>
<td>Supply, installation, testing and commissioning of Control Panel of 12 Zone complete with charger, rectifier, alarm display with all other necessary attachments</td>
<td>1</td>
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</tr>
<tr>
<td>20</td>
<td>SMOKE DETECTORS</td>
<td>SITC Analogue photoelectric smoke/Heat detector including all accessories like junction boxes, glands, terminating lugs etc as required as approved</td>
<td>30</td>
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<tr>
<td>21</td>
<td>CABLING</td>
<td>SITC of 2x1.5 Sq.mm FRLS copper armored cable</td>
<td>125</td>
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<tr>
<td>22</td>
<td>WATER TANK</td>
<td>PVC 5000L water with 2.0M dia tank</td>
<td>1</td>
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<td>23</td>
<td>LESS: SCRAP MATERIAL</td>
<td>old dismantled material from the existing Down Comer Hydrant &amp; other material from the system scrap buyback</td>
<td>1</td>
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</tbody>
</table>

Grand Total in Words: TOTAL

Signature of Contractor