

TENDER DOCUMENT

TENDER SPECIFICATION No : BAP:CF:OT: 03/2017-18 Dt: 25/06/2017

NAME OF WORK:

“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai”

PERIOD OF CONTRACT:


Five Months

PART – I – QUALIFICATION BID

(Pages **1 – 304** including this cover page)



CIVIL PROJECTS & SERVICES
BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
BOILER AUXILIARIES PLANT
INDIRA GANDHI INDUSTRIAL COMPLEX
RANIPET – 632 406

	Bharat Heavy Electricals Limited Boiler Auxiliaries Plant Ranipet - 632 406 Tamil Nadu, India CIVIL PROJECTS & SERVICES	
	Phone:	04172 –284792 / 95855 01087
	Email :	mmselvam@bhelrpt.co.in

CIVIL PROJECTS & SERVICES

BAP: CP & S:CONTRACTS:

Dt: 25/06/2017

To

The Tenderer

Dear Sirs,

Sub: **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”**

Ref: 1. Tender Notice No. **BAP:CF:OT: 03/2017-18 DT: 25/06/2017**

Please find enclosed / attached non-transferable tender document containing I) Qualification bid consisting of Preamble, Specifications, General Conditions & Special Conditions of Contract, Norms for Qualification to Tender etc ii) Price bid consisting of Bill of Quantities to offer your most competitive rates for all the items of Bill of Quantities.

Tender for the work should be submitted in a sealed cover consisting of three inner sealed covers viz. i) Qualification bid cover, ii) Price bid cover & iii) EMD cover, all super scribing the name of work, tender schedule number etc.

- 01.** Qualification bid cover shall contain duly filled in qualification bid document signed by the tenderer in all the pages with documentary evidences for Qualification Criteria such as experience, value of work executed in the similar nature of work, etc. **Any bid without proper documentary evidence for Qualification Criteria shall not be considered for further evaluation.**
- 02.** The Price Bid cover shall contain only price bid document duly filled in and signed by the tenderer in all the pages. **The tenderer has to quote most competitive rates for Bill of Quantities from Part – II – Section B: Format to Quote Total Amount only.**
- 03.** EMD cover shall contain requisite EMD in the form of Demand Draft. Tender without EMD will be summarily rejected and the qualification bid & price bid shall not be considered. **Tender documents can be downloaded from web sites. Demand Draft towards EMD shall be drawn in favour of BHEL, Ranipet payable at Ranipet.**

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The completed qualification bid and price bid along with requisite EMD of **Rs. 6,77,750/-** for the work in the form of Demand Draft in favour of BHEL, Ranipet shall reach the office of the undersigned on or before **14/07/2017 at 15.00 hrs.** EMD in any other form other than mentioned in this tender will not be accepted. The qualification bid will be opened on the **same day at 15.00 hrs.** In case of opening day falls on holiday or happened to be declared as a holiday, the receipt and opening of the tender shall automatically fall on the same timing of the next working day. Date and time of opening of the Price Bid shall be intimated only to the bidders those who have qualified after evaluation of the qualification bid. You / your authorized representative may participate in the tender opening. Clarification if any can be obtained contacting following phone No. 04172 – 284792. E-mail: mmselvam@bhelrpt.co.in.

Thanking you,

Thanking you,

Yours faithfully
For and on behalf of
Bharat Heavy Electricals Limited,

Senior Manager / Civil Projects & Services
BHEL-BAP-Ranipet
Vellore – 632406
Tamilnadu.

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Mandatory List of Documents to be submitted by the Tenderer along with the Tender:

- 1) EMD paid details as per tender.
- 2) Work experience (for completed works) certificates of last 7 years as per qualification requirement (QR) of the tender along with copy of the work order / purchase order / work agreement of client work completion certificate issued by them.
- 3) Audited balance sheet and profit & loss account of your company for last 3 years.
- 4) IT return filing proof of last 3 years.
- 5) PAN card.
- 6) VAT registration.
- 7) Goods and Services Tax (GST) registration.
- 8) Sales Tax registration.
- 9) PF registration.
- 10) ESI registration / Comprehensive insurance for the workers.
- 11) No deviation certificate fully filled. (available with the tender)
- 12) Acceptance form for EFT payments, duly filled and signed by the bank manager with his authorization number. (form available with the tender)

**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – I

NOTICE INVITING TENDER	
1. Tender Notice No	BAP:CF:OT: 03/2017-18 Dt: 25/06/2017
2. Name of work	“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”
3. Period of contract	Five Months
4. ESTIMATED COST of the work:	N.A
5. Tender Document Cost	NIL –(can be downloaded freely from BHEL web site – http://www.bhel.com/tender/list_tender.php)
6. Earnest Money Deposit (EMD) Amount	Rs. 6,77,750/- (Rs. Six lakh seventy seven thousand seven hundred and fifty only)
7. Last date & Time for receipt of the completed Tender	14/07/2017 at 15.00 Hrs.
8. Date of Technical bid Opening	14/07/2017 at 15.00 Hrs.
9. Date of Price Bid Opening	Tenderers whose technical bids are found acceptable will be intimated separately about the status of their offers and the date of opening of Price Bid / Reverse Auction.
10. Place of submission of Tender	<u>Tender Box placed in</u> Office of the DGM, Civil Projects & Services, BHEL - BAP, Ranipet – 632 406
11. Address on the Sealed Tender Cover to be:	Deputy General Manager Civil Projects & Services, Bharat Heavy Electricals Limited, Ranipet – 632 406 Vellore District. Tamilnadu
12. Venue of the Tender Opening	Office of the DGM / Civil Projects & Services
13. Tender Document Contains:	Totally 341 pages (Qualification bid & Price bid)

TENDERER

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**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – II

PREAMBLE

Name of work: **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”**

Time is the essence of the contract. Being a time bound work on urgent nature; the contractor should make all efforts to complete the work in the stipulated time.

01. The tenderers are advised to visit M/s NTECL (NTPC Tamil Nadu Energy Company Limited) -BHEL site at Vallur, Chennai and get themselves acquainted with the site conditions before submitting the offer.

02. **Qualifying / Eligibility Criteria:**

The essential qualification requirements of contractors for submission of this tender shall be as under:

- a. Average annual financial turnover of the Contractor during last 3 years ending on 31st March 2016, should **not be less than Rs. 101.66 Lakh** and the tenderer should submit audited balance sheet and Profit & Loss Account for the last three financial years [for F.Y. 2013 – 14, 2014 – 15 & 2015 – 16], duly certified by chartered accountant / auditor.
- b. Contractors having experience of successfully completed similar works[(Similar work means Construction of industrial buildings, RCC control rooms, Structural sheds, machine foundations, water retaining structures, RCC cable trenches – minimum two of these types of civil works involved in the completed work(s)] in a power plant / other process industries of Govt. / PSU / reputed private sector companies / organizations or Corporations / Municipalities during the last 7 years as on **31/05/2017** should be either of the following.

(i) Three similar completed works each costing not less than Rs. 135.55 Lakh.

OR

(ii) Two similar completed works each costing not less than Rs. 169.44 Lakh.

OR

(iii) One similar completed work costing not less than Rs. 271.10 Lakh.

The tenderer should have executed similar type of work in their own name shall be considered.

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- c. The tenderers to note that possession of Provident Fund (PF) code is not a pre-condition for participation in the tender. However, the successful tenderer should ensure to get the PF code No. and the PF amount deducted from their employees are to be deposited in this PF code along with their contribution.
- d. Also Contractor should have separate Registration Code No. for ESI, Sales Tax, PAN and Goods and Services Tax (GST). Contractor shall submit copy of the above registration codes or proof of having applied for the registration codes along with the tender bid.

Tender bids not meeting any of the above pre-qualification criteria shall be rejected.

- 03. Dissimilar / irrelevant works will not be considered for eligibility criteria.
- 04. The details on turnover, works experience (**Works Completion Certificates issued by customers / clients must be enclosed**), P.F, ESI registration etc., all as furnished by the tenderer shall have to be supported with documentary evidences (Xerox copies -attested). If BHEL demands at any stage, original certificates also have to be shown to BHEL authorities.
- 05. Tender Value is only approximate and liable for variation without entitling the tenderer to any compensation, provided the total value of contract does not vary by more than 20% (twenty percentages).
- 06. **The rates quoted shall be valid for three months period from the date of Tender opening (Qualification bid) / Reverse Auction.**
- 07. The offered rate is for finished item of work as per Bill of Quantities and shall provide for the complete cost towards supply of all materials, labour, tools & plants, testing materials, levies, taxes, transport, lay-out, repairs, rectifications, maintenance, supervision, establishment, services, overheads, profits & all other incidentals etc., complete. **The rate quoted shall not include Goods and services tax. The applicable Goods and Services Tax – GST (as quoted extra by the bidder in the Price Bid / limited to applicable tax, whichever is lesser) can be claimed from BHEL along with their monthly bills for further payment to be made for the authorities concerned.** In case of reverse charge applicability, BHEL will not reimburse to the bidder the reverse charge of GST paid by BHEL.
- 08. For any item of work not covered in the Bill of Quantities of the Price Bid, the rate will be arrived at based on the conditions given in BHEL General Conditions of Contract.
- 09. **After award of work the contractor has to furnish the security deposit, as per Clause 11, CHAPTER – IV, TENDER NOTICE, before the commencement of work.**
- 10. As and when required, the contractor has to supply manpower like Unskilled, Semi-skilled, Skilled, Trade certificate holders etc. for which payment (monthly) will be made to the contractor as per the prevailing rates of Government of Tamilnadu for the category including employer's contribution of P.F, ESI & minimum bonus for the wages and a profit margin of 10 %.

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**WAGES & OTHER PAYMENTS / CONTRIBUTIONS TO BE MADE TO THE WORKERS
DEPLOYED IN THE CONTRACT:**

11. The tenderer has to ensure payment of Minimum Wages as per Tamil Nadu State Minimum Wages as applicable under law from time to time.

Also the labourers shall be paid a minimum bonus which shall be 8.33% as per the payment of Bonus Act 1965 for the total wages paid (i.e.) Payment of minimum wages.

The Contractor shall have to remit EPF & ESI contributions at the rates applicable under law to the authorities concerned for the total wages paid.

Normally the revision of Tamil Nadu govt. minimum wage will be with effect from 1st April of every year. TENDERERS ARE REQUESTED TO QUOTE THEIR OFFER AFTER TAKING IN TO ACCOUNT OF THE ABOVE FACTOR ALSO. The quoted rate shall be firm for the entire contract period of one year and any extension of contract if accepted thereafter.

12. The contractor has to carry out the work without affecting the working environment.
13. The decision of Engineer-in-charge shall be final and binding on the contractor regarding clarification of items in this tender schedule.
14. The contractor shall strictly adhere to various labour laws in force.
15. The contractor shall follow norms of BHEL / NTECL security system for movement of men & materials within the complex including biometric system. **The bidder of this tender shall assess all local conditions prevailing at NTECL w.r.t labour engagement, Quality systems of NTECL, work execution procedures etc before Quoting for this tender. The rate quoted shall include for all these factors.**
16. Daily labour report for the manpower engaged on previous day area wise shall have to be submitted next day.
17. Since the responsibility for the quality, workmanship and accuracy of any work being carried out under this contract lies with the contractor, the contractor should ensure that no work is done without the presence of contractor's representative at the work spot.
18. The contractor has to submit the organization chart of their set up for the works and any change thereafter in the organization set up shall have the prior approval of BHEL.
19. Statement of completed works with detailed measurements along with material reconciliation statements shall be submitted by the contractor every week and the payment for the work done will be paid once in a month.
20. The works contract to be entered into with the successful tenderer will be governed by the BHEL General Conditions of Contract in force.

TENDERER

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- 21. All materials brought by the Contractor for incorporation in the work shall be got inspected, tested as per relevant codes and approved by the Engineer-in-charge before they are incorporated in the work.
- 22. The contractor should extend fullest co-operation with the third party agencies engaged, if any by BHEL to adhere the Quality Control Procedures ensuring quality.
- 23. The contractor should extend full co-operation to the other contractors who may be doing other works in the same areas to enable them to execute their portions of work without any delay or difficulty.

24. Electricity

The Contractor shall submit to the Employer within thirty (30) days from the date of acceptance of the Notification of Award, his electrical power requirements, if any, to allow the planning of the same by the Employer. The Contractor shall be provided with free supply of electricity for the purposes of the Contract, only at two locations in the Employer's Site and at 415V voltage level. The Contractor shall make his own further distribution arrangement. All temporary wiring must comply with local regulations and will be subject to Employer's inspection and approval before connection to supply. The free supply of power will not be provided for the use in the labour and staff colony. Power supply for labour and staff colony shall be provided at one point and the Contractor shall be charged at rates prevalent at the site.

Water

Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite / colony within the quoted rates.

- 25. BHEL reserves its right to reject a tender due to unsatisfactory past performance in the execution of a contract at another Project/Unit of BHEL awarded against a different enquiry.
- 26. BHEL reserves its right to accept / reject any or all the tenders.
- 27. No advance / mobilization advance will be given.
- 28. LD / Penalty clause is applicable as per General Conditions of Contract. All the terms & conditions in the tender documents are binding on the tenderers.

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**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER- III

INSTRUCTIONS TO TENDERERS

1. The tender is open to all Contractors. The Contractors not borne on the approved list of contractors of this Organization must submit the following testimonials simultaneously with their tenders.
 - i. A Certificate to establish that the tenderer is an independent contractor working on his own.
 - ii. At least two certificates from responsible Officers of Government / Firms of repute, regarding the tenderer's capacity to undertake and carryout the work tendered for or similar work satisfactorily

NOTE:

- a) Copies of testimonials unless attested by a Gazetted Officer will not be accepted
- b) Non – Submission of the above testimonials simultaneously with the tenders may result in the tender being rejected

2. The tenders should be accompanied by a list of contracts already held by the contractor at the time of submitting the tender and giving the following particulars

- a) Value of each contract
- b) The balance value of work to be done on the same

The tenderer is advised to download the tender document from BHEL / CPP / Tenders India web sites.

3. **Total amount for the tender schedule should be quoted in FIGURES as well as in WORDS in Indian currency only – i.e., Rupees and Paise with reference to the all the items shown in the attached schedule.**

Bidders shall only quote 'Total Amount' in the format given in PART – II Section - B of the price bid. Any other entry elsewhere in the price bid shall be treated as Null and Void.

4. Amount quoted shall include all royalties, terminal taxes, Octroi duties, Central or Provincial Excise Tax, Sales Tax and any other taxes leviable under the State or Central Government rules. The Bharat Heavy Electricals Ltd., will not entertain any claim whatever in this respect. The rate quoted shall not include Goods and services tax. The applicable Goods and services tax (as quoted by the bidder / limited to applicable tax, whichever is lesser) can be claimed from BHEL along with their monthly bills for further payment to be made for the authorities concerned. In case of reverse charge applicability, BHEL will not reimburse to the bidder the reverse charge of GST paid by BHEL.

TENDERER

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5. Tender Value is only approximate and liable for variation without entitling the tenderer to any compensation, till the total **value of contract vary by more than 20% (Twenty Percentage)**
6. The works contract to be entered in to with the contractor will be governed by the BHEL General Conditions of contract in force.
7. **Should a tender find discrepancies or omissions in the drawings or any of the tender documents or should be in doubt as to their meaning, he should at once address the authority inviting the tender for clarification. Every Endeavour is made to avoid any error which can materially affect the basis of the tender but the successful tenderer shall take upon himself to provide for the risk of any error which may be subsequently by discovered and shall make no subsequent claim on account thereof.**
8. Tenders submitted by post should be sent “Registered Post with Acknowledgement due”. These should be posted with due allowance for any delay in postal delivery. Tenders received after the due date and time of opening are liable to be rejected.
9. The contractor’s responsibility under this shall commence form the date of receipt of contract or the order of acceptance of his tender. The scheduled period of completion for this work will be **Five Months**, and the Contractor will have to plan his work accordingly.
10. The maintenance period for this work will be **Six Months**.
11. **Earnest Money Deposit:**

Earnest Money is to be paid by each tenderer to ensure that the tenderer does not refuse to execute the work after it is awarded to him.

EMD shall be furnished only in the form of

- (i) Cash deposit as permissible under the extant Income Tax Act.**
 - (ii) Electronic Fund Transfer credited in BHEL account.**
 - (iii) Banker’s Cheque / Pay Order / Demand Draft in favour of BHEL, payable at Ranipet.**
- EMD in any other form will not be accepted.**

(One Time EMD is not applicable for this tender. If you have already deposited One Time EMD with BHEL-Ranipet / with any other unit of BHEL, the same will not be considered for this tender. The bidder has to pay separate EMD for this tender without fail)

EMD by the Tenderer will be forfeited as per tender Documents if:

- a) After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates,
- b) The tenderer does not commence the work within the period as per LOI / Contract. In case the LOI / contract is silent in this regard then within 15 days after award of contract.

EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of acceptance of award of work by the successful tenderer. **EMD shall not carry any interest.**

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BHEL has now made arrangements for payment of EMD thru' Online

The steps to make online payment are detailed as below:

- a) Visit <https://www.onlinesbi.com/prelogin/icollecthome.htm>
- b) Click 'Proceed' button.
- c) Select '**Tamilnadu**' in the drop down menu under 'State of Corporate / Institution *'
- d) Select '**PSU-PUBLIC SECTOR UNDERTAKING**' in the next drop down menu under "Type of Corporate / Institution"
- e) Click 'Go' button
- f) Select '**BHEL BAP RANIPET**' in the drop down menu under "PSU – PUBLIC SECTOR UNDERTAKING"
- g) Click 'Submit' Button
- h) Select '**EMD**' in the drop down menu under 'Select Payment Category'
- i) Now Fill in the required details and ensure correctness of data filled. Ensure that you are entering correct enquiry/tender number and other details correctly.
- j) Make payment for EMD as required in tender after entering the details and enclose copy of receipt along with tender documents. Scan and upload the receipt document in case of tender under e-procurement mode.

The above facility is in addition to the existing method of remitting by Demand Draft.

12. Should a tenderer or a contractor on the list of approved Contractors have a relative, or in the case of a firm or Company of contractors any of its share holders or share holder's relative, employed in a gazetted capacity in the Engineering Department of the Bharat Heavy Electricals Limited, the authority inviting tenders shall be informed of this fact at the time of submission of the tender, failing which tender, may be disqualified or if such fact subsequently comes to light, the contract may be rescinded in accordance with the relevant provisions in the General Conditions of Contract.
13. If tenderer expires after the submission of his tender or after the acceptance of his tender the BHEL may, at their discretion, cancel such tender. If a partner of a firm expires after submission of tender or after the acceptance of the Tender, BHEL may cancel such Tender at their discretion unless the firm retains its character.
14. The Bharat Heavy Electricals Limited will not be bound by any power of attorney granted by the tenderer or by changes in the composition of firm made subsequent to the execution of the contract. They may however recognize such power of attorney and changes after obtaining proper legal advice the cost of which will be chargeable to the contract concerned.
15. If the tenderer deliberately gives wrong information in his tender or creates conditions favourable for the acceptance of his tender, the Bharat heavy Electricals Limited, reserves the right to reject such tender at any stage.

TENDERER

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16. Words importing the singular number shall also be deemed to include the plural number and vice versa where the context so requires.
17. The expenses for competing and stamping the agreement shall be paid by the contractor.
18. The General and special conditions are complementary to each other and where they are conflict the Special Conditions shall prevail. In regard to matters not covered by the General and Special Conditions of Contract, those contained in the Tamil Nadu Building Practice Standard Specifications or other specifications approved by the Bharat Heavy Limited, shall apply.
19. Tenderers shall not increase their quoted rates in case the Bharat Heavy Electricals Limited negotiates for reduction of rates. Such negotiation shall not amount to cancellation or withdrawal of the original offer and the rates originally quoted shall be binding on the tenderers for a period of three months from the date of opening of tenders.
20. Canvassing in any form in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection
21. All contractors will have to produce Income Tax Clearance Certificate from the Income Tax– Officer concerned along with their tenders. Those Contractors whose income is not taxable will be required to give an affidavit of their income on the prescribed form. If the successful tenderer fails to produce the Income – tax clearance certificate within the stated period, the Earnest Money Deposit and Security Deposit of the tenderer may be forfeited and the contract terminated.
22. **Benefits to Micro, Small & Medium Enterprises (MSE):** Guidelines of the Govt. of India shall be followed to provide benefits to MSE. MSE suppliers can avail the intended benefits only if they submit along with offer, attested copies of either EM-II certificate having deemed validity (Five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with CA certificate (Format enclosed as per Appendix – IV) applicable for the year, certifying quantum of investment in plant and machinery within the permissible limit as per the act for relevant status (Micro or small) where the deemed validity of EM-II is over. Date to be reckoned for determining the deemed validity will be the last date of technical bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents.

APPENDIX – IV

Certified by Chartered Accountant on letter head

This is to certify that M/s, (hereinafter referred to as 'company') having its registered office at is registered under MSMED Act 2006, (Entrepreneur Memorandum No (part-II) dtd Category:..... (Micro/Small) (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as on date as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O.1722(E) dated 5, 2006:

Rs..... Lakhs

2. **For Services Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006:

Rs..... Lakhs

The above investment of Rs..... Lakhs is within permissible limit of Rs..... Lakhs for Micro / Small (**Strike off which is not applicable**) Category under MSMED Act 2006.

Date:

(Signature)

Name –

Membership Number –

Seal of Chartered Accountant

TENDERER

ACCEPTING OFFICER

BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT

CHAPTER - IV

TENDER NOTICE

NAME OF WORK: **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”**

1. SEALED TENDERS for the above noted work are hereby invited from contractor experienced in works of similar kind and magnitude. Tenders will be received by DEPUTY GENERAL MANAGER / CIVIL PROJECTS & SERVICES, **Bharat** Heavy Electricals Limited, Ranipet – 632 406 up to **15.00** Hrs. on **14/07/2017** and (Qualification Bid only) will be opened on the same day at **15.00** Hrs. at the **Office of the SENIOR MANAGER / CIVIL PROJECTS & SERVICES** in the presence of such of those tenderers Or their agents who may choose to attend.
2. TENDERS must be submitted in sealed covers and should be addressed to with full name and address of the tenderer and the name of work being noted on the cover.
3. All entries in the tender documents should be in the one ink. Erasers and over writings are not permitted. All cancellations and insertions should be duly signed by the tenderer concerned.
4. TENDERERS should fill in all the required particulars in the blank spaces provided for this purpose in the tender documents and also sign each and every page of Tender Documents including the drawings attach there to before submitting their tender.
5. Clause regarding rates quoted in the tender:-
 - a. If, in the price structure quoted for the required goods / services / works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.
 - b. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
 - c. If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject of (a) and (b) above.
 - d. If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date up to which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.
6. In quoting their rates, the tenderers are advised to take account all factors including any fluctuations in the market rates etc. No claim will be entertained on this account after acceptance of the tender or during the currency of the contract.

TENDERER

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7. Before tendering, the tenderers are advised to inspect the site of work and its environments and be well acquainted with the actual working and other prevalent conditions, position of materials and labour, General and Special Conditions of Contract. Instructions to tenders, drawings and Specifications and all other documents which form part of the Agreements to be entered into.
8. **The rates quoted in the tender shall remain valid for a period THREE MONTHS** from the due date of opening of the tender (Qualification bid).
9. In the event of tender being submitted by firm the tender must be signed separately and legibly by each partner or member of the firm or in their absence, by the person holding the power of attorney on behalf of the firm concerned in the latter case a copy for the power of attorney duly attested by a Gazetted Officer must accompany the tender.
10. Every tender must be accompanied with EMD for the amount as specified in Page No. **12** in any of the form mentioned in Para **11** of the “Instruction to Tenderers”. This Earnest Money will be refunded to the unsuccessful tenderers within fifteen days of finalization of the award of work. In case of the successful tenderer, the Earnest Money will be retained as part of the Security Deposit for satisfactory completion of the work in accordance with Clause 16 of the General Conditions of Contract

NOTE: Cheques, Currency Notes and Money Orders will not be accepted in lieu of the deposit receipt referred to above

11. **Security deposit:** Chapter – III clause 18 (18.1.1 to 18.1.5) Page Nos. 12 & 13 of General Conditions of contract booklet deleted & Revised as below.
 - a) The rate of Security Deposit (SD) will be 5% of the contract value.
 - b) 50% of the required Security Deposit, including the EMD, should be collected before start of the work from the Contractor. Balance of the Security Deposit can be collected by deducting 10% of the gross amount progressively from each of the running bills of the Contractor till the total amount of the required Security Deposit is collected.
 - c) The security deposit may be furnished in any one of the following forms:
 - 1) Cash (as permissible under the Income Tax Act)
 - 2) Local cheques of scheduled banks, subject to realization.
 - 3) Pay order / Demand draft / Electronic fund transfer in favour of BHEL,
 - 4) Bank guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.
 - 5) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/c BHEL, duly discharged on the back.

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6) Securities available from Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly endorsed / hypothecated / pledged in favour of BHEL and discharged on the back).

EMD of the successful tenderer can be converted and adjusted against the security deposit.

The security deposit shall not carry any interest.

(Note: Acceptance of security deposit against Serial No.5 & 6 above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However BHEL will not be liable or responsible in any manner for the collection of Interest or renewal of the documents or in any other matter connected therewith.)

50% of the security deposit may be refunded on completion of the work after payment of the final bill and the balance 50% of the security deposit is refundable only after the expiry of the maintenance period of six (6) months from date of completion of work as stipulated in the contract concerned.

12. Unless the contractor whose tender is accepted signs the Contract Agreements and makes the necessary security deposit specified in Para **11 above within Seven days of the date of the order** directing him to do so the amount of Earnest Money Deposit already deposited by him will be forfeited and acceptance of his tender withdrawn.
13. If after opening of tenderer revokes his tender or increases his earlier quoted rates or after acceptance of his tender does not commence the work in accordance with the instruction of the Engineer-in-charge, the Earnest Money deposited by him will be forfeited and acceptance of his tender withdrawn. If only a part of the work included in the tender had been awarded to the tenderer, the amount of Earnest Money to be forfeited will be based on the value of the contract so awarded.
14. The Bharat Heavy Electricals Limited reserve the right to reject any or all the received or accept any tender or part thereof without assigning any reason thereof. In the case acceptance of part of tender, time for completion may also be reduced to the extent considered appropriate by the Accepting Authority.
15. Conditional and un witnessed tenders, tender containing absurd rates and amounts, tenders which are incomplete or otherwise considered defective and tenders not in accordance with the tender conditions laid down by the Accepting Officer are liable to be rejected.
16. Tenders not submitted on the prescribed form are liable to be rejected
17. The work must be completed within a contract period of **Five Months**.
18. The General Manger / Additional General Manager / Senior Manager / Senior Engineer or the Officer mentioned by BHEL shall be Accepting Officer, herein after referred to as such for the purpose of this contract.
19. This tender notice shall be deemed to form an integral part of the contract to be entered into for this work.

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20. The tenderers are advised to go through the condition stipulated in the Tender document & code of conduct for Health & Safety of Contract Labourer in details. Any violation thereof will invite punitive action being taken against them. While quoting the rate all the above factors are to be taken into account.
21. **Quoted rates shall be firm through out the contract period of **Five Months** and extended contract period also and no cost escalation is allowed on any account.**
22. **The similar works executed in the own name of the tenderer only will be considered for eligibility / qualification criteria.**
23. BHEL reserves the right to increase or decrease the tendered quantity.
24. Lowest prices received against BHEL tenders need not be the technically acceptable one, and in that case, BHEL reserves the right not to consider the same.
25. BHEL reserves the right to negotiate or refloat the tender opened, if L1 Price is not lowest acceptable price to them inter-alia other reasons.
26. **The contract will be finalized based on the overall LOWEST value and to be awarded to single party only since split in schedules is not possible.**
27. *"No interest shall be payable by BHEL on Earnest Money or Security Deposit, if applicable, or any money due to the Contractor by BHEL."*
28. *"BHEL shall have the right to recover any money which in the sole opinion of BHEL is due from the Contractor from any money due to the Contractor under this Contract or any other contract or from the security Deposit furnished by the Contractor under this contract or any other contract."*
29. *"Notwithstanding anything to the contrary, including, but not limited to, provisions relating to extension of time and compensation for delay, time shall be the essence of the Contract."*
30. *"BHEL's Guidelines for Suspension of Business Dealings with Suppliers / Contractors shall apply to this Tender / Enquiry. The said Guidelines are available at http://www.bhel.com/vender_registration/pdf/Suspension_guidelines_adbridged.pdf*
- The Bidders shall peruse the same prior to submission of the bid.*
- Any action taken or proposed to be taken by BHEL under the above said policy shall be without prejudice, and in addition, to other rights and remedies as may be available to BHEL under contract or law."*
31. *In respect of work within the premises of BHEL Ranipet / customer premise, the Bidder shall, while quoting, take into the account the likely expenditure in complying with statutory obligations including PF & ESI related laws and the expenditure that would be incurred in making contributions towards PF & ESI as per the NIT. The Bidder shall refer to the general conditions of contract which forms a part of NIT in this regard.*
32. *In respect of work within the premises of BHEL Ranipet / customer premise the contractor shall strictly comply with labour laws including PF & ESI related laws and shall make contributions towards PF & ESI notwithstanding the numerical strength of the employees of the contractor.*

**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – V

SPECIAL CONDITIONS OF CONTRACT

1. Contract supervisor shall be responsible for all official correspondences with BHEL.
2. The contractor should maintain all monitoring records as listed in Chapter – VIII.
3. The contractor shall ensure payment of Minimum wages, Bonus to the workmen employed by him at the rate at which shall not less than the minimum wage applicable under Law from time to time.
4. PF & ESI Act should cover the workmen as applicable and payment will be made only on verification of the documents for the remittance of ESI and PF for the personnel engaged in the work.
5. The contractor should submit the list and quantity of consumables and spares used every month for the verification by BHEL.
6. The workers should be provided with personal protective equipments such as Gloves, Goggles, safety shoes, Gum boots, face masks, waste cloths, soaps, etc by the Contractor within the quoted rates.
7. The contractor should follow all procedures pertaining to safety and EMS in day to day running of the plant.
8. The contractor should keep a First Aid Box with list of Aids and should be refilled as and when required.
9. **During this period the contractor should take whole responsibility of the working site. Any deviation from the performance requirement of quality as per norms, the contractor shall immediately take steps to rectify the deficiency without any extra cost to the Authority.**

Scope of work:

1. The work to be done under this contract consist of providing all materials, labour, construction equipment, supervision, scaffoldings, tools & plants, transportation & storage and all incidental items not shown or specified but reasonably implied or necessary for completion of entire civil works required.
2. Tenderer drawings annexed hereto are preliminary and give the nature of work and only for guidance to the tenderers. The work shall be carried out in accordance with drawings to be made available during the course of execution of works.
3. The contractor in the event of this work awarded to him, shall establish an office at site and keep posted an authorized responsible officer with a valid power of attorney for the purpose of the contract along with other staff like safety officer, quality control officer, engineers, supervisors etc. Any order or instructions of the Engineer – in – charge or his duly authorized representative, at site office will be deemed to have been communicated to the contractor at his legal address.

Completion schedule:

The contractor is required to commence the work within 15 days from the date of issue of LOI, failing which the contract is liable to be cancelled and EMD / SD shall be forfeited.

The work shall be executed in a workman like manner and as per relevant Indian Standard Specification.

The Engineer – in – charge will communicate or confirm his instructions to the contractor in respect of the execution of the work in a “work site order book” maintained at his office and confirm receipt of such instructions by signing the relevant entries in this book. Such entries will rank as order or notices in writing within the intent and meaning of these conditions.

Quality of Works

All materials supplied by the contractor and incorporated on the work shall conform to the latest IS specifications including the applicable amendments and revisions from time to time.

It is not the intent to specify here in all details, however the work in all respects shall confirm to CPWD / IS codes and standard engineering practices and workmanship. If there is any ambiguity between the specifications, the decision of the Engineer – in – charge shall be final and binding on the contract.

Any work found defective / unsatisfactory the contractor has to rectify the same at his own cost. In case the contractor fails to rectify the defects within a specified time as per the Engineer – in – charge’s instructions the same will be got done by BHEL at the risk and cost of the contractor and the cost deducted from the contractor’s bill.

The contractor shall prepare and submit quality assurance program / comply with any other quality plan requirement proposed by NTECL / BHEL with all details along with tender documents and indicate the field equipment that he is going to use for quality assurance.

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Site Clearance

Written permission for erection of temporary work sheds at site will have to be obtained from BHEL / NTECL. Once the work is completed the contractor should remove his temporary shed and also the unwanted materials and dispose the debris as instructed by the Engineer – in – charge, around the constructed area, the contractor should remove all debris and clear unwanted materials.

Project Information

Project site is located at inside NTECL Power Plant, Vallur, Chennai in Tamilnadu State.

Note:

Bidders are requested to visit site and verify themselves about the actual lead and assess the site condition before quoting for the job. No compensation for not acquainting themselves with the actual site conditions will be entertained at the later stage.

Technical specifications

1. All civil and road works shall have to be carried out strictly as per the specifications including all applicable official amendments and revisions laid down in Tamil Nadu Building Practice volume I & II for reference the above volumes are kept in the office of Deputy General Manager / Civil Projects & Services. However, in cases of conflicts of specifications, M/s NTECL specifications will prevail.
2. All structural and fabrication works shall have to be carried out as per BHEL General Specifications and special conditions incorporated under “Structural Steel Construction” (for reference the specifications are kept in the office of the Deputy General Manager / Civil Projects & Services.
3. ***BHEL shall not supply any material, tools & plants for this work or for any other purpose on free / chargeable basis. Contractor shall supply all the materials (i.e. cement, reinforcement steel, structural steel, sand, bricks & aggregates etc.), labour, scaffoldings, tools & plants required for this work within their quoted rates.***

Undertaking by the tenderer / contractor:

1. I/We have gone through the BHEL General Specifications and Special Conditions incorporated under “Structural Steel Construction”.
2. I/We have gone through the customer (NTECL) specifications and agreed to follow the specification for construction.

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**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – VI

Reverse Auction

It is planned to conduct English Reverse Auction for this tender the rules, terms and conditions for the same are included in the tender.

It is the discretion of BHEL to conduct the Reverse Auction or directly open your envelope price bid and award the work.

As such, you are requested to submit your most competitive rates in your sealed envelope price bid itself for this tender.

The bidder shall agree for both the above options; otherwise the tenders will be rejected.

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Business Rules, Terms & Conditions of Reverse Auction:

Business Rules, Terms & Conditions of Reverse Auction for **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai”** against the Tender No. **BAP:CF:OT:03/2017-18 Dt: 25/06/2017**

BUYER NAME	BHARAT HEAVY ELECTRICALS LIMITED BOILER AUXILIARIES PLANT CIVIL PROJECTS & SERVICES RANIPET-632 406 E-mail: rathinam@bhelrpt.co.in , mmselvam@bhelrpt.co.in
AUCTION TO BE CONDUCTED BY	Name and Address of Service Provider
DATE OF AUCTION	Auction Date : xx/xx/2017 Sealed Bid Time : 14.00 PM – 14.30 PM Reverse Auction Time : 15.00 PM – 16.00 PM Auction Website: xxxxxxx
DOCUMENTS ATTACHED	1) Business rule for reverse auction (Annexure I) 2) Terms & conditions of reverse auction (Annexure II) 3) Process Compliance Statement (Annexure III) 4) Price Confirmation (Annexure IV) 5) Contact Information 6) RA Excel Sheet (Document for RA only)
SPECIAL INSTRUCTIONS	<u>Bidding in the last minutes and seconds should be avoided in the bidders own interest. Neither the Service Provider nor BHEL will be responsible for any lapses / failure on the part of the vendor, in such cases.</u>

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Terms & Conditions of Reverse Auction:

Against this enquiry for the subject item / system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH **Service Provider**). The philosophy followed for Reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit "online sealed bid" in the Reverse Auction. Non-submission of "online sealed bid" by the bidder for any of the eligible items for which techno-commercially qualified will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
3. BHEL will engage **Service Provider**, who will provide all necessary training and assistance before commencement of on line bidding on internet.
4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
5. Business rules like event date, time, bid decrement, extension etc., also will be communicated through **Service Provider** for compliance.
6. Bidders have to fax the Compliance form (annexure III) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Goods and Services Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.
8. Reverse auction will be conducted on scheduled date & time.
9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure IV) as provided on case-to-case basis to **Service Provider** within two working days of Auction without fail.
11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.

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12. Bidders shall be required to read the “Terms and Conditions” section of the auctions site of **Service Provider**, using the Login IDs and passwords given to them by **Service Provider**, before reverse auction event. Bidders should acquaint themselves of the “Business Rules of Reverse Auction”, which will be communicated before the Reverse Auction.
13. If the Bidder or any of his representatives are found to be involved in Price manipulation / cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped / aborted.
14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
15. In case BHEL decides to go for reverse auction, the H1 bidder(s) (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

Business Rules for Reverse Auction:

This has reference to tender no **BAP:CF:OT:03/2017-18 Dt: 25/06/2017**. BHEL shall finalize the Rates for **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai”** through Reverse Auction mode. BHEL has made arrangement with **Service Provider**, who shall be BHEL’s authorized service provider for the same. Bidders should please go through the guidelines given below and submit acceptance of the same.

The technical & commercial terms are as per (a) BHEL Tender Enq. No **BAP:CF:OT:03/2017-18 Dt:25/06/2017** (b) Bidder’s technical & commercial bid (in case of two part bid) and (c) subsequent correspondences between BHEL and the bidders, if any.

1. Procedure of Reverse Auctioning:

- I. **Online Sealed Bid:** This duration of online sealed bid will be 30 minutes. All bidders have to submit their online sealed bids during this period.
- II. **Online Reverse Auction:** The “opening price” i.e. start price for RA and “bid decrement” will be decided by BHEL.
- III. If BHEL decides the lowest online sealed bid as the starting price, then the lowest bidder in online sealed bid shall be shown as current L1 automatically by the system and no acceptance of that price is required. System shall have the provision to indicate this bid as current L1.
- IV. Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become “L1” and this continues as an iterative process.
- V. After the completion of the online reverse auction, the Closing Price (CP) shall be available for further processing.

2. Schedule for reverse auction:

The Reverse Auction is tentatively scheduled on **xx/xx/2017** and the duration of online sealed bid will be **30 minutes**. All bidders to submit their online sealed bids during this period.

Online Sealed Bid: -

Start Time: 14:00 Hrs.

Close Time: 14:30 Hrs.

Online Reverse Auction: -

Start Time: 15:00 Hrs.

Close Time: 16:00 Hrs.

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- 3. Auction extension time:** If a bidder places a bid in the last **10 minutes** of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another **10 minutes**, for the entire auction (i.e. for all the items in the auction), from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last **10 minutes** and if that bid gets accepted as the lowest bid. If the bid does not get accepted as the lowest bid, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last **10 minutes** of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.

The above process will continue till completion of Reverse Auction.

Complaints / Grievances, if any, regarding denial of service or any related issue should be given in writing thru e-mail / fax to **Service Provider**, with a copy to BHEL within 15 minutes from the initial closing time of Online Reverse Auction.

- 4. Bid price:** The Bidder has to quote the F.O.R. destination Price inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, ED + cess, CST against C-form, Freight (bidder to provide original Freight paid receipt), insurance charges, etc. including loading (if indicated by BHEL due to deviations in commercial terms) for the Items specified. Details are as shown in Excel Sheet for calculation of Landed cost.

Note: For the consideration of L1 bidder, the bid value shall be reduced by loading amount, if applicable.

- 5. Bidding currency and unit of measurement:** Bidding will be conducted in {*Indian Rupees per Unit*} of the material as per the specifications.

In case of foreign currency bids, exchange rate (TT selling rate of State Bank of India) as on scheduled date of tender opening (Part-I bid in case of two part bid) shall be considered for conversion in Indian Rupees. If the relevant day happens to be a bank holiday, then the forex rate as per the previous bank (SBI) working day shall be taken.

- 6. Validity of bids:** Price shall be valid for **90 days** from the date of reverse auction. These shall not be subjected to any change whatsoever.
- 7. Lowest bid of a bidder:** In case the bidder submits more than one bid, the lowest bid at the end of Online Reverse Auction will be considered as the bidder(s) final offer to execute the work.
- 8.** Bidders shall be assigned a **Unique User Name & Password** by BHEL or **Service Provider**. Bidders are advised to change the Password and edit the information in the Registration Page after the receipt of initial Password from BHEL / **Service Provider**. to ensure confidentiality. All bids made from the Login ID given to the bidders will be deemed to have been made by the bidders / bidder's company.

- 9. Post auction procedure:** BHEL will proceed with the Lowest Bid in the Reverse Auction for further processing.
- 10.** Any commercial / technical loading shall be intimated to bidders prior to RA. The excel sheet provided in this regard shall cover all these aspects. Commercial / technical loading if any, shall be added by the respective bidder in its price during online sealed bid & Online Reverse Auction. Modalities of loading & de-loading shall be separately intimated to the bidders. The responsibility for correctness of total cost to BHEL shall lie with the bidders.
- 11.** Computerized reverse auction shall be conducted by BHEL (through **Service Provider**), on pre-specified date, while the bidders shall be quoting from their own offices / place of their choice. Internet connectivity shall have to be ensured by bidders themselves.

During the RA if a bidder is not able to bid and requests for extension of time by fax / e-mail / phone then time extension of additional 15 minutes will be given by the service provider provided such requests come before 5 minutes of auction closing time. However, only one such request per bidder can be entertained.

Despite this extension if bidder fails to upload his prices due to extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders' responsibility / decision to send fax communication immediately to **Service Provider**, furnishing the price the bidder wants to bid online with a request to the **Service Provider**, to upload the faxed price on line so that **Service Provider** will upload that price on line on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable / legible form and also the Bidder should simultaneously check up with **Service Provider** about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be uploaded by **Service Provider** only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time / reverse auction. It shall also be noted that **Service Provider** should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of **Service Provider** at the time of receipt of the fax message from the bidders, **Service Provider** will not be uploading the prices and either BHEL or **Service Provider** are not responsible for this unforeseen circumstances. In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements / alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor **Service Provider** is responsible for such eventualities.

12. Proxy bids: Proxy bidding feature is a pro-bidder feature to safe guard the bidder's interest of any internet failure or to avoid last minute rush. The proxy feature allows bidders to place an automated bid in the system directly in an auction and bid without having to enter a new amount each time a competing bidder submits a new offer. The bid amount that a bidder enters is the minimum that the bidder is willing to offer. Here the software bids on behalf of the bidder. This obviates the need for the bidder participating in the bidding process until the proxy bid amount is decrementally reached by other bidders. When proxy bid amount is reached, the bidder (who has submitted the proxy bid) has an option to start participating in the bidding process.

The proxy amount is the minimum amount that the bidder is willing to offer. During the course of bidding, the bidder cannot delete or change the amount of a proxy bid.

Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing bidder bids, regardless of the fact whether the competing bids are submitted as proxy or standard bids. However, it may please be noted that if a manual bid and proxy bid are submitted at the same instant manual bid will be recognized as the L1 at that instant.

In case of more than one proxy bid, the system shall bid till it crosses the threshold value of each lowest proxy bid and thereafter allow the competition to decide the final L1 price.

Proxy bids are fed into the system directly by the respective bidders. As such this information is privy only to the respective bidder(s).

13. Bidders are advised to get fully trained and clear all their doubts such as refreshing of Screen, quantity being auctioned, tender value being auctioned etc. from **Service Provider**.
14. **Service Provider**, shall arrange to demonstrate / train the bidder or bidder (s) nominated person(s), without any cost to bidders. **Service Provider**, shall also explain the bidders all the business rules related to the Reverse Auction. Bidders are required to submit their acceptance to the terms and conditions / modalities before participating in the Reverse Auction in the process compliance form as enclosed. Without this, the bidder will not be eligible to participate in the event.
15. Successful bidder shall be required to submit the final price (L1) in prescribed format (Annexure – VI) for price breakup including that of line items, if required, quoted during the online Reverse Auction duly signed and stamped as token of acceptance without any new conditions (other than those already agreed to before start of auction), after the completion of auction to **Service Provider**, besides BHEL within two working days of Auction without fail.
16. Any variation between the final bid value and that in the confirmatory signed price breakup document will be considered as tampering the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings (as available on www.bhel.com).

17. Bidders' bid will be taken as an offer to execute the work / supplies the item as per enquiry no. **BAP:CF:OT:03/2017-18 Dt: 25/06/2017**. Bids once made by the bidder, cannot be cancelled/ withdrawn and bidder shall be bound to execute the work as mentioned above at bidder's final bid price. Should bidder back out and not execute the contract as per the rates quoted, BHEL shall take action as per extant guidelines for suspension of business dealings (as available on www.bhel.com).
18. Bidders shall be able to view the following on their screen along with the necessary fields during Online Reverse Auction:
- Leading (Running Lowest) Bid in the Auction (only total price of package)
 - Bid Placed by the bidder
 - Start Price
 - Decrement value
 - Rank of their bid during bidding as well as at the close of auction.
19. BHEL's decision on award of contract shall be final and binding on all the Bidders.
20. BHEL reserves the right to extend, reschedule or cancel the Reverse Auction process / tender at any time, before ordering, without assigning any reason, with intimation to bidders.
21. BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. In such cases, the decision of BHEL shall be binding on the bidders.
22. Other terms and conditions shall be as per bidder(s) techno-commercial offers and other correspondences, if any, till date.
23. If there is any clash between this business document and the FAQ available, if any, in the web site of **Service Provider**, the terms & conditions given in this business document will supersede the information contained in the FAQs. Any changes made by BHEL or **Service Provider**, (due to unforeseen contingencies) after the first posting shall be deemed to have been accepted if the bidder continues to access the portal after that time.
24. Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party. If the Bidder or any of his representatives are found to be involved in Price manipulation / cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines for suspension of business dealings (as available on www.bhel.com), shall be initiated by BHEL.

Process Compliance Form:

(The bidders are required to print this on their company's letterhead and sign, stamp before RA)

To

Service Provider name and address.

Sub: Agreement to the Process related Terms and Conditions.

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the BHEL enquiry no - **BAP:CF:OT:03/2017-18 Dt: 25/06/2017.**

This letter is to confirm that:

- 1) The undersigned is authorized official / representative of the company to participate in RA and to sign the related documents.
- 2) We have studied the Reverse Auction Terms & Conditions and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
- 3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
- 4) We also confirm that, in case we become L1 bidder, we will email / fax the price confirmation & break up of our quoted price (including that of line items) as per *Annexure - IV* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post / courier both to M/s. BHEL and **{Service Provider.}**
- 5) We also confirm that in case we become L1 bidder, the envelope sealed price bid submitted by us shall be opened by BHEL and we agree to accept the lower of the two bids (RA closing price & envelope sealed price) for placement of order and we have understood that in case online sealed bid placed by us is found higher than envelope sealed price bid submitted by us, then BHEL may take action as stipulated in NIT.

We, hereby confirm that we will honour the Bids placed by us during the auction process.

With regards

Signature with company seal

Name –

Company / Organization

Designation within Company / Organization

Address of Company / Organization

Sign this document and Fax it to **Service Provider**, prior to start of the Event.

TENDERER

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RA price confirmation and breakup:**To****Service Provider Name and Address**

CC: BHARAT HEAVY ELECTRICALS LIMITED
 BOILER AUXILIARIES PLANT
 CIVIL PROJECTS & SERVICES
 RANIPET-632 406

Sub: Final price quoted during Reverse Auction and price breakup

Dear Sir,

We confirm that we have quoted.

Rs. {_____ in value & words _____} for item covered under tender enquiry No. BAP:CF:OT:03/2017-18 Dt: 25/06/2017.

Total price of the items covered under above cited enquiries is inclusive of *Goods and services tax and other as per NIT.*

Our final landed prices as quoted during the Reverse Auction conducted today {xx/xx/2017} which will be valid for a period of 90 (Ninety) days.

=====

Total (Grand total including Goods and Services tax) - Rs.

=====

(Details of individual price breakups for each sections of price schedules is attached herewith in BHEL Excel sheet format)

Thanking you and looking forward to the valuable order from BHEL.

Yours sincerely,

For _____

Name:**Company:****Date:****Seal:**

TENDERER

ACCEPTING OFFICER

CONTACT INFORMATION:

Service Provider	Bharat Heavy Electricals Limited
Contact person Name Company Address Contact No E-mail ID	Civil Projects & Services Department Shri. G. Rathinam, DGM/CIVIL PROJECTS & SERVICES BHEL, Ranipet - 632 406 Email : rathinam@bhelrpt.co.in Phone : 04172 284632 Cell : 094425 24416 (Or) Shri. M. Muniselvam Sr. Manager/Civil Projects & Services BHEL, Ranipet - 632 406 e-mail: mmselvam@bhelrpt.co.in Ph : 04172-284792 Cell: 09585501087

**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – VII

GENERAL INSTRUCTIONS

1. The contractor shall not resort to sub-contracting under any circumstances. If found at a later date, BHEL reserves the right to take action whatever action it deems fit, including cancellation of the contract.
2. All the bills of contractors will be cleared by Finance department subject to production of “Clearance certificate’ by the contractors in respect of compliance of all statutory requirements, issued by IR section of Human Resource Department
3. Disputes, grievances between the contractor and his labour, will have to be settled by the contractor.
4. If the management of BHEL engages workers to complete any part or whole of the work as per this contract for any period due to failure of the contractor or to engage adequate number of workers. He has to reimburse to BHEL, the extra cost involved on this account. The extra cost of engaging such workmen by BHEL will be reckoned at the rate as per minimum wages and other payments (as mentioned in the tender reg. wages payable to the workers) of BHEL for purpose of recovery from the contractor along with BHEL’s administrative charges @ 12.5%.
5. The management of BHEL shall be at liberty to terminate the contract by issuing a month’s notice to the contractor without assigning any reason what so ever. As regards unsatisfactory performance or non compliance with any of the terms and conditions of the contract by the contractor, BHEL shall have the right to terminate the contract forthwith without notice & rearrange the balance work through other agencies at the risk and cost of the contractor & under such circumstances, the security deposit paid by the contractor shall stand forfeited.
6. The contractor shall follow such Act, rules & regulations of the state / central Govt. that are in force & that may be framed from time to time. BHEL shall not be responsible for any infringement of the various statues in force by the contractor.
7. In case, the contractor fails to make payment of wages to his employees or remittance of contribution to the concerned authorities & a claim is made against BHEL for whatsoever reason, the security deposit / other dues / running bills under the contract can be utilized by BHEL to discharge the liability of the contractor.
8. Contractor shall indemnify BHEL against all claims and losses it suffers under various labour laws, statues or any civil or criminal law in connection with employees deployed by him.
9. Contractor shall obtain necessary insurance cover at his own cost to mitigate any risk of accidents, losses, damages etc. BHEL shall not be responsible for any losses, damages to the contractor or to his employees.

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**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – VIII

GENERAL SAFETY PRECAUTION TO BE FOLLOWED AT WORK SITE DURING EXECUTION

1. The following safety measures should be strictly adhered to during execution of works at sites.
2. Providing the working platform with toe – board and handrail for continuous working at heights.
3. Providing safety belt and life – line at all times for men working at heights.
4. Providing dust or fume respirator in places where dust and fume concentration exist.
5. Providing goggles and welding screens.
6. Providing acid and alkali – proof rubber gloves for handling acid and alkali and chemical which are corrosive.
7. Providing rubber gloves for working on electrical works.
8. Ensuring proper lashing of the components while being transported in vehicles.
9. The vehicles must have side supports or have body to support the materials conveyed.
10. The materials should not to be allowed to extend or overflow the sides of the vehicles.
11. Materials should not be allowed to overhang from the rear edge of the body of the vehicle.
12. Driver of the vehicle must possess valid license.
13. Vehicle must not be overloaded beyond the prescribed limits.
14. Red flags and lights for parts projecting from the body of vehicle must be provided.
15. The speed restrictions within the factory premises must be strictly adhered to.
16. The gas cylinders must be always handled on trolleys or kept tied down when not in use. They should never be rolled as Roller for conveying.
17. Cylinders should not be used without Regulators.
18. All excavations must be barricaded and red lamps must be provided.

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- 19. All electrical connections must be properly earthed.
- 20. No work should be taken up of execution inside shop floor, without obtaining necessary work permit.
- 21. Providing helmet for high level work.
- 22. The contractor should maintain a register regarding the driver license particulars.
- 23. All personal protective equipment conforms to standard specification as per the details given in the code of conduct.

All Contractors including their sub contractors, agents and labour engaged on the work are required to scrupulously adhere to the safety regulations, safety precautions and measurers. Any violation thereof will invite punitive action being taken against them. Also contractors with frequent violations of safety regulations will not be entrusted with further work in this organization.

24. Contractor shall provide thick hat, safety glass with side shield, full face shield, ear plug set, face mask, protective & chemical resistant gloves, safety shoe, gum boots, safety belt, rain coat, chemical resistant protective clothing to the workers within the quoted rates.

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**TERMS AND CONDITIONS REGARDING COMPLIANCE WITH VARIOUS LABOUR LAWS
BY THE CONTRACTORS FOR BHEL**

1. The Contractor shall not employ in connection with the work any person who has not completed 18 years of age.
2. The Contractor shall in respect of labour employed by him either directly or through subcontractors, company with or cause to be complied with the following statutory provisions and rules and in regard to an all matters provided therein.
 - a. The Contract Labour (Regulation & Abolition) Act 1970 and the related Tamil Nadu Rules.
 - b. The Minimum Wages Act 1948 and the related Tamil Nadu.
 - c. The payment of Wages Act 1936 and the related Tamil Nadu Rules.
 - d. The Factories Act 1948 and the related Tamil Nadu.
 - e. The Employee's Provident Fund & Miscellaneous Provisions Act 1952.
 - f. The Employees State Insurance Act 1948.
 - g. The Workmen Compensation Act. 1923.
 - h. The Industrial Disputes Act 1947.
 - i. **The Payment of Bonus act 1965.**

And any other law or modifications to the above or there to the Rules made thereunder from time to time.

REGISTRATION AND LICENSING

3. Every Contractor shall register his name with the Welfare Section of BHEL before taking up the work awarded to him by giving the following information getting a Code Number:
 - a. The Name of the Contractor.
 - b. Nature of Contract Work.
 - c. Period of work.
 - d. Number of maximum labour employed by him on any one day.
 - e. License No. & Date (Applicable in case of contractor employing 20 or more workers).
 - f. Whether enrolled for PF, ESI, etc., and enrolment No.

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4. The Contractor employing 20 or more workmen is required to obtain license from the authorities (The Deputy Chief Inspector of Factories / Assistant Commissioner of Labour as the case may be). The license shall be amended and / or renewed wherever, there is an increase in the workmen employed by him or in the event or contract being extended or renewed. The Contractor shall inform the license number to the BHEL Management before taking up the work.
5. The Contractor (Licensed or unlicensed) shall promptly furnish every information and document required by BHEL authorities for the purpose of fulfilling their obligations as Principal Employer and / or Occupier of the Factory and shall render all necessary assistance for the same.

WAGES

6. **The tenderer has to ensure payment of Minimum Wages as per Tamil Nadu State Minimum Wages as applicable under law from time to time (Normally the revision will be with effect from 1st April of every year) for the employment in General Engineering & Fabrication Industry.**

Also the labourers shall be paid a minimum bonus which shall be 8.33% as per the payment of Bonus Act 1965 for the Payment of minimum. The Contractor shall have to remit EPF & ESI contributions at the rates applicable under law to the authorities concerned for the total wages paid (i.e.) Payment of minimum wages as mentioned above.

7. The Contractor shall fix wage periods in respect of which wages shall be payable. No wage period shall exceed one month.
8. The Contractor shall ensure payment of wages to the contract labour employed by him within three days from the end of wage period in case the wage period is one week or a fortnight and in all other cases before 10th day of the following month
9. All Payment of wages shall be made on working days at the work site and during the working time and on date notified in advance. In case the work is completed before the expiry of the wage period final payment shall be made within 48 hours of the last working day.
10. Where the employment of worker is terminated by or on behalf of the Contractor, the wages earned by him shall be paid before the expiry of the second working day from the day on which his employment is terminated.
11. Wages due to every worker shall be paid to him direct or to the person authorized him in this behalf. All wages shall be paid in current coin or in both.
12. The Contractor shall ensure the disbursement of wages in the presence of authorized representative of BHEL Management
13. The above payment shall be verified by the authorized office / representative of BHEL with the following certificate of the payment sheet "Certified that the amount shown in Column No..... has been paid to the workmen concerned in the presence on at....."

TENDERER

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14. A certificate of payment shall be furnished in duplicate by the Contractor to the Engineer in charge each month in Form „A“ enclosed.
15. A notice showing the wage period and the place and time of disbursement of wages shall be displayed at the work and a copy to be sent to the Welfare Department by the Contractor under acknowledgement.
16. Notices showing the rate of wages, weekly rest days, hours of work, wage period, date of payment of wages, names and addresses of the Inspector having jurisdiction, the date of unpaid wages shall be displayed in Tamil and English in conspicuous places at the establishment and work at work site by the Contractor. The Contractor shall inform the BHEL Management every month the details of contract labour engaged for contract in this following form:
 - a. Serial Number.
 - b. Location.
 - c. Period of work.
 - d. No. of days worked.
 - e. No. of man worked.
 - f. Wages paid to workers.

The above statement shall be furnished to BHEL Management at the end of every month.

REGISTERS AND RECORDS AND COLLECTION OF STATISTICS

17. The following documents / formats under Contract Labour (Regulation & Abolition) Act 1970 and Tamil Nadu Rules thereunder shall be maintained by each contractor.
 - a. Register of persons employed by the Contractor.
 - b. Employment Card.
 - c. Service Certificate.
 - d. Muster Roll, Wage Register, Deduction Register, wage slip, Overtime Register, register of Fines, Register of Advances etc.,
18. The Contractor shall display the abstract of the Contract Labour (Regulation & Abolition) Act and the Rules thereunder both in English and Tamil.
19. Half yearly Return shall by the Contractor in duplicate to the Licensing Officer.
20. The Contractor shall submit the returns required under the Contract Labour (Regulation * Abolition) Act 1970 periodically to BHEL Management.
21. The Contractor shall without fail give up to date information in writing to the attendance of the workers employed by him.

TENDERER

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22. The Contractor shall ensure that his workers keep and produce their Employment Card when coming to duty and take them back when leaving duty.
23. All the above registers and records shall be preserved in original for a period of three years. All the registers, records and notice maintained under the Act and rules shall be produced on demand by Inspector or any authority under the Act.

WORKING HOURS AND WORKING CONDITIONS

24. No worker shall be required or allowed to work on Sunday unless he has or will have a holiday on anyone of the three days before or after the said say.
25. The Contractor shall inform BHEL Management in the prescribed form details of the contract workers scheduled to work on Sunday, the way of rest and also indicate the substituted holiday in lieu thereof. This shall be intimated two days in advance before his workmen and booked for work Sunday.
26. The contract labour working for more than nine hours in any day or for more than 48 hours in any week shall be paid wages at the rate of twice the ordinary rate of twice the ordinary rate of wages in accordance with the provisions of Sections 59 of the Factories Act 1948.
27. The Contractor shall provide all safety devices and personal protective equipment to his workmen at his own cost and shall ensure that his workmen wear / use such devices or equipment provided to them while doing the work and there should not be any relaxation on this.
28. The Contractor shall give four paid National Holidays to his workers, viz., 26th January, 1st May 15th August and 2nd October.
29. The Contractor shall ensure that his workmen vacate the premises after the shift is over.
30. No woman worker shall be required or allowed to work in the Factory except between the hours of 6.00 A.M. and 7.00 P.M.
31. The Contractor shall comply with the provisions relating to Welfare and Health facilities as provided in the Contractor Labour (Regulation and Abolition) Act 1970 read with the Tamil Nadu Contract Labour Rules 1975.

NOTICE OF ACCIDENTS

32. Notwithstanding anything contrary to this, in the event of accident the contractor shall be required to fill injury report and submit the Engineer in charge immediately and ensure the compliances of ESI / workmen's compensation Act, Factories Act and Rules made there under. He shall also maintain a register of accident as per the Act.
33. The Contractor shall get the contract labour engaged by him insured under Workmen's Compensation policy from general should be for the entire period of Contract. The Contract shall comply with the provisions of the Workmen's Compensation Act 1923. (This should be read in conjunction with the provisions of ESI Act).

COVERAGE UNDER THE ESI ACT / PF AND MISCELLANEOUS PROVISIONS ACT

34. The contractor shall ensure that all his workmen are covered under the Employee's State Insurance Act and producer to BHEL such Registration Number / Enrolment Number before executing the contract work.
35. The Contractor shall regularly pay the amount of contribution. i.e., employer's contributions as well as employee's contribution pursuant of the above scheme as time. The Contribution payable presently is 1.75% wages to be recovered from his workmen and 4.75% of wages to be contributed by the Contractor. Contributions recovered from employee and contribution made by the contractor may be rounded to the higher multiples of five paise.
36. The Contractor shall take note of any amendment that may be brought forth in the above contribution rate and act accordingly.
37. The contractor shall ensure that his workmen are covered under the EPF & Miscellaneous Provisions Act 1952 and accordingly produce to the BHEL Management the registration / enrolment number before awarding of contract work. As per the existing provisions every worker shall be entitled and required to become a member of the fund. The employee's contribution payable at present is 12% of wages which will be recovered by the contractor from the wages of his workmen and the contractor should pay equal contribution. The contractor is also liable to pay any administrative charges in this behalf that may be decided from time to time. It will be the responsibility of the contractor to ensure such contribution payable in respect of workmen employed through sub-contractors also.
38. The Contractor shall take note of any amendment in the rate of contribution payable under the scheme from time to time.
39. The Contractor shall with seven days of the close of every month submit to BHEL a statement showing the amount of contribution payable / paid for employees engaged by him or through him and shall also furnish to BHEL such information as Principal Employer is required to furnish under the provisions of the ESI Act and PF as well as the schemes made thereunder to the authorities concerned.

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40. Whenever any sum of money is found to be recoverable from or payable by the contractor under the above Act, the sum shall be deducted from any sum that may be due or which at any time thereafter may become due to the Contractor under this contract or under any other contract or from his security deposit, the contractor shall immediately thereafter such further sums as may be required to replenish the shortage caused by such recoveries in amount of security deposit.
41. The Contractor shall abide by all the labour and other laws applicable to contract labour / worker under this contract and shall at all times keep BHEL indemnified against all losses, claims, prosecutions under any law.
42. In case of non-compliance of any of the provisions of the Acts and in case BHEL having complied with the same BHEL will be entitled to recover the same from the contractor / sub-contractor.
43. Non-exercise of any of the powers of rights available to BHEL hereunder to under any law shall not in any way operate as waiver thereof.

Note: The Specimen forms for the following are available in BHEL.

- 1) Form "A" - Payment Certificate.
- 2) Form IV - Application for License.
- 3) Form XIII - Register of Workmen employed by contractor.
- 4) Form XIV - Employment Card.
- 5) Form XV - Service Certificate.
- 6) Form XVI - Muster Roll.
- 7) Form XVII - Register of wages.
- 8) Form XIX - Wage up.

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**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – IX

ANNEXURE TO SCHEDULE – A

NAME OF WORK: **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”**

SL.NO	APPROXIMATE QUANTITY	DESCRIPTION OF WORK	SPECIFICATION	RATE (both in figures and words)	UNIT	AMOUNT
Refer Tender Document Part-II (BOQ)						

TENDERER

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ISSUE OF STORES TO THE CONTRACTORSCHEDULE – B

1. The following materials will be issued to the contractor at BHEL stores / stock yard. **(Not applicable for this work)**

SL.NO.	DESCRIPTION	PLACE OF	ISSUE RATE
1	-	-	-
2	-	-	-
3	-	-	-

2. It will be the responsibility of the contractor to submit his indents for the above stores in writing at least SEVEN days in advance of the actual requirements.
3. Issue of stores is subject to their availability at the place of issue noted above. Items of stores to be issued by BHEL, which are not available at the time of indenting by the contractor, may be supplied by BHEL after necessary procurement. The contractor shall not be entitled to any claim or compensation for delay in the supply of stores by BHEL under any circumstances.
4. The material will be issued only during the working hours of the BHEL stores department.
5. The contractor shall from time to time, render proper account of all materials issued to him by BHEL. If he fails to do, no further issue of materials will be made to him and he will be responsible for any delay in the execution of the work, which may occur on this account.
6. All surplus materials in good condition, which are not returned to the BHEL Stores and quantities of materials consumed in excess of maximum permissible limit as fixed by BHEL shall be charged for at punitive rates, which will be 100% higher than the recovery rates.
7. The steel materials if issued will be in random lengths and sizes as stocked by the BHEL and the cost of all cutting, conversion, substitution and fabrication as well as wastage shall have to be borne by the contractor.
8. The Structural and reinforcement steel will be issued at free of cost at BHEL stores, Recovery for the excess consumption up to 5% over and above theoretical consumption will be recovered as stated in the special condition. Beyond 5% punitive rate shall be charged, which will be 100% higher than the recovery rate specified above.
9. The decision of the accepting officer/Engineer-in-charge as the case may be as to the extent to which materials have been rendered surplus or consumed in excess of the actual requirements shall be final, conclusive and binding on the contractor.

TENDERER

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SCHEDULE – C**LIST OF TOOLS AND PLANTS TO BE ISSUED ON HIRE TO CONTRACTOR**

SL.NO	QUANTITY	PARTICULARS	HIRE CHARGES PER UNIT PER DAY OF 8 HOURS	PLACE OF ISSUE	REMARKS
----- NIL -----					

- a) Machinery shall not be worked overtime without the written permission of the Engineer-in-charge and cost of liability of the same will be contractor's expense.
- b) All coolies, waterman, etc., required in addition to BHEL crew mentioned in Column 4 above shall be arranged for by the contractor at his own expense.

SCHEDULE – D

NOTE:

All drawings are to be signed by the contractor as well as the officer entering in to contract for **“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”**

SL.NO	DRAWING NUMBER	DESCRIPTION	REVISION

TENDERER

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QUESTIONNAIRE

Questionnaire to be answered by the tenderer by ticking the suitable boxes.

Sl. No.	Description	Yes	No
01	Whether the tenderer has understood the scope of work and agrees to deploy required man power as indicated in the tender. (If there is any clarification required, the same may be got cleared from the Executive-in-charge, before submitting the offer.)		
02	Whether the tenderer has agreed to all Terms & Conditions given in the tender. (If there is any deviation, the same may be mentioned in separate sheet.)		
03	Whether the tenderer has their own code for ESI & PF. (A copy of the certificate to be enclosed).		
04	Whether the tenderer has enclosed copy of the present Service / Sales / Works contract sales Tax registration certificates. If a vendor is exempted from the registration under Service / Sales Tax, the reason there of be stated.		
05	Whether the vendor / Contractor is availing Goods and Services Tax credit / VAT Credit for their inputs.		
06	Whether the vendor will submit Goods and Services Tax invoice as per the existing ACT and the rules their under.		
07	Full Goods and Services Tax indicated in the price bid applicable as extra for this tender.		%
08	Whether the tenderer agrees to Pay Wages as per Minimum wages Act, EL Wages, and Holiday Wages as per Tamil Nadu Factory rules. (Necessary proof should be submitted while claiming running bill and final bill.)		
09	Whether the PAN Number of the vendor is furnished. If exempted from IT, the exemption certificate shall be enclosed.		
10	Whether the tenderer agrees to keep the validity of their offer for three months from the date of opening of bid and keep the prices firm throughout the contract period.		
11	Whether the tenderer agrees for the payment terms of BHEL.		
12	Whether the tenderer has agreed to submit EMD of Rs. 6,77,750/- and has submitted the same along with technical bid. (If not enclosed, the tender will not be considered) shall be in the form of Pay order or DD payable at Ranipet.		
13	Whether the tenderer has agreed to submit Security Deposit immediately after receipt of the work order.		
14	Whether the tenderer has enclosed the list of their clients with addresses & contact persons.		
15	Whether the tenderer has enclosed the completion certificates received from Government / Reputed organization for the similar work done for the last 7 years ending on 31/05/2017 .		
16	Whether the tenderer has enclosed the list of similar works carried out with supporting documents		
17	Whether the includability / excludability of the taxes and duties in the rates offered has been clearly indicated. If the same is not done, BHEL will choose to assume the rates are inclusive only.		

TENDERER

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18	All payments by BHEL will be made through e-payment only. The required certificate as enclosed in the tender is submitted by the vendor with Banker's signature.		
19	Whether the tenderer has enclosed the list of technical personnel, their qualification & experience for who will be deployed for this work.		
20	Whether the tenderer has indicated the address of their local office in Ranipet along with phone no. & fax no.		
21	Whether the tenderer has enclosed the DD towards the cost of Tender Document, along with the Technical bid. (In case the tenderer has downloaded the tender document directly from the Web Site and If DD is not enclosed, the tender will not be considered).		
22	Whether the tenderer accepts reverse auctioning process through internet.		
23	Whether the tenderer has enclosed the annual report (audited P&L Account, Balance Sheet & IT Return) for the last three financial years (2013-14, 2014-15 & 2015-16).		
24	Whether the tenderer has submitted the proof of average annual turnover for last 3 years for a value not less than Rs. 101.66 Lakh .		
25	Whether the tenderer agrees for the compensation for Delay clause as per GCC (Clause 43)		
26	Whether the Bidder has read the Guidelines for Suspension of Business Dealings with Suppliers/ Contractors referred to in this Tender / Enquiry and confirms acceptance to the same?		

Note: If any of the question is not applicable, please mention as "Not Applicable (NA)"

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**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – X

CERIFICATE OF NO DEVIATION

I / We of M/s

hereby certify that **there is no deviation** from the tender conditions either technical or commercial and I am / we are agreeing to all the terms and conditions mentioned in the Tender Specification No:

BAP:CF:OT:03/2017-18 Dt: 25/06/2017.

I / We have submitted our offer for this tender. I / We have fully gone through, understood and accepted all specifications, terms & conditions of the whole tender documents uploaded in BHEL web site including all corrigenda, addenda etc published in the website time to time for this tender.

In case of any deviation, the detail of which I / we have to furnish in a separate sheet(s) along with our offer.

Date:

Signature of the tenderer

TENDERER

ACCEPTING OFFICER

**BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS & SERVICES DEPARTMENT**

CHAPTER – Xi

ANNEXURE: 'B'

It is hereby agreed by me / us that the BHEL General Conditions of Contract including subsequent amendments / additions / deletions to clauses if any, and conditions pertaining to the settlement of disputes by Arbitration form an integral part of the tender documents and that the tender submitted by me / us is subject to the aforesaid BHEL General Conditions of Contract which has been read and accepted by me/us.

TENDERER

ACCEPTING OFFICER

ANNEXURE: 'C'**CLAUSE 22 OF GENERAL CONDITIONS OF CONTRACT****LABOUR**

The contractor shall employ labour in sufficient numbers either directly or through sub-contractors to maintain the required date of progress and of quality to ensure workmanship to the degree specified in the contract and to the satisfaction of the Engineer – in – charge. The contractor shall not employ, in connection with the works, any person who has not completed eighteen years of age.

The Contractor shall pay to labour employed by him, either directly or through sub-contractors, wages not less than fair wages, as defined in the Contractor's Labour Regulations.

The Contractor shall in respect of labour employed by him, either directly or through sub-contractors, comply with or cause to be complied with contractor's labour Regulations in regard to all matters provided therein.

The Contractor shall comply with the provisions of the payment of Wages Act, 1936, Minimum Wages Act, 1948, Workmen's Compensation Act 1923, Industrial Disputes Act, 1947, Maternity Benefit Act 1961, or any modifications thereof or any other law relating there to and rules made there under from time to time.

The Contractor shall be liable to pay his contribution and the employee's contribution of the State Insurance Scheme in respect of all labour employed by him for the execution of the contract, in accordance with the provision of "The Employees' State Insurance Act, 1948" as amended from time to time. The Contractor shall apply to the ESI Authorities, get himself registered with them and obtain a code Number. He shall pay the remittances under his Code Number only.

The Contractor shall be liable to his contribution and the employee's contribution towards PF as per Provident Fund Rules and Regulations, in respect of all labour employed by him for the execution of the contract. The Contractor shall apply to the PF Authorities, get himself registered and obtain a code number from them. He shall pay the remittances towards PF under his code number only.

The Engineer-in-charge shall, on a report having been made by an Inspecting Officer as defined in the Contractor's Labour Regulations, have the power to deduct from the moneys due to the contractor any sum required or estimated to be required, for making good the loss suffered by a worker or workers by reason of non fulfillment of the conditions of the contract for the benefit of workers, non-payment of wages or of deductions made a from his or their wages which are not justified by the terms of the Contract of non observance of the said Contractor's Labour Regulations.

The Contractor shall indemnify BHEL against any payment to be made under and for observance of the Regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractors.

In the event of the Contractor committing a default or breach of any of the provisions of the aforesaid contractor's Labour Regulations, as amended from time to time or furnishing any information or submitting or filling any form / Register / Slip under the provisions of these Regulations which is materially incorrect, then, on the report of the Inspecting Officers as defined in

TENDERER

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the Contractors Labour Regulations, the Contractor shall without prejudice to any other liability pay to BHEL a sum not exceeding Rs. 50/- as liquidated damages for every default, breach, or furnishing, making, submitting, filling materially incorrect statements as may be fixed by the Engineer-in-charge and in the event of the contractor's default continuing in this respect, the liquidated damages may be enhanced to Rs. 50/- per day for each day of default subject to a maximum percent of the estimated cost of works put to tender. The Contractor shall defend the case by himself any action brought in by such Government Agencies for non-compliance of any Labour Regulations and / or reimburse the expenses incurred by BHEL in this regard.

The Engineer-in-charge shall deduct such amount from bills or security deposit of the Contractor and credit the same to the welfare fund constituted under Regulations. The decisions of the Engineer-in-charge in this respect shall be final and binding.

MODEL RULES FOR LABOUR WELFARE

The Contractor shall, at his own expense, comply with or cause to be complied with Model Rules for Labour Welfare as appended to these conditions or rules framed by Government from time to time, for the protection of health and for making sanitary arrangements for workers employed directly or indirectly on the works. In case the Contractor fails to make arrangements as aforesaid, the Engineer-in-charge shall be entitled to do so and recover the cost there from the contractor.

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ANNEXURE: "D"**CLAUSE 40 OF BHEL GENERAL CONDITIONS OF CONTRACT INSURANCE OF WORKS AGAINST DAMAGE AND LOSS DUE TO FIRE, STRIKE, TEMPEST, FLOODS, EARTHQUAKE, RIOT AND AGAINST DAMAGE BY AIRCRAFT**

The contractor shall, within one month after the date of acceptance of the contract, insure the work against loss and damage by fire, tempest, floods, earthquake, riots, strike and against damage by aircraft with an insurance office approved by the accepting officer, from the date of acceptance of work or actual commencement of work whichever is earlier. Such insurance shall be effected in the name of BHEL and shall be for the full value of the contract sum. The contractor shall lodge with BHEL the policies and receipts of the premiums for such insurance and shall maintain such policies in force until the entire completion of the work as certified by the Engineer-in-charge.

If the contractor fails to comply with the terms of this condition, the accepting officer may insure the work and may deduct the amount of premiums from any money that may become payable to the contractor or may at his discretion refuse payment of any advance payment to the contractor until the contractor shall have complied with the terms of this condition.

Such insurance whether effected by the Accepting officer or the Contractor shall not be a limit or bar to the liability and obligation of the contractor to complete the entire work in all respects as certified by the Engineer-in-charge.

In case of such a loss or damage as aforesaid, the money payable under any such insurance shall be received and may be retained by BHEL until the work is finally completed and shall then be credited to the contractor in the final statement of accounts in the event of the contract not having been previously cancelled under these conditions, after taking into account the delay in completion, settlement to his workers for damages, damage to BHEL's property etc.

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SAFETY CODE

RESPONSIBILITIES OF THE CONTRACTOR IN RESPECT OF SAFETY OF MEN, EQUIPMENT, MATERIAL AND ENVIRONMENT

1. Before commencing the work, the contractor is required to submit a “SAFETY PLAN” to the authorized BHEL official. The ‘safety plan’ shall indicate, in detail, the measure that would be taken by the contractor to ensure safety of men, equipment, material and environment during execution of work. The plan shall take care to satisfy all requirements specified hereunder. The contractor shall submit safety plan along with his offer. During negotiations before placing of work order and during execution of the contract, BHEL shall have right to review and suggest modification in the safety plan. The contractor shall abide by BHEL’s decision in this respect.
2. The contractor shall take all necessary safety precautions and arrange for appropriate appliances as per direction of BHEL, or its authorized officials, to prevent loss to human lives, injuries to personnel engaged, and damage to property and environment.
3. The contractor shall provide to its work force and ensure the use of the following personal protective equipment as found necessary and as directed by the authorized BHEL officials:-
 - (i) Safety helmets conforming to IS-2925: 1984.
 - (ii) Safety Belts conforming to IS-3521:1983
 - (iii) Safety Shoes conforming to IS-1989:1978.
 - (iv) Eye and Face protection devices conforming to IS-8520:1977. And IS-8940:1978.
 - (v) Hand and body protection devices conforming to
 1. IS-2573:1975 (2) IS-6994:1973 (3) IS-8807:1978 (4) IS-8519:1977.

All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, safety nets, ladders, equipment etc. used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained, before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item.

All the electrical equipment, connections and wiring for constructions, power, its Distribution and use shall conform to the requirement of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carry out the all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

The contractor shall not use any hand – lamp energized by electric power with supply voltage of more than 24 Volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 Volts.

The contractor shall adopt all fire safety measures as laid down in the “Code for Fire Safety at Construction sites” issued by the safety department of BHEL and as per the directions of the authorized BHEL official. A copy of the above referred “Code for Fire Safety at Construction sites” shall be made

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available by BHEL to the contractor for reference, on demand by the contractor, during tendering stage itself.

Where it becomes necessary to provide and/or store Petroleum Products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and / or storage in accordance with the rules and regulations laid down in the relevant government acts, such as Petroleum Act, Petroleum and Carbides of Calcium Manual of the Chief Controller of Explosives, Govt. of India etc., Prior approval of the authorized BHEL official at the site shall also be taken by the contractor in all such matters.

The contractor shall arrange at his cost (wherever not specified), appropriate illumination at all work spots for safe working when natural daylight may not be adequate for clear visibility.

The contractor shall be held responsible for any violation of statutory regulations local, state or central and BHEL instructions, that may endanger safety of men, equipment, material and environment in his scope of work or another contractor's or agency's. Cost of damages if any, to life and property arising out of such violation of statutory regulations and BHEL instructions, shall be borne by the contractor.

In case of fatal or disabling injury/accident to any person at construction / work sites due to lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor, after notifying the contractor suitably and giving him opportunity to present his case.

If the contractor fails to improve the standards of safety in its operation, to the satisfaction of BHEL, after being given a reasonable opportunity to do so and / or / if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor, after giving a notice of not less than seven days, indicating the steps that would be taken by BHEL.

The contractor shall submit report of all accidents, fires and property damage, dangerous occurrence to the authorized BHEL official immediately after such occurrence, but in any case not later than twelve hours of the occurrence. Such reports shall be furnished in the manner prescribed by the contractor to the authorized BHEL official from time to time as prescribed.

Before commencing the work, the contractor shall appoint/nominate a responsible office to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

If the Safety record of the contractor is to the satisfaction of Safety Department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job.

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GOODS AND SERVICES TAX (GST)

Price Bid: “Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai.”

The Bidder shall not include Goods and Services Tax (GST) in their quoted rates; but the bidder has to separately indicate the GST rate, amount and workings thereof in the Price bid schedule included in the bid documents.

If GST amount is not indicated separately in the price bid schedule included in the Bid documents, it will be presumed that the quoted rate is inclusive of applicable GST and bids will be evaluated accordingly.

1. The bidder has to quote GST rate extra as applicable in the tabulation given in the Price Bid.
2. The quoted rate for the work shall be inclusive of all taxes other than GST.
3. In case of reverse charge applicability, BHEL will not reimburse to the bidder the reverse charge of GST paid by BHEL.

Bidders are requested to fill the full GST for the quoted rate as applicable for this tender in the following tabulation.

SI No	GST	Service Account Code (SAC)	Applicable GST % (Fill the applicable GST % as quoted by you in the Price Bid)	Applicable GST Amount (Amount not to be filled in this technical bid) - Tick Quoted / Not Quoted only	Remarks
1	CGST			Quoted / Not Quoted	
2	SGST			Quoted / Not Quoted	
3	IGST			Quoted / Not Quoted	
4	GGST			Quoted / Not Quoted	
5	CESS			Quoted / Not Quoted	

Any statutory variation in GST rate during contract period shall be reimbursed by the Company based on claim by the Agency along with valid documentary evidence.

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BHARAT HEAVY ELECTRICALS LIMITED
RANIPET – 632 401
CIVIL PROJECTS AND SERVICES

CHAPTER – XII

ANNEXURE III - BRIEF

GENERAL CONDITIONS OF CONTRACT (APPLICABLE FOR ALL CONTRACTORS)

1. DEFINITION: -

In these General Conditions of Contract, the following terms shall have the meaning hereby assigned to them, except where the context otherwise requires:-

- a) The "Contract" means, the documents forming the tender and acceptance thereof, together with all the documents referred to therein including general and special conditions to contract. All these documents as applicable taken together shall be deemed to form one contract and shall be complementary to one another.
- b) The "work" means, the work described in the tender documents in individual work-orders as may be issued from time to time to the contractor by the Officer-In-charge within the power conferred upon him including all notified or additional items of works and obligations to be carried out as required for the performance of contract.
- c) The "contractor" means, the individual Firm or Company whether incorporated or not, undertaking the work and shall include the legal personal representatives of such individuals or the persons composing the firm or Company or the successors of the firm or company and the permitted assigns of such individual or firm or Company.
- d) "The Officer-In charge" means, the Officer deputed by the DGM/CP&S to supervise the work or part of the work.
- e) "Approved" and "Directed" means, the approval or direction of DGM/CP&S, or person deputed by him for the particular purposes.
- f) "BHARAT HEAVY ELECTRICALS LIMITED" (herein after referred to as BHEL) shall mean the Board of Directors, Chairman, Executive Director, General Manager or other Administrative Officer of the said Company including DGM/CP&S authorized to invite tenders and enter into contract for works on behalf of the Company.
- g) The "Contract sum" means, the sum accepted or the sum calculated in accordance with the prices accepted in tender and / or the contract rates as payable to the contractor for the execution of the work during the currency of the contract.

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- h) A "week" means, Seven Days, without regard to the number of hours worked or not worked in any day in that week.
- i) A "day" means, the day of 24 hours (TWENTY FOUR) irrespective of the number of hours worked or not worked in that day.
- j) A "working day" means, any day other than that prescribed by the NEGOTIABLE INSTRUMENTS ACT as being a Holiday, and consists of the number of hours of labour as commonly recognized by good employers in the trade in the district where the work is carried out or as laid down in the BHEL regulations.

2. **HEADING TO THE CONTRACT CONDITIONS:** - The heading to these conditions shall not affect the interpretations thereof.
3. **WORK TO BE CARRIED OUT:** - The Contract shall, include all labour, materials, tools, plant, equipment and transport which may be required for the execution of the work.

The Contractor will be deemed to have satisfied himself as to the nature of the site, local facilities of access and all matters affecting the execution of the work. No extra charges consequent on any misunderstanding in these respects or otherwise will be allowed.

4. **DEVIATIONS:** - The contractor shall not carry out any work not covered by schedule except in pursuance of the written instructions of DGM/CP&S. No such work shall be valid unless the same has been specifically confirmed and accepted by BHEL in writing and incorporated in the Contract.
5. **OCTROI AND OTHER DUTIES:** - All charges on account of Octroi terminal or Sales Tax and or other Duties on materials obtained for the work shall be borne by the Contractor.
6. **PLANT AND EQUIPMENT:** - The Contractor shall at his own expense, supply all tools, plant and equipment (Herein after referred to as T&P) required for the execution of the contract.
7. **ASSIGNMENT OF TRANSFER OF CONTRACT:-** The Contractor shall not without the prior written approval of the BHEL, assign or transfer the contract or any part thereof, or any share, or interest thereon to any other persons. No sum of money which may become payable under the contract shall be payable to any person, other than the contractor unless the prior written approval of the BHEL to the assignment or transfer of such money is given.
8. **SUB-CONTRACT:** - The Contractor shall not sub-let any portion of the contract without the prior written approval of the BHEL.
9. **COMPLIANCE TO REGULATIONS AND BYE-LAWS:** - The Contractor shall confirm to the provisions of any statute relating to the work and regulations and Bye-Laws of any local authority. The Contractor shall be bound to give all notices required by statute regulations or By-Laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof.

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10. **ORDERS UNDER THE CONTRACT:** - All orders, notices etc. to be given under the contract shall be in writing, type-script or printed and if sent by registered post to the address given in the tender of the Contract, shall be deemed to have been served on the date, when in the ordinary course they would have been delivered to him. The Contractor shall carry out without delay all orders given to him.
11. **CONTRACTOR'S SUPERVISION:** - The Contractor shall either himself supervise the execution of the contract or shall appoint a competent agent acceptable to the DGM/CP&S to act in his stead.

Orders given to the Contractor's agent shall be considered to have the same force as if they have been given to the Contractor himself.

The Contractor or his accredited agent shall attend when required without making any claim for doing so, either the office of the DGM / Civil Projects & Services or the OFFICER-INCHARGE, to receive instructions.

The DGM/CP&S shall have full powers and without assigning any reason, require the Contractor to immediately cease to employ in connection with this contract, any agent, servant or employee where continued employment is, in his opinion undesirable. The Contractor shall not be allowed any compensation on this account.

12. **LABOUR:** - The Contractor shall remain liable for the payment of all wages or other moneys to his work-people or employees under the payment of Wages Act 1936, Employees Liability Act. 1938, Workmen's Compensation Act 1923 or any other Act or enactment, relating thereto and rules framed, thereunder from time to time.
13. **PRECAUTIONS AGAINST RISK:** - The Contractor shall be responsible for providing at his own expense for all precautions to prevent loss or damage from any and all risks and to minimize the amount of any such loss or damage and for the necessary steps to be taken for the said purpose.
14. **DAMAGE & LOSS TO PRIVATE PROPERTY & INJURY TO WORKMEN:** -

The Contractor shall at his own expense reinstate and make good to the satisfaction of the DGM/CP&S and pay compensation for any injury, loss or damage occurred to any property or rights whatever including property and rights of BHEL (or agents) servants or employee of BHEL, the injury loss or damage arising out of or in any way in connection with the execution or purported execution of the contract and further the contractor shall indemnify, the BHEL against all claims enforceable against BHEL (or any agent, servant or employee of BHEL) or which would be so enforceable against BHEL where BHEL is a private person, in respect of any such injury (including injury resulting in death) loss or damage to any person whomsoever or property including all claims which may arise under the Workmen's Compensation Act or otherwise.

15. **LAWS GOVERNING THE CONTRACT:** - The contract shall be governed by the Indian Laws for time being in force.

16. CANCELLATION OF CONTRACT FOR CORRUPT ACTS: - BHEL, whose decision shall be final and conclusive, shall without prejudice to any other right or remedy which shall have accrued shall accrue thereafter to BHEL cancel the contract in any of the following cases and the Contractor shall be liable to make payment to BHEL for any loss or damage resulting from any such cancellation to the same extent as provided in the case of cancellation for default.

If the Contractor shall: -

a) Offer or give or agree to give to any person in BHEL service any gift or consideration of any kind, as an inducement or reward for doing or for bearing to do or for having done or for borne to do any act, in relation to the obtaining or execution of this or any other contract for BHEL service,

OR

b) enter in to a contract with BHEL in connection with which commission has been paid or agreed to be paid by him or with his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to BHEL,

OR

c) Obtain a contract with BHEL as a result of ring tendering or by non-bonafide methods of competitive tendering, without first disclosing the fact in writing to BHEL.

17. RISK PURCHASE CLAUSE:

If the contractor fails to carry out the specified works as per the contract scope of work within the timeframe as directed by DGM/CP&S or his authorized officials and continues in that state after a reasonable notice from DGM/CP&S or his authorized officials, BHEL reserves the right to have the work done by any means at the Contractor's risk and expenses provided always that in the event of the cost of the work so done (as certified by DGM/CP&S which is final and conclusive) being less than the contract cost, the advantage shall accrue to the BHEL and if the cost exceeds the money due to Contractor under the contract, the Contractor shall either pay the excess amount ordered by DGM/CP&S or the same shall be recovered from the Contractor by other means.

18. CANCELLATION OF CONTRACT FOR INSOLVENCY ASSIGNMENT OF TRANSFER OR SUB-LETTING OF CONTRACT: -

BHEL, without prejudice to any other right or remedy, which shall have accrued or shall accrue thereafter to BHEL, shall cancel the contract in any of the following cases:

If the Contractor,

a) being an individual or if a firm any partner thereof shall at any time be adjudged bankrupt or have a receiving order for administration of his estate, made against him or shall take any proceedings for liquidation or composition under any bankruptcy Act or assignment of his effects of composition or arrangement for the benefit of his creditors or purport to do so, or if any application made under any Bankruptcy Act for the time being in force for the sequestration of his estate or if a trust deed be granted by him on behalf of his creditors

OR

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- b) being a Company, shall pass a resolution or the Court shall make an order for the liquidation of its affairs, or a receiver or Manager on-behalf of the debenture holders shall be appointed or circumstances shall arise which entitle the Court or debenture holders to appoint a receiver or Manager,

OR

- c) Assigns, Transfers, Sub-lets or attempts to assign, transfer or sub-let any portion of the work without the prior written approval of the BHEL.
- d) Whenever BHEL exercise the authority to cancel the contract under this conditions, BHEL may have the work done by any means at the Contractor's risks and expenses provided always that in the event of the cost of the work so done (as certified by DGM/CP&S which is final and conclusive) being less than the contract cost, the advantage shall accrue to the BHEL and if the cost exceeds the money due to Contractor under the contract, the Contractor shall either pay the excess amount ordered by DGM/CP&S or the same shall be recovered from the Contractor by other means.
- e) In case BHEL carries-out the work under the provisions of this condition the cost to be taken into account in determining the excess cost to be charged to the Contractor under this condition shall consist of the cost of the materials, hire charges of tools and plants and/or labour provided by the BHEL with an addition of such percentage to cover superintendence and establishment charges as may be decided by the DGM/CP&S whose decision shall be final and conclusive.

19. CANCELLATION OF CONTRACT IN PART OF FULL FOR CONTRACTOR'S DEFAULT: -

If the Contractor:

- a) makes default in carrying out the work as directed and continues in that state after a reasonable notice from DGM/CP&S or his authorized representative;
- b) fails to comply with any of the Terms and Conditions of the contract or after reasonable notice in writing with orders properly issued thereunder;
- c) BHEL, may without prejudice to any other right or remedy which shall have accrued or shall accrue thereafter to BHEL CANCEL the contract as whole or in part thereof or only such work order or items of work in default from the contract. Whenever BHEL exercise the authority to cancel the contract as whole or part under this condition BHEL may complete the work at the contractor's risk and cost (as certified by DGM/Stores which is final and conclusive) being less than the contract cost, the advantage shall accrue to the BHEL. If the cost exceeds the moneys due to the Contractor under this contract the Contractor shall either pay the excess amount ordered by DGM/CP&S or the same shall be recovered from the Contractor by other means. In case the BHEL carries out the work or any part thereof under the provisions of the conditions the cost to be taken into account in determining the excess cost to be charged to the Contractor under this condition shall consist of the cost of the materials, hire charges of tools and plant and/or labour provided by the BHEL with an addition of such percentage to cover the superintendence and establishment charges as may be decided by the DGM/CP&S whose decision shall be final and conclusive.

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20. TERMINATION OF CONTRACT ON DEATH OF CONTRACTOR: -

Without prejudice to any of the rights or remedies under this contract, if the Contractor dies, or if the firm is dissolved or the company is liquidated BHEL shall have the option of terminating the contract without compensation to the Contractor.

21. SPECIAL POWER TO TERMINATION:- If at any time after the award of contract, BHEL shall for any reason whatsoever not require whole or any part of the work to be carried out the DGM/CP&S shall give notice in writing of the fact to the Contractor who shall have no claim to any payment of compensation or otherwise howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of the fore-closing of the work.

“If any employee / labourer working in the contract is found involved in corruption activities, the contract will be terminated and the contractor will be banned for applying for any future contract for 3 years.”

22. SUBMISSION OF BILLS BY CONTRACTOR: - The Contractor at the end of each month shall submit a bill in triplicate detailing the various items of work done during the month supported by the requisitions issued from time to time. The Contractor shall, once in every month, submit to the DGM/CP&S separately details of his claims for the work done by him up to and including the previous month which are not covered by his contract agreement in any of the following respects:

- a) Deviation from the items provided in the contract documents.
- b) Extra items / new items of work.
- c) Items in-respect of which rates have not been settled. He should in addition furnish a clear certificate to the effect that the claims submitted by him as aforesaid cover all his claims and that no further claims shall be raised by him in respect of the work done up to and including the period under report.

23. PAYMENT OF BILLS: - All payments to be made to the Contractor, under this contract shall be by "CHEQUE" crossed "A/C PAYEE ONLY" OR by NEFT / RTGS payment within a reasonable time after the certification of bills by DGM/CP&S.

24. RECOVERY FROM CONTRACTOR: - Whenever under the contract, any sum of money, shall be recoverable from or payable by the Contractors, the same may be deducted from or any sum then due or which at any time thereafter may become due to Contractor under the contract or under any other contract with BHEL or from his Security Deposit or he shall pay the claim on demand.

25. POST TECHNICAL AUDIT OF WORK AND BILLS:- BHEL reserves the right to carry out the post-payment Audit and technical examination of the work and final bill including all supporting vouchers, abstracts etc., and enforce recovery of any sum becoming due as a result thereof in the manner provided in the presiding sub-paragraphs. However, no such recovery shall be enforced after three years of passing the final bill.

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26. REFUND OF SECURITY DEPOSIT:- The Security Deposit mentioned in condition 10 above may be refunded to the Contractor after a period of one month on termination or expiry of the contract provided always that the Contractor shall first have been paid the last and final bill and have rendered a "NO DEMAND CERTIFICATE".
27. FORCE MEJEURE CLAUSE:- If, at any time during the continuance of this Contract the performance in whole or in part by either party of any obligations under this Contract shall be prevented or delayed by reason of any War, Hostile acts of the public enemy Civil Commotion, Epidemics, or Acts of God (Floods, Storm/Cyclone, Hurricane, Earth Quake etc.) then provided notice of happening of any such event is given by either party to other within 7 days from the date of occurrence therefor neither party shall by reason of such event be entitled to terminate this Contract nor shall either party have any claim for damages against the other in respect of such non-performance and delay in performance under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist. If the performance in whole or part of any obligation under this Contract is prevented or delayed by reason of any such event, claims for extension of time shall be granted for periods considered reasonable by the DGM/CP&S subject to prompt notification by the contractor.
28. ARBITRATION:- All disputes between the parties to the contract, arising out-of or relating to the contract, other than those for which the decision of the DGM/CP&S or Accepting Officer or any other person is by the contract expressed to be final and conclusive shall after written notice by either party to the contract to the other party be referred to the Arbitration by a sole Arbitrator to be appointed by BHEL.
- Unless the parties otherwise agree, such reference shall not take place until after the completion, alleged completion or abandonment of the work or the determination of the contract.
- The place of Arbitration shall be Ranipet. The venue of Arbitration may be at such a place or places as may be fixed by the Arbitrator in his sole discretion. The award of the Arbitrator shall be final, conclusive and binding on both parties to the contract.
29. SIGNING OF CONTRACT:- Each contract document shall be signed by the Contractor with his usual signature. Contract by partnership of Hindu Joint Family firm, may be signed in the FIRM'S name by one of the Partners or the Karta or Manager as the case may be or by any other duly authorized representative followed by the name and designation of the persons so signing. Contracts by a Company shall be signed with the name of the Company by a person authorized in this behalf and a power of attorney or other satisfactory proof showing that the persons signing the Contract documents on behalf of the Company is duly authorized to do so, shall accompany the contract.
30. All statutory requirements under Minimum Wages Act,1948, Factories Act 1948, Workmen Compensation Act 1923,Employees Provident Fund and Miscellaneous Provisions Act, 1952,Payment of Gratuity Act 1972, Employee State Insurance Act 1948, Contract Labour (R&A) Act 1970, Payment of Bonus Act 1965, Income Tax Act, Goods and Services Tax Act and all other applicable Acts shall be complied with by the Contractor.
31. Contractor shall comply with all statutory requirements, rules, regulations, notifications in relation to employment of his employees issued from time to time by the concerned authorities.

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32. Contractor shall indemnify BHEL against all claims and losses under various Labour Laws, statutes or any civil or criminal law in connection with employees deployed by him.
33. Contractor wherever applicable shall maintain proper records prescribed by the concerned statutory authorities and provides a copy of the same to BHEL.
34. Contractor shall furnish proper returns to the concerned statutory authorities and provide a copy of the same to BHEL.

ANNEXURE IV

SAFETY PRECAUTIONS TO BE TAKEN BY THE CONTRACTORS

1. The Contractor must inspect the area of work to decide the safety precautions necessary for executing this contract.
2. Whenever people work at height more than six feet, platform shall be provided or the workers shall wear safety belt to avoid fall from the height.
3. Wherever any area declared as dangerous, the workers shall not be allowed to work till a written clearance is obtained from appropriate authorities.
4. No material of any kind shall be dropped or allowed to be dropped from any height.
5. Defective ladders shall not be used at all.
6. Inflammable materials shall not be stored near places where the sparks are likely to occur.
7. The necessary safety equipment's such as gloves, boots, helmets etc. must be issued to the workmen and strictly to be used while carrying out the work.
8. If the contractor's workmen are found to be violating the safety precautions, punitive action will be taken by withholding a sum of Rs.500/- to Rs.1000/- from the contractor's bill for each violation.
9. The working area shall be kept clean and free from all obstructions.
10. All temporary electrical connections shall be properly earthed, insulated and periodically checked.
11. The contractor should arrange WORKMEN COMPENSATION / INSURANCE POLICY covered for all his/her workmen. A copy of the policy has to be submitted before commencement of work.
12. All safety precautions are to be taken by the contractor at his cost.
13. These safety measures shall be deemed to form an integral part of the Work Order/ Agreement.



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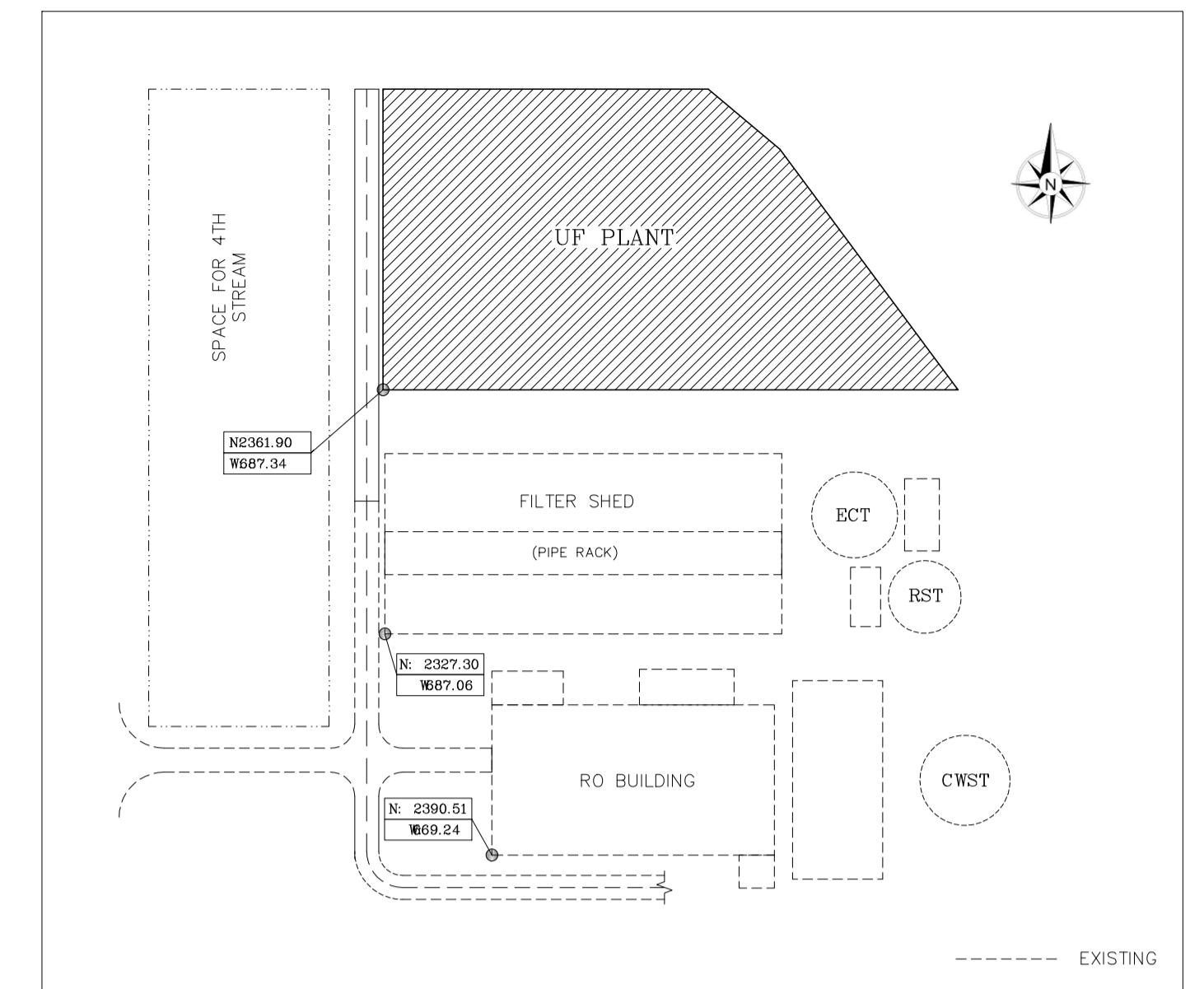
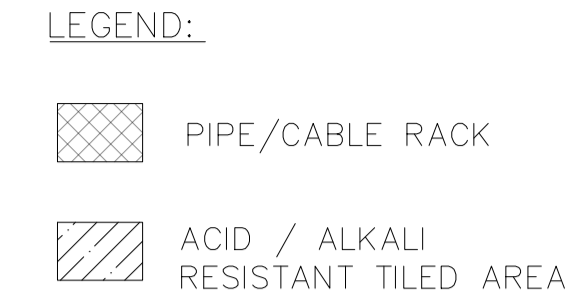
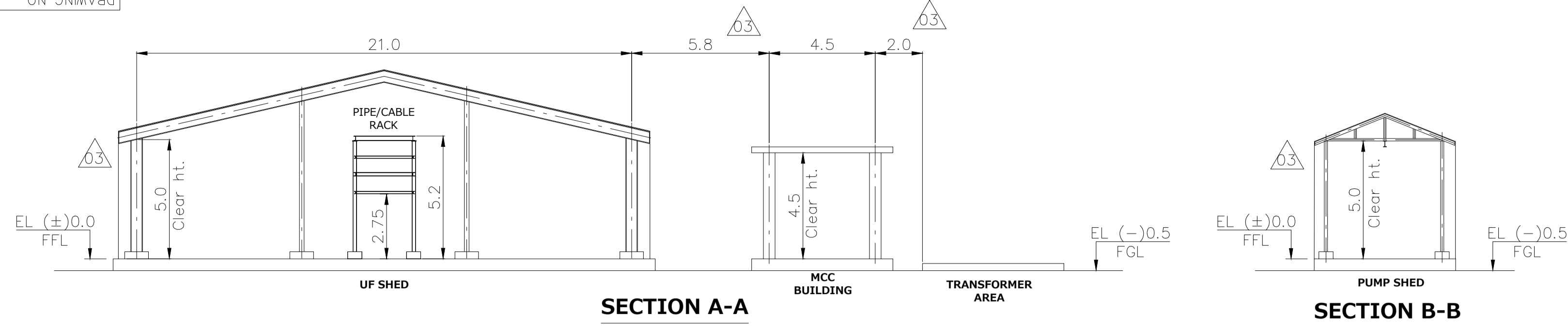
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HR Annexure

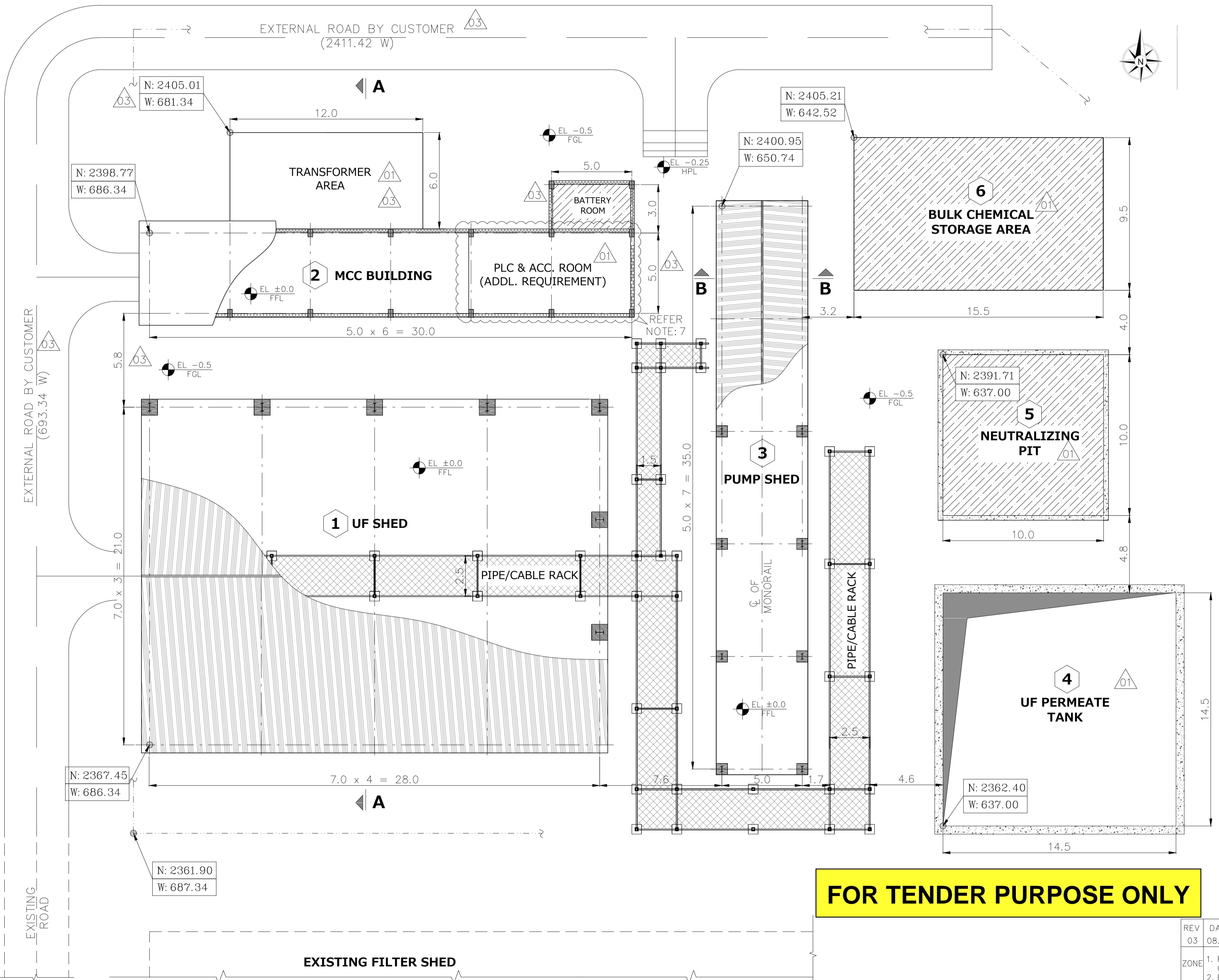
1. PF = 12% (Employer) + 12% (Employee)
2. PF to be remitted in contractor's own code
3. ESI = 4.75% (Employer) + 1.75% (Employee)
4. If ESI is not available in that area, then take insurance
5. Contract License as per CL Act
6. Issue of employment card to contract labours
7. Issue of one month notice before termination of contract
8. Minimum wages as per current stipulation.
9. Payment of wages – within stipulated time.

And other statutory requirements under various applicable labour laws to be ensured.





- NOTES:**
- ALL DIMENSIONS, CO-ORDINATES, ELEVATIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 - UF PLANT AREA FGL IS (-)0.5 M WHICH CORRESPONDS TO RL (+)4.1 M.
 - ELEVATION 0.0 M CORRESPONDS TO RL (+) 4.6 M.
 - BUILDING DIMENSIONS FURNISHED IN THIS DRAWING ARE:
 FLOOR: COLUMN CENTER TO CENTER
 ROOF: INSIDE CLEAR HEIGHT
 - ALL RCC TANKS / SUMPS DIMENSIONS FURNISHED IN THIS DRAWING ARE CLEAR INSIDE DIMENSIONS.
 - CO-ORDINATES & SIZES SHOWN FOR THE BUILDINGS, TANKS AND OTHER FACILITIES ARE TENTATIVE. IT SHALL BE FINALIZED DURING DETAILED ENGINEERING.
 - PLC & ACC. ROOM IS ADDED ADJACENT TO MCC BUILDING OF THE UF PLANT; BASED ON SITE VISIT & JOINT DISCUSSION WITH NTECL (DUE TO NON-AVAILABILITY OF SPACE IN THE EXISTING CCR)



Buildings/Tanks List				
S.no	Description	Qty (Nos)	Unit size (in m)	Remarks
1	UF shed	1	28.0 x 21.0 x 5.0	Structural steel shed; side covered
2	MCC building	1	30.0 x 5.0 x 4.5	RCC building
3	Pump shed	1	5.0 x 35.0 x 5.0	Structural steel shed; side covered
4	UF permeate storage tank (700 m ³)	1	14.5 x 14.5 x 3.5	RCC tank; top covered
5	Neutralizing pit (200 m ³)	1	10.0 x 10.0 x 2.0	RCC sump; top open
6	Bulk chemical storage area	1	15.0 x 9.5	A/R tiled area
7	Transformer area	1	12.0 x 6.0	

FOR TENDER PURPOSE ONLY

- REF. DRAWINGS:**
- KEY PLAN: 3-WT-220-00811 REV.00
 - EQUIPMENT LAYOUT: 1-WT-220-00968 REV.00

REV	DATE	ALTERED: SV	REV	DATE	ALTERED: SV
03	08.06.17	CHECKED: GR	01	29.04.17	CHECKED: GR
ZONE		1. REVISED INLINE WITH CUSTOMER COMMENTS DT: 23.05.17 2. BATTERY ROOM ADDED.			
02	05.05.17	CHECKED: GR	02		
ZONE		REVISED INLINE WITH THE SITE VISIT & JOINT DISCUSSION DURING THE KOM.			

OWNER: NTECL
 Tamil Nadu Energy Company Limited, Vavur

OWNER'S CONSULTANT: NTPC NATIONAL THERMAL POWER CORPORATION

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: NTECL VALLUR TPP - 3 x 500 mw
 UF PLANT - 2400 cu.m/hr

DRN: S.VIVEK
CHD: G.RAJENDIRAN
APPD: M.NATARAJAN

DEPT NP: GRADE OF UNTOLODIM
CODE 9776: PR:QA:500

SCALE: ---
WEIGHT (KG): ---

REF. TO ASSY/OLD DRG.: 0260-132G-PVM-F-001

TITLE: PLANT LAYOUT
CARD CODE: U 01
DRAWING NO.: 1-WT-220-00967

NO. OF ITEMS: 03

PLAN LAYOUT - PLAN



ACCEPTANCE FOR ELECTRONIC FUND TRANSFER / RTGS TRANSFER

01	NAME & ADDRESS OF THE SUPPLIER / VENDOR PHONE NO. WITH STD CODE	PAN NO. <input type="text"/>											
02	VENDOR CODE (as in WORK ORDER)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
03	Details of Bank Account:												
A)	NAME & ADDRESS OF THE BANK (WITH PIN CODE)												
B)	BANK TELEPHONE NUMBER (WITH STD CODE)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
C)	BANK BRANCH CODE:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
D)	MICR CODE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
E)	ACCOUNT NUMBER	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
F)	TYPE OF ACCOUNT	CURRENT / OD / CASH CREDIT											
G)	VENDOR NAME AS PER BANK RECORDS												
H)	BANK BRANCH RTGS IFSC CODE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
I)	BANK BRANCH NEFT IFSC CODE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
J)	VENDOR'S EMAIL ID (give two ids)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
K)	NAME OF AUTHORISED SIGNATORY												

CERTIFICATE

I / We hereby agree to receive the payments due from BHARAT HEAVY ELECTRICALS LIMITED, RANIPET by the National Electronic Funds Transfer and/or RTGS Transfer mode by credit to my / our above mentioned Bank Account. I / We also agree that payments made to the above mentioned Account is a valid discharge of the liability of Bharat Heavy Electricals Limited, Ranipet. I / we also agree to bear the applicable Bank Charges for the above mode of transfer.

AUTHORISED SIGNATORY OF VENDOR WITH SEAL

Banker's Certification

We confirm that we are enabled for receiving RTGS and NEFT credits and we further confirm that the account number of _____ (name of account holder), the signature of the authorized signatory and the MICR and IFSC codes of our Branch mentioned above are correct.

PLACE:

DATE:

(Manager / Officer's
Signature Under Bank stamp)
Authorisation No. _____

Note: This EFT Form is to be submitted duly filled in manually in all fields and duly signed by Authorised Signatory and certified by Banker.

GENERAL AND SPECIAL SPECIFICATIONS

1. Site Clearance

All the area upon which the construction is to be carried out and areas which are required by the Contractor for his construction facilities are to be cleared off all rubbish and objectionable matter at Contractor's own cost. Trees, if any, shall not be uprooted or cut without the prior approval of the Engineer-in-charge. All spoils, unserviceable materials and rubbish shall be burnt or removed from site. Usable materials, saleable timber, fire-wood etc., shall be stocked properly at work site in the manner as directed by the Engineer-in-charge. The cost of clearing the areas shall be deemed to have been included by the tenderer in his general rate.

2. Earthwork for Foundations

Earthwork excavation for foundations and filling in foundations shall conform to TNBP 23 and 24. The area to be excavated or filled in with excavated materials shall be clearly demarcated in the field by the Contractor. Excavation shall be done to lines and levels defined. Excavation shall be carried out to such widths, lengths, depths, profiles and grades as shown in the drawing or as may be specified by the Engineer – in – charge. Rough Excavation may be carried out up to a depth 15 cm less than the final level but the balance shall be excavated to precise level with special care. All soft pockets of soil met with even below the final level shall be removed and the excavation filled up as directed by Engineer-in-charge. The methods of excavation shall in every case be subject to the approval of the Engineer-in-charge and the contractor shall ensure the safety and stability of the excavations, being executed by him as well adjacent buildings, structures, services and other works in the vicinity of the site of work. Wherever necessary Engineer-in-charge may direct that the sides of the excavation should be timbered and shored at the contractor's own cost, adopting a proper method approved by the Engineer-in-charge. Notwithstanding the above, should any slip occur, the contractor shall remove all the slipped materials from the excavated pit, at his own cost. He shall also make good at his own all damages caused to the work as well as adjacent buildings, structures etc., as a result of the slip, referred to.

All excavation work shall be subject to inspection and approved by the Engineer-in-charge before any further works in the excavated areas allowed commencing. Should any excavation be carried out beyond the specified depth, the contractor should fill it up at his own cost with the same type and class of material as it is proposed to be laid over the excavated portion. No payment will however be made to the contractor on his account.

The contractor shall ensure that the excavations and the structures under construction are kept free from water logging at all stages of construction. He shall take all necessary precautions and `streams, aquifers, springs, surface flows etc., are excluded effectively so as to ensure that the works are carried out in a reasonable dry conditions in accordance with the construction schedule.

Back filling around the foundations, trenches, and plinth and under the floor shall be done in accordance with TNBP 24 and 25. The finished level of the plinth filling shall be trimmed to the slope required to be given to the finished floor. Back filling, watering and consolidation of excavated earth in layers etc., complete as per specifications shall be done unless otherwise stipulated in the tender schedule.

Removal of Hard rock by Blasting

This shall include all rock occurring in large masses which cannot be removed except by blasting. Blasting shall be done in conformity with TNBP 19 & 23 and as instructed by the Engineer-in-charge. When rock blasting has to be done adjacent to structures, the following precautions shall be observed.

- (1) All blasting should be completely muffled to prevent damage by flying pieces.
- (1) Blasting within 3 meters of the structures shall be avoided

- (2) No blasting should be done within 1.5 meters of concrete / masonry structures.
- (3) An isolated boulder extending under the existing structure but projecting within the area of blasting should be blasted.
- (4) The contractor shall be responsible for all damages caused by blasting and shall replace or repair the damaged structures at his own cost.

3. Plain and Reinforced Cement Concrete Works:

All design and construction shall be performed in accordance with the Indian standard code of Practice for plain and reinforced concrete – IS 456 and TNBP 30. Any Special requirements noted on the drawings or bill of quantities shall govern over the provisions of this specifications. Controlled concrete shall be used wherever specified in the schedule of items complying with all requirements of IS: 456 and as per special specifications appended herewith.

The coarse aggregate to be used shall be of hard broken granite stone jelly of various sizes as specified under respective items in the Bill of Quantities, conforming to IS 383 latest edition. The Engineer-in-charge may require the contractor to carryout moisture content tests in both fine and coarse aggregates. For determination of moisture content IS – 2386 shall be referred to. The amount of water to be added shall be then adjusted to compensate for any observed variation in the moisture contents. Proper control of mixing water is deemed of paramount importance. Mixtures with automatic water measuring drums shall be used or else. Water should be measured by volume in calibrated buckets. All measuring equipments shall be maintained in a clean serviceable condition and the accuracy periodically checked and got certified by the Engineer-in-charge. The contractor shall carryout slump tests apart from taking test cubes at regular intervals. All such methods of sampling and analysis of concrete shall be in accordance with IS – 1199.

Mixing of concrete shall be strictly carried out in an approved type mechanical mixer. The mixing equipment shall be capable of combining the aggregates, cement and water within the specified time (not less than 2 Minutes) into a thoroughly mixed and uniform mass and of discharging the mixture without segregation. Mixing shall be continued until there is a uniform colour and consistency, Concrete shall be handled from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of any of the ingredients. Before depositing the concrete, all debris and dirt shall be removed from the space to be occupied by concrete. Concreting shall not be done unless the formwork conform to the shapes, lines and dimension as shown in the drawings.

Unless otherwise approved, concrete shall be placed on single operation to the full thickness of slabs and beams and similar members and not exceeding 1 metre deep in walls, columns and similar members. Concrete shall be placed continuously until completion of the part of the work between construction joints or as directed by the Engineer-in-charge. The concrete after being laid shall be compacted by means of vibrators of approved type under proper supervision as directed by the Engineer-in-charge. Care should be taken to avoid segregation and formation of air bubbles. The whole process starting from the mixing of concrete to the placing and compaction shall not take more than 20 minute and the process shall be completed before the initial setting takes place. Curing shall be accomplished in accordance with IS-456 by keeping the concrete covered with a layer of sacking, canvas or similar absorbent materials and kept constantly wet for the period as directed by the Engineer-in-charge.

Reinforcement

All reinforcement shall be clean and free from pitting, loose mill-scales, dust, loose rust and coats of paint, oil or other coatings which may destroy or reduce bond. General construction details and workmanship relative to reinforcement including bar bends, lap splices and installation shall be in accordance with the IS-2502 as well as IS-456. All bars be bent as per the bar bending schedules indicated in the drawings or supplied separately relevant to particular drawing. The contractor shall in all cases verify himself the correctness of schedules, giving the number, length and the bending details of the bars. The numbers, sizes, shape and position of all the reinforcement shall, unless otherwise, directed or authorized

by the Engineer-in-charge be strictly in accordance with the drawing. The reinforcement shall be adequately held in position by 18 / 20 SWG soft black annealed binding wire. The contractor must obtain the approval of Engineer-in-charge for the reinforcement placed, before any concrete is placed in the form. All reinforcing bars shall be so tied as to form a rigid cage to prevent displacement before or during concreting. Rate quoted for reinforcement should include cost of transporting M.S. Rods / CTD bars from BHEL Store to site of work, cleaning, cutting, bending, placing, binding with contractor's own binding wire and providing necessary cover blocks of concrete but excluding cost of steel which shall be supplied free of cost at BHEL Stores.

Form Work

Formwork shall conform to the shape, lines and dimensions of concrete and RCC structures as shown in the drawings and shall be well within the permissible tolerance. Formwork for concrete shall be of plywood, steel, good seasoned timber or other approved materials, properly designed easy for removal and cleaning. They shall be of sufficient strength and rigidity to maintain their position and shape under loads incidental to placing concrete. The number of props, their sizes and dispositions shall be such as to be able safely carry the full dead load area constructional loads. The arrangement and alignment of formwork shall be got approved by the Engineer-in-charge prior to concreting. However this shall not relieve the contractor from his responsibility for proper work and safety. Formwork shall be sufficiently tight to prevent loss of cement slurry from the concrete. All joints and holes in the formwork shall be caulked with putty jute cloth or other approved materials to the satisfaction of the Engineer-in-charge. The stripping time for the shuttering and the formwork shall in general conform to the provisions in the relevant clauses of IS 456. Unless otherwise specified rates for reinforced cement concrete shall include cost of centering, shuttering charges also.

.4. Stone Masonry

General: Stone masonry shall conform to TNBP 35. Stone shall be obtained from the approved quarry and shall be free from decay and weathering.

All stones shall be thoroughly wetted before use. The mortar used for jointing shall be as per approved Drg. .

The walls shall be carried up truly plumb. Every stone shall be carefully fitted to the adjacent stones so as to form neat and closed joints.

To give sufficient lateral bond, vertical joints shall be avoided. Prescribed number of headers as required shall be provided to give sufficient transverse bond. At junctions of wall the stones each alternate course shall be so carried into each of the respective walls as to unite the work thoroughly. Where breaks are unavoidable in carrying up the work continuously in horizontal course sufficiently long steps shall be left to join the old and new work building of two thin faces and filling up the middle with small stuff or dry packing shall be strictly avoided. When plastering or raised pointing is not required to be done joints shall be struck flush and finished simultaneously.

Random rubble masonry

Random rubble masonry work shall conform to TNBP 35-L and J. Stones shall be hammer dressed at faces and joints to enable them to come into close proximity with each other. The face stone shall be laid headers and stretchers alternately, so as to break the joint by at least 75mm. Thickness of joint shall not exceed 12mm. No pinning shall be used on the face and face stone shall extend well back into the headers. Stones less than 130 mm. in height shall not be used on the face.

Bond stones running through the wall shall be provided at 1.8M intervals in walls up to 0.60 M. thickness and if the wall is more than 0.60 M. thick a line of headers shall be laid from face to back each header overlapping the other by at least 150 mm.

5. Brick Masonry:

First class Bricks: Brick shall be sound, hard, tough, and rectangular in shape and size, well burnt of uniform deep red or copper colour and conform to IS – 1077.

Brick shall be free from cracks, chips, flaws, stone or humps of any kind. Bricks shall be homogeneous in texture and emit a clear ringing sound on being struck and shall have a minimum compressive strength of 50KG / sq.cm. And shall not absorb water more than 20% of its weight, when soaked cold water for 24 Hrs. All bricks shall be table moulded.

Second Class Bricks: These shall be ground moulded but should otherwise conform to the specifications of first class bricks except for some surface cracks are allowable. These shall have minimum compressive strength of 50 Kg./sq.cm.

Samples of each type of brick, shall be got approved by the Engineer-in-charge before being used. All subsequent deliveries shall be up to the standards of the approved samples.

Brickwork shall conform to TNBP31 and IS –2212.

Brick works shall be classified as first or second class according to the classification of bricks used and the method of laying. The thickness of joints shall not exceed 6 mm. in first class brickwork and 10 mm in second class brick work.

Bricks shall be well soaked before use on works for at least 6 hrs. The soaked bricks shall be kept on wooden planks or platform. Brick required for masonry with clay or lime mortars shall not be soaked.

Brickwork shall be laid with specified mortar to be prepared in accordance with IS –2250. Brick works shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except when needed to complete the bond. Each course shall be taken up truly plumb, if battered, the batter is to be truly maintained. The level of brickwork shall be checked up at every one metre interval. Bricks shall be laid with frogs upward, while laying bricks shall be thoroughly bedded and flushed in mortar and taped into position with a wooden mallet and the superfluous mortar removed. Walls of all structures shall be carried up regularly in all cases, leaving no part, one metre lower than the other. Where the masonry of one part has to be delayed, the work shall be raked back according to bond (and not toothed) an angle not exceeding 45 Deg. But the raking back should not start within 60cm. of a corner vertical joints in alternate courses shall come directly over one another. The brickwork shall not be raised more than 14 courses per day. All iron fixtures, pipes, conduits, drains, sleeves, bolts, holdfasts of doors and windows etc. which are required to be built in walls shall be embedded in cement mortar or cement concrete as specified, in their correct position as the work proceeds.

Joints

Joints shall be restricted to 6 mm in first class brickwork and 10mm in second class brick work. All bed joints shall be normal to the pressure upon them, radial in arches and at right angles to the face in battered retaining walls. Care shall be taken that all joints are fully mortared (proportion as specified in the schedule items) well flushed up and in case where no pointing to be done, neatly struck at the work proceeds. The joints in faces which are to be plastered or pointed shall be squarely raked out to a depth of 12 mm while the mortar is still green. The raked joints shall be well brushed to remove loose particles. After the work the faces of work shall be cleared well by brush so as to remove any splashed mortar during the course of raising the brickwork.

Curing

Green work shall be protected from rain by suitable covering. Masonry work shall be kept thoroughly well watered on all faces for at least 10 days after completion. In case of fat lime mortar curing shall commence two days after laying of masonry and shall continue for seven days.

6. Scaffolding

Scaffolding will generally be single but may be double if warranted for the particular work as approved by the Engineer-in-charge. The contractor shall take all measure to ensure safety of work and the working people.

Payment for brickwork shall be made on cubic metre basis on the volume of actual work done. Half brick wall and brick on edge wall shall be paid on square metre basis. The rate of brick work shall include scaffolding and all items mentioned above and no extra payment will be made for cutting bricks if required either for openings or for rounding or insertions or for recesses at the time of brick wall construction.

7. Damp Proof Course

Damp proof course shall either be with cement concrete or with cement mortar of specified thickness as mentioned in the relevant item of schedule. Damp proof course shall not be carried across doorways. It shall be laid for all walls except verandah retaining wall or for particular wall only directed by the Engineer-in-charge. It shall be laid flush with floor level or as instructed by the Engineer-in-charge.

Damp proof course with cement concrete shall be of 25 or 38 mm thick in cement concrete M15/M20 as specified using 12mm. and down size aggregate well rammed and smoothed with trowel. It will be kept wet for 40 hours and after it has dried, two coats of hot bitumen shall be applied over it and allowed it to dry after which sand shall be sprinkled over it.

Damp proof course with cement mortar shall be 12 or 20 mm thick in cement mortar 1:3 well mixed with crude oil at 5% by weight of cement used.

8. Cement Plastering:

Cement plastering shall be in accordance with IS – 1661 and TNBP –56 & 57, Cement mortar shall conform to IS – 269. The mortar of specified mix and thickness shall be used.

The surface to be plastered shall be thoroughly cleaned so that it is free from dust, oil, salts etc., the joints of masonry shall be raked out to a depth of at least 12 mm. On cement concrete surfaces the surface shall be cleaned with wire brush and scarified by lines with trowel or hacking done. The surfaces in both cases shall be washed properly and kept wet for 4 hours before plastering is commenced.

Plastering shall be started from top and gradually worked down towards the floor. It shall not at any place be thinner than specified. To ensure even thickness plaster of about 15 cm X 15 cm shall be first applied horizontally and vertically at not more than 2 metres intervals over the entire surface to serve as gauges. The surface of these gauges shall be truly in the plane of finished surface. The mortar shall then be laid in the wall or other surfaces between the gauges and finished even. All corners shall be rounded to a radius of 24 mm unless otherwise directed. The contractor shall not be paid for any extra thickness of plaster done than as specified.

Plaster, when more than 15 mm thick shall be applied in two coats, a base coat followed by the finishing coat. Thickness of the base coat shall be just sufficient to fill up unevenness in the surface, no single coat, however, shall exceed 12mm in thickness. The under coat shall be roughened or scratched before it is fully hardened.

Curing shall start 24 hours after the plaster is laid. It shall be kept wet for 14 days. During this period it shall be suitably protected from all damages at the contractor's cost by such means as approved by the Engineer-in-charge.

Any cracks which appear in the surface shall be cut out in rectangular shape and redone as directed by the Engineer-in-charge. Wherever specified standard waterproofing compound as approved by the

Engineer-in-charge shall be added to the mortar at the rate of 2% or as specified by the manufacturer by the weight of cement for which the rate shall be paid separately. The rate for plastering shall include cost of scaffolding, swing etc., needed for the work with labour and material all complete.

9. Steel Door, Windows and Ventilators:

All steel doors, windows and ventilators shall conform to IS – 1038, IS – 1361 and IS 1081 or equivalent as mentioned in the bill of quantities and as approved by the Engineer-in-charge.

Rolled steel sections shall conform to IS – 226. The sections shall be cold straightened and finished goods shall be free from bends and other defects. Materials used in the fabrication shall be the best procurable and conforming to relevant IS specification. Thickness and specification of the glass to be provided shall be as indicated in the relevant item of the bill of quantities. Glass shall be free from flaws, specks, bubbles, etc., Bolts, nuts, screws, peg stays and other mild steel fittings shall be treated for corrosion as per relevant Indian Standards. Putty for glazing shall conform to IS – 420.

Doors, windows and ventilators, etc., shall be truly square and free from twist and warp. They shall be constructed of sections which have been cut to the required lengths and welded or riveted at the corners as per standard specifications.

All steel surfaces shall first be thoroughly cleaned free of rust scale or dirt and mill scale by approved means and shall be painted with one coat of approved primer conforming IS – 102 before dispatch. Alternatively if specified they may be galvanized by the “Hot dip” zinc spray or electro galvanizing process described IS – 1361. Doors, windows and ventilators shall be fixed in positions, as specified under IS 1081.

Whenever contractor is required to supply the doors, windows and ventilators etc., he shall first submit to the Engineer-in-charge, the details about source of supply, detailed drawing and specifications etc., for prior approval.

11. Wooden Doors, Windows and Ventilators :

All wood work for doors, windows, ventilators cup board, shelves, etc., conform to relevant IS specification and TNBP 82 and shall be well seasoned teak wood or well seasoned country wood (Pillamarudu or Karumarudu) as the case may be. Timber shall be best quality and shall be free from knots, injurious open shales, bore holes, decay, soft or spongy spots, hollow pockets and all other defects and blemishes. Timber shall conform to IS 1003 (Part 1). Size of doors, windows and ventilators shall as specified in the relevant item of schedule and detailed drawings and generally in conformity with IS – 1003, part I and part II. The rates for doors, windows and ventilators etc., shall be for the finished work inclusive of fixing them in position with necessary iron hold fasts and furniture fitting of oxidized iron or aluminium or oxidized brass as stated in the description of the relevant items of the bill of quantities and as directed by the Engineer-in-charge. Fittings and furniture shall be of best quality and machine made and robust type. Wherever glazed shutters are to be provided, the cost of glass panes of specified thickness and fixing them in position should be included in the quoted rate. All glass shall be of superior quality from approved manufacturer. In case of solid core flush doors, they should conform to IS:2202 Part I and Part II. The flush door shutters should have a finished thickness as specified in the scheduled item. Flush door shutters shall be obtained from firms of repute as approved by the Engineer-in-charge.

12. ROOFING : (A) R.C.C Slabs :

Roof slab shall be of RCC of specified mix conforming to IS : 456, with adequate main tensile, transverse and adhesive reinforcement of ribbed steel bars of mild steel rounds. Unless otherwise mentioned the rates for RCC slab shall include cost of concrete, centering and shuttering charges, vibration charges, rounding of corners, curing and finishing etc., complete. Expansion joints in reinforced cement slabs shall be as per TNBP 30.

The ceiling should be finished as per Clause 30 of TNBP. No extra payment shall be made towards cost of ceiling plaster necessitated on account of defective centering materials used or poor workmanship.

The top of roof slab shall be finished with weathering course treatment if so specified. The weathering course work shall conform to TNBP 44-HJ and consist of concrete with broken brick in neat slacked lime of specified thickness finished with one course of pressed split tiles / pressed tiles of specified thickness and size as described in the bill of quantities.

13. A.C. Rain Water Pipes

The pipes shall be of standard quality conforming to IS 1628. These shall be straight, true smooth and regular in thickness. They shall be free from cracks and other flaws. The supply shall include all necessary pipe fittings and accessories.

All pipes shall be fixed to wall or columns by standard M.S butt holder clamps of approved make. The spigot of the upper pipe shall be properly fitted into the socket of the lower pipe, such that there is uniform annular space for filling with the jointing materials. One third depth of this annular space is to be filled with spun yarn soaked in bitumen of approved quality and properly pressed with caulking tool. The remaining two, third depth of the joint is to be filled with Cement Mortar 1:2 (1Cement : 2 coarse sand) and shall be pressed with caulking tool and finished smooth at the top at an angle of 45 Deg. sloping up.

The rate shall include supplying and fixing pipes with specials and accessories, including sizing as required, jointing, testing, cutting of walls and making good necessary scaffolding etc., complete.

14. Flooring :

Flooring shall consist of a base course of cement concrete of specified thickness and proportion laid over the compacted earth or sand filling as specified and a finishing layer of concrete, mosaic, glazed tiles or any other material as specified to be laid. Flooring work for Factory shop floors as well as mosaic flooring shall be done as per the special specifications.

The bed flooring shall be prepared either level or sloped as per relevant drawing or as instructed by the Engineer-in-charge. Filling in basement with earth or sand shall be in accordance with TNBP 25. On the prepared bed, cement concrete of specified mix and thickness shall be laid and well consolidated.

A. Ellispattern, 1st Sort Flooring

On the clean wet surface of the concrete base before it has set, will be laid a layer of cement concrete to give a finished depth of 20/25 mm over the base concrete. The cement concrete will be of 1:3 proportions (1 cement and 3 hard broken stone chippings 3 to 10 mm Size). To make a coloured floor red oxide iron powder or other approved materials should be mixed with cement at the rate 10% of the weight of cement or as directed by the Engineer-in-charge. Ellis pattern flooring shall be done as described under clause 41-G of TNBP.

B. Glazed Tile Flooring

The tiles shall be of ceramic white or coloured and of specified dimensions as described in the schedule item. The top surface of tiles shall be glazed with a neat finish of uniform colour and texture and free from flaws, cracks, craze, specks or other imperfections. Tiles shall be true and shape with straight edges, non-absorbing and non – fading. Samples of tiles together with manufacturer's literature shall be submitted to the Engineer-in-charge for approval. Tiles shall conform to IS 177 latest.

Over the prepared surface of the floor a bedding layer of Cement Mortar (1:3) of specified thickness shall be laid-in-proper level and slope using screed patterns. The bedding layer shall be deeply scratched while it is set. A mortar set bed of 6mm thickness in cement lime mortar 1:1:3 (one cement one lime putty and three sand), shall be laid over the bedding layer. After mortar setting, bed has been leveled, a skin of neat cement shall be trowel led to the mortar setting bed immediately before the tiles are set. As soon as the mortar setting bed has sufficiently hardened, all tiles shall be finally secured in place and gently beaten in and finished surface brought to desired level. When grouting the glazed tiles, special care shall be taken to prevent scratching of the glazed surface. Joints shall be pointed with white or coloured cement to match the tile surface and cured. No joint shall be more than 1.5 mm thick.

15. White Washing and Colour Washing

White washing and colour washing shall be done as per clauses 63 and 64 of TNBP. The surface shall be thoroughly cleaned off mortar drops and foreign matter. All patching must be scraped properly. The white washing shall be done from pure shell lime / Janathacem. Samples of lime shall be got approved by the Engineer-in-charge. The wash shall be applied with a brush, the coats being laid on vertically and horizontally alternatively, each coat being allowed to dry before next coat is applied. For colour washing the desired shade shall be obtained by mixing approved quantity of colouring matter or distemper with shell lime solution and applied as per white. The contractor shall take every precaution to prevent white wash being splashed on wall, floor and other places and articles not to be white washed. No colour wash shall be done unless a sample pattern of the mixed colour has been approved by the Engineer-in-charge. The rates shall be inclusive of scaffolding charges, cost of ladder etc.,

16. Painting

All painting work shall be done in accordance with TNBP-66 and the relevant Indian Standard Specifications. Paints, varnishes, cement paints etc., shall be the highest grade products of well known approved manufacturer and shall be delivered to site in original sealed containers. It is desired that materials of one manufacturer only shall be used as far as possible. Colours shall be uniform and nonfading. Samples of all colours selected shall be submitted to the Engineer in charge for approval before bulk purchase is made. All finished work shall match corresponding samples kept with the Engineer.

Preparation of Surface :

Before painting wooden surfaces, protruding timber fibres shall be removed and nail marks shall be covered with putty. The surface shall be thoroughly cleaned and sand prepared. In case of steel work it shall be scraped, well brushed and cleaned free of rust, scale dirt. Base preparation for painting concrete, masonry and plastered surfaces shall be carried out as per IS 2395 – Part I. Before actually proceeding with the work of painting the concrete, masonry and plastered surfaces, it shall be verified that the surfaces shall be completely dry, free from efflorescence and alkaline effect.

Application

The primer shall be applied with brushes and spread as evenly and as smooth as possible. For steel work a priming coat of Red Oxide / Zinc Chromate paint shall be applied. Painting shall be done by skilled labourers in a work-man like manner. All coats shall be of proper consistency and shall be well brushed out, so that no brush marks are visible. The under coating should be nearest to the specified colour of the finishing coat. Unless otherwise specified ready mixed synthetic enamel paints shall be used for painting, wood and steel work. Under coats should be completely dry before finishing coat is taken up. Priming coat and under coat shall be rubbed with sand paper and dusted clean. The finished coat of approved paint shall then be applied.

17. Cement Painting

Cement Paint solution shall be applied to the surface with hair brushes in a number of coats to get uniform finish. After the first coat of paints has hardened, it shall be cured with water at least for 24 hours. The surface shall be wetted again before the application of the second coat. At least 24 hours should lapse between the two coats, number of coats shall be as specified in the schedule of quantities. It shall be kept damp at least for seven days.

18. French Polish

French polish to be used shall comply with IS 348. Polishing shall be obtained by dissolving 1 lb, of shellac in one gallon of mentholated spirit without applying any source of heat. After the shellac has dissolved $\frac{1}{4}$ lbs of cobalt, $\frac{1}{4}$ lbs of lobano and 0.4 oz of crystals of desired pigment shall be added. The solution shall be applied with a pad of fine muslin cloth tied as per general practice. The pad shall be dipped into the solution and wrung with fingers and be rubbed hard on the surface in this way, the first coat is to be given after this gets dried up, the successive coats shall be given in the same fashion till the mirror like surface is obtained. The wood to be polished shall be first applied with filler composed of 1.25 Kg. of whiting mixed with one litre of mentholated spirit and then sand papered when dry. The finished surface shall have uniform texture and gloss. Approved transparent sealer shall only be used in base preparation.

SPECIAL SPECIFICATION FOR CONTROLLED CONCRETE

a) PROPORTIONING MIX:

The proportion of aggregate, Cement and water to be used for controlled concrete shall be designed by preliminary tests of the materials to be actually used to obtain the densest to workable concrete requiring the minimum quantity of cement paste for binding the materials to give the required strength. However the maximum total quantity of aggregate by weight per 50 kg. of cement shall not normally exceed 450kg All proportions shall be by weight. However water may be added by weight or volume.

b) MIX DESIGN:

Immediately upon the receipt of the award of the contract, the Contractor shall inform the Engineer-in-charge the exact location of the sources of materials which he proposes to use and get the materials approved. The mix with the actual approved materials to be used shall be got designed by the Contractor in an approved laboratory chosen by BHEL and got approved by the Engineer-in-charge. These proportions shall be used so long as the materials continue to be the same quality and from the same sources. If during the progress of work, the Contractor wishes to change the materials, the proportions shall be fixed on the basis of fresh preliminary tests to give the required strength. No change of materials shall be allowed unless fresh tests with new materials show satisfactory results.

c) STRENGTH REQUIREMENTS OF CONCRETE:

Controlled concrete shall be in the following grades, M 15, M 20, M 25, M 30, and M 35 & M 40. The concrete mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than the appropriate values (as per I.S. 456) as given in table below:

Sl. No	Grade of. Concrete	Specified Characteristic Cube Strength	
		Preliminary test N/mm ²	Works test N/mm ²
1.	M 15	20	15
2.	M 20	26	20
3.	M 25	32	25
4.	M 30	38	30
5.	M 35	44	35
6.	M 40	50	40

d) WORKABILITY OF CONCRETE:

The proportions chosen shall be such that the concrete is of adequate workability for the conditions prevailing on the work in question, and shall be properly compacted. Water shall be added to the mixer to give the required workability. The water content of each batch shall be adjusted as necessary to maintain the required workability with simultaneous adjustment of cement concrete such that the water cement ratio is not changed. The workability tests shall be carried out in accordance with IS : 1199 - Latest, "Methods of sampling and analysis".

Workability of concrete shall be controlled by direct measurement of water content, making allowance for any surface water in the fine and coarse aggregates. Allowance shall be made for surface water present in the aggregate when computing the water content. Surface water shall be determined by one of the field methods described in IS : 2386, Part III.

e) CONSISTENCY AND SLUMP:

The concrete shall have a consistency such that it will be workable in the required position. It shall be of such consistency that when properly vibrated it will flow around reinforcing steel and all embedded parts. The slump for concrete as determined by slump tests as per Indian Standard 456 (latest edition) shall not exceed the maximum slumps indicated below for each type of construction as approved by the Engineer-in-charge.

Slum in MM	Type of Construction		Workability
	Min.	Max.	
Medium	40	80	All RCC works

The contractor shall not place concrete having a slump outside the limits specified without the approval of the Engineer-in-charge.

At least one slump test shall be made for every compressive strength test carried out. More frequent tests shall be made if there is a distinct change in job conditions or if required by the Engineer-in-charge.

f) TESTS:

Test shall conform to the specifications laid down in IS : 456. These tests shall be got done in an approved laboratory and in accordance with IS : 516 - Latest at the cost of the Contractor (for making necessary cube moulds, transporting the cubes to the Laboratory and all other incidental etc.). The test fees for the cubes shall be borne by the contractor. In order to ensure proper quality control sampling of the concrete of each specification placed on any day in work shall be done in accordance with the following table.

Quantity of Concrete in work	Total Number of samples(each sample to consist of 6 test cubes)
Up to 5.00 Cu.m.	1
Greater than 5.00 Cu.m. and less than 15.00 Cu.m	2
Greater than 15.00 Cu.m. and less than 30.00 Cu.m.	3
Greater than 30.00 Cu.m. and less than 50.00 Cu.m.	4
Greater than 50.00 Cu.m.	4 + one additional sample for each additional 50 Cu.m. or part thereof.

i) The sampling shall be spread as evenly as possible throughout the day. When wide changes in weather conditions occur during concreting, additional samples may be taken as desired by Engineer-in-charge. Each sample shall consist of 6 cubes of 15 x 15 x 15 cm concrete. Test cubes shall be kept immersed in water until required for test which will be usually at 7 days and minimum crushing strength of not less than the following:

Grade of Concrete	M15	M20	M25	M30	M35	M40
Crushing strength in N/mm ² at the end of						
a) 7 days	10	13.50	17	20	23.50	27
b) 28 days	15	20	25	30	35	40

All costs connected with the preliminary tests for proportioning the mix, sampling, curing, handling, other incidental charges, labour charges and cost of materials shall be borne entirely by the Contractor. Testing charges for cubes (work tests) shall be borne by contractor. Such testing shall be conducted at approved laboratory as directed by the Engineer-in-charge or at the contractor's own laboratory set up at site itself.

All samples for tests shall be taken in the presence of Engineer-in-charge and the Contractor or his authorized agents.

A set of six specimens from random mixer batches, shall constitute a test, three being tested for 7 days and three being tested for 28 days strength.

The strength test result shall be the average strength of the three companion test specimens, tested at 28 days, except that, if one specimen in a test shows manifest evidence of improper sampling, moulding or testing, the result shall be discarded and the remaining two strengths averaged.

ii) Normally, 7 days and 28 days tests shall be made on specimens. For any mix, a correlation between 7 days and 28 days strengths may be made in the laboratory. Soon after a job starts, a similar correlation will be evolved for samples of a concrete taken from the mixer. After that correlation has been established, the results of the 7 days test may be used as an indicator of the compressive strength which should be expected at 28 days, provided such results are consistent, if 7 days tests shown compressive strength that are too low, corrective measures shall be taken at once, at the Engineer's direction, without waiting for the results of the 28 days tests.

iii) Each class of concrete shall meet the following strength requirements:

The average of any three consecutive strength tests shall have a value equal to or greater than the specified strength subject to the condition that only one out of three consecutive tests may give a value less than the specified strength but this shall not be less than 90% of the specified strength.

iv) In the event that concrete tested in accordance with the requirements of this specification, fails to meet the requirement, the Engineer shall have the right to require any one or all the following.

1. Changes in the concrete mix proportions for the remaining work.
2. Curing and testing of the concrete represented by the tests which failed.
3. **Replacement of any such portions of the structure. (No payment for dismantled concrete, associated from worker or reinforcement shall be made. Embedded fixtures, reinforcement and adjoining structures, damaged during dismantling shall be made good by the Contractor at his own expense).**

4. Extended curing of the concrete represented by the specimen.
5. The contractor shall carry out all such measures as directed at his own expense.

Load tests of structural members may be required by the Engineer when the strength of the job control tests falls below the required strength and is not acceptable as per "Acceptance Criteria" stated earlier. The entire cost of the load test shall be borne by the Contractor. If the load testing is decided by the Engineer, the member under consideration shall be subjected to a superimposed load equal to one and quarter (1.25) times the specified superimposed load used for design and this load shall be maintained for a period of 24 hours before removal.

The detailed procedure of the test shall be decided by the Engineer-in-charge.

If, within 24 hours of the removal of the load, the structure does not show a recovery of at least 75 percent of the deflection after the 24 hours under load, the test should be repeated. The structure should be considered to have failed to pass the test if the recovery after the second test is not at least 80 percent of the maximum deflection occurring during the second test.

If the member shows evident failure, such changes as are necessary to make the structure adequately strong, shall be made by the contractor free of cost to the Department. If on the other hand, the failure becomes apparent, the Engineer under special circumstances, can retain the portion of the structure under test, provided suitable strengthening and or load dispersed arrangement is feasible. Cost of such strengthening or load dispersed arrangement shall be borne by the Contractor.

Load test shall not be made until the expiry of 56 days of effective hardening of the concrete.

If a portion of the structure is found to be unacceptable it shall be dismantled and replaced by a fresh structure as per specification. The cost of such dismantling and reconstruction should be borne by the Contractor.

The proportions of cement, fine aggregate, coarse aggregate and water necessary to produce a concrete mix which will fulfill the requirements of this specification for each grade of concrete shall be determined on the basis of trial mixes conducted with the samples of the material to be used in the work by the Engineer-in-charge in the field Laboratory.

All mix design and test data and results shall be maintained as part of the record of the contract and shall be signed by the Engineer-in-charge and the Contractor. A register showing such record shall be maintained at site of work.

**GENERAL CONDITIONS OF CONTRACT
FOR
LUMP SUM, ITEM RATE AND
PERCENTAGE CONTRACT**



Bharat Heavy Electricals Limited

**BOILER AUXILIARIES PLANT
RANIPET - 632 406.**

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CHAPTER - I

DEFINITIONS IN THE CONTRACT AS HEREINAFTER DEFINED

The following terms shall have the meanings hereby assigned to them, except here the context otherwise requires :-

- a. **'CONTRACT'** means and includes the conditions of contract, the documents forming the tender and acceptance, thereof, specifications, drawings, bill of quantities, schedule of rates and prices if any, general and special conditions of contract, schedules A,B,C,D and or general summary attached to the form of tender and contract agreements. All these terms and conditions and documents as applicable taken together shall be deemed to form one contract and thereby complementary to one another.
- b. **'TENDER DOCUMENTS'** means and includes the form of tender, the applicable schedules A, B, C, D and / or general summary, general and special conditions of contract and specifications and drawings as given to the contractors on payment.
- c. **'THE CONTRACTOR'** means the person or persons, firm or company whether incorporated or not, whose tender is being accepted and includes the contractor's legal / personal representatives, successors and permitted assignees.
- d. **'THE WORK'** means the work described in the tender documents and / or individual work orders, drawings and specifications as may be issued from time to time to the contractor by the Engineer - In - Charge within the powers conferred upon them including modified or additional works and obligations to be carried out either at the site or at any factory, workshop or any other place as required for the performance of the contract.
- e. **'THE SITE'** means the lands and other places on, under, in or through which the work has to be executed under the contract and any other lands and places provided by the company for the purpose of carrying out the contract.
- f. **'THE COMPANY'** referred to as BHEL in this contract shall mean M/s. Bharat Heavy Electricals Limited including its Board of Directors, Director, Executive Director, Group General Manager, General manager, Dy. General Manager and / or the Officers of the company including Sr. Manager, Manager, Dy. Manager, Sr. Engineer and Engineer authorised on behalf of Bharat Heavy Electricals Limited, Boiler Auxiliaries Plant, Ranipet.
- g. **'THE ACCEPTING OFFICER'** means the official who signs the contract agreement on behalf of Bharat Heavy Electricals Limited and includes his successors.
- h. **'ENGINEER-IN-CHARGE'** means the Officer / Engineer of BHEL who is in charge of works under the contract and includes such other Officer / Engineer as may be notified by BHEL from time to time.
- i. **'APPROVED AND DIRECTED'** means approval and / or directions of the Officers / Engineers of BHEL issued from time to time with regard to the contract.

- j. In the case of Lump-sum Contracts '**CONTRACTOR'S PERCENTAGE**' means the percentage offered by the Contractor as addition to our deduction from the cost of building, or other works listed in Schedule "A" to provide a Lump-sum quotation for performance of the contract inclusive of all extra costs, profit, establishment charges, carriage, insurance etc., complete.
- In the case of percentage Rate "Contracts Contractor's Percentage" shall, if the context so permits mean the uniform percentage tendered by the Contractor and accepted by the Accepting Officer; and the expression '**CONTRACT RATE**' shall likewise mean the rates in the BHEL Schedule of Rate applicable as on date as adjusted by the said Contractor's percentage, if any.
- k. '**THE CONTRACT SUM**' means the sum accepted or the sum calculated in accordance with the prices accepted in the tender and / or the contract rates as payable to the contractor for the execution and full completion of the work.
- l. The '**FINAL SUM**' means the actual amount payable under the Contract by BHEL, to the Contractor for the entire Execution and full completion of the work.
- m. The '**DATE OF COMPLETION**' is the date or dates for completion of the whole or any part of the work as the case may be set out in or ascertained in accordance with the individual work orders of the tender documents, or any subsequent agreed amendments thereto.
- n. A '**WEEK**' means seven days without regard to the number of hours worked or not in any day in that week.
- o. A '**DAY**' means a day of 24 (Twenty Four) hours irrespective of the number of hours worked or not in that day.
- p. A '**WORKING DAY**' means any day other than the holidays declared by BHEL, Ranipet.
- q. '**DEVIATION ORDER**' means an order given by the Engineer-in-Charge to effect an alternation addition or deduction which does not radically affect the scope or nature of the contract.
- r. '**EMERGENCY WORKS**' means any urgent measures which in the opinion of the Engineer-In-Charge, become necessary during the progress of the work to obviate any risk of accident or failure which become necessary for security.
- s. '**PROVISIONAL SUM**' or "Provisional Lump-sum" means a Lump-sum included by the BHEL in the tender documents and represents the estimated value of work for which details are not available at the time of inviting the tender.
- t. '**PROVISIONAL ITEMS**' means items for which approximate quantities have been included in the tender documents.
- u. '**DAY WORK**' means an item of work requiring the employment of labour with or without materials as the case may be which in the opinion of the Engineer-in-charge, is not capable of being evaluated by the accepted methods of measurement or assessment and is paid for on the basis of the actual labour and materials utilised on the particular item of work referred to.

- v. Heading of these terms and conditions shall not affect the interpretation or construction thereof.
- w. The '**DATE OF CONTRACT**' shall mean the date / dates on which the parties to the contract have signed the contract agreement.
- x. **MAINTENANCE PERIOD / GUARANTEE PERIOD** shall mean the period during which the contractor shall remain liable for satisfactory performance of the work under the contract, repair or replacement of any part of the work performed under the contract.
- y. '**COST**' shall mean and include any liability, expenditure, overhead costs whether on the site or off the site incurred by BHEL.

The contractor shall be deemed to have carefully examined all the documents to his satisfaction. If he shall have no doubt as to the manner of the contract document, he shall obtain the details/clarification from BHEL before signing the contract.

MANNER OF EXECUTION OF CONTRACT

The contract shall be deemed to have come into force from the date of Letter of Intent unless otherwise provide in the Letter of Intent. Unless and untill the contract agreement is executed, the Letter of Intent read in conjunction with the tender documents will constitute a binding contract.

CONTRACTOR / TENDER

ACCEPTING OFFICER

CHAPTER - II

SCOPE OF CONTRACT

2. Heading to the Contract

The heading to these conditions shall not affect the interpretation thereof.

3. Contract Documents

The Accepting Officer shall furnish to the Contractor on demand "FREE OF COST" three copies of signed Drawings and one copy of the signed agreement comprising of preamble to agreement, General and Special Specification, Schedule A,B,C & D etc., (but excluding General Conditions of Contract and Drawings) and three copies of all further drawing issued the progress of work.

However, for any additional copies of the agreement of drawings required by the Contractor, the same will be supplied on payment of the Specified cost.

The Contractor shall keep one copy of all the Drawings and of the Specifications on the site and the Engineer-in-Charge or his representative shall be at all reasonable times have access to them.

None of these documents shall be used by the contractor for any purpose other than that of this contract.

3a. Secrecy

The Contractor shall take necessary steps to ensure that all persons employed on any work in connection with this contract have noted that the Indian Officials Secrets Act 1923 (XIX of 1923) applies to them and shall continue so to apply even after the execution of such work under the contract.

All classified documents furnished to the contractor shall be returned to the Engineer-in-charge on the completion of works or the earlier determination of the Contract.

4. Works to be Carried Out

The Contract shall, except as provided under Schedules "B" and "C" included all labour materials, tools, plant, equipment, and transport which may be required in preparation for and in the entire execution and full completion of the work. Schedule "A" shall be deemed to have been prepared in accordance with good practice and recognised principles and unless otherwise stated, the descriptions given therein shall be held to include waste on materials carriage and cartage, lead, hoisting, setting, fitting in position and all other labour necessary in and for the entire execution and full completion aforesaid. Any error in description or quantity in Schedule "A" or any omission therefrom shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the work comprised therein according to the Drawings and Specifications, or from any of his obligations under the Contract.

The insertion of the name of any firm of suppliers in the Tender Documents is for the purpose of obtaining a particular class or quality of materials or workmanship but the articles or materials specified may be obtained from any other firm subject to prior written approval of the Engineer-in-Charge.

In the case of a discrepancy between Schedule "A" the specification and / or the Drawings, the Accepting Officer shall be the sole deciding authority as to which shall prevail and his decision shall be final and conclusive. If neither Drawings nor specifications contain any mention of minor details of construction, which is in the opinion of the Accepting Officer, whose decision shall be final and conclusive, are reasonable and obviously and fairly intended for the satisfactory completion of the work, such details shall be provided by the Contractor without any extra cost as if they were specially mentioned and shall be deemed to be included in the contract.

The Contractor will be deemed to have satisfied himself as to the nature of the site, local facilities of access and all matters affecting the execution and completion of the work. No extra charges consequent on any mis-understanding in these respects or otherwise will be allowed.

5. Provisional Items

The full amount of provisional Lump-sums and the value annexed to each provisional item inserted in the Tender Documents shall be deducted from the contract sum and the value of work ordered and executed there under shall be ascertained by measurement or valuation as for deviations.

No work under these items is to be begun without instructions in writing from the Engineer-in-charge.

The extent of quantities or items described as "Provisional" shall not be held to guarantee or limit the amount and description of the work to be executed by the Contractor either in respect of the items concerned or the work as a whole.

No addition or deduction shall be made by the Contractor to the amount of the provisional Lump-sum as included in the tender documents.

6. Deviations

The contractor shall not make any alteration in addition to or omission from the work as described in the tender documents except in pursuance of the written instructions of the Engineer-in-charge. No such deviation from the work described in the tender documents shall be valid unless the same has been specifically confirmed and accepted by the Accepting Officer in writing and incorporated in the contract.

The Accepting Officer may deviate either by way of addition or deduction, from the work so described, provided that the contract sum be not thereby varied on the whole by more than percentage set out in the tender documents. The value of all additions and deductions will be added to or, deducted from the contract sum, when ever the Accepting Officer intends to exercise such a right, his intentions shall specify the deviations which are to be made, the Lump-sum assessment or the proposed basis of payment, the extra time allowed, if any, and the date for completion of the entire contract.

Any objection by the Contractor to any matter concerning the order shall be notified by him in writing to the Engineer-in-charge within seven days from the date of such order, but under no circumstances shall the work be stopped (unless so ordered by the Engineer-in-charge) owing to differences or controversy that may arise from such an objection. In the absence such notification of objection by the contractor, he will be deemed to have accepted the order and the conditions stated therein. In the event of the contractor failing to agree with the Engineer-in-charge regarding the terms of the proposed deviation, the objection shall be referred to the Head of Civil Engineering Department whose decision shall be final, conclusive and binding on the contractor.

7. Time

Time is the essence of the contract and is specified in the tender documents or in each individual Work Order.

As soon as possible after the contract is let or any substantial Work Order is placed and before work order is to begin, the Engineer-in-charge and the Contractor shall agree to a Time and progress Chart. The Chart shall be prepared in direct relation to the time stated in the tender documents or the Work Order for the completion of the individual items there of and the contract or order as a whole. It shall indicate the fore cast of the dates for the commencement of the various trade processes or sequence of the work, and shall be amended as may be required by agreement between the Engineer-in-charge and the Contractor within the limitation of the time imposed in the tender, document or order.

In the absence of any specific Time and Progress chart to be agreed to between the Contractor and Engineer-in-charge the contractor shall ensure and maintain uninterrupted progress of the work such that the entire work shall be completed within the time imposed in the Tender documents or Order and that the proportion of the work completed upto any time in relation to the entire work to be under the Contract or Order shall not be less than the proportion that the time elapsed bears to the total time of completion provided in the Tender documents or Order.

The Contractor shall suspend the execution of the work, or any part or parts thereof whenever call upon in writing by the Engineer-in-charge to do so, and shall not resume work there on until so directed in writing by the Engineer-in-charge. The Contractor will be allowed an extension of time for completion not less than the period of suspension. However, no other claim in this respect for compensation or otherwise however will be amitted. Provided the cause for suspension is not attributable to any default of the contractor's part to proceed with or fulfil the contractual obligations. This may also be extended to allow for alteration of work made by the deviation order.

8. Stores and Materials

8.1 Materials to be supplied by the Contractor

The Contractor shall at his own cost and expense provide all materials required for the work other than those listed in Schedule-B which are to be supplied by Bharat Heavy Electricals Ltd.

All materials to be provided by the Contractor shall be brand new and in conformity with the specifications laid down in the contract and the Contractor shall if requested by the Engineer-in-charge furnish proof, to the satisfaction of the Engineer-in-charge, that the materials so comply.

The Contractor shall at his own cost and expense and without delay, supply to the Engineer-in-charge samples of materials proposed to be used in the works. The Engineer-in-charge shall within seven days of supply of samples or within such further period as he may require and intimate to the Contractor in writing, inform the Contractor whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the Engineer-in-charge for his approval fresh samples complying with the specification laid down in the contract.

The Engineer-in-charge shall have full powers to require removal of any or all of the materials brought to site by the Contractor which are not brand new and not in accordance with the contract specifications or do not conform in character or quality to samples approved by him. In case of default on the part of the Contractor in removing rejected materials, the Engineer-in-charge shall be at liberty to have them removed by other means at the Contractor's expense and risk. The Engineer-in-charge shall have full power to require other proper materials to be substituted for rejected materials and in the event of the contractor refusing to comply, he may cause the same to be procured by other means. All costs charges and expenses which may attend such substitution shall be borne by the contractor. All charges on account of Octroi, terminal or sales tax and other duties on material obtained for the works from any source (excluding materials supplied by BHEL) shall be borne by the Contractor.

The Engineer-in-charge shall be entitled to have tests carried out as specified in the Contract for any materials supplied by the Contractor other than those for which, as stated above, satisfactory proof has already been furnished, at the cost of the Contractor and the Contractor shall provide at his expense all facilities which the Engineer-in-charge may require for the purpose.

8.2 Materials to be supplied by BHEL

Materials which BHEL are prepared to supply are shown in Schedule-B which also stipulates place of issue and rate(s) to be charged in respect thereof soon after acceptance of the tender the Contractor shall agree in writing with the Engineer-in-charge on a phased programme of his requirements with regard to deliver of materials.

In the event of delay in supply of any Stores and materials mention in Schedule-B the contractor shall be entitled to reasonable extension of time as provided for under condition-9 but no claim for compensation or damage on any ground whatsoever shall be entertained by BHEL.

For the materials listed in Schedule-B the contractor shall give a reasonable notice in writing of his requirement to the Engineer-in-charge in accordance with the phased programme.

All materials issued to the Contractor by BHEL for incorporation or fixing in the works shall on completion or on fore-closure of the works and before submission of bills, be returned by the Contractor at his expense, at the place of issue, after making due allowance for actual consumption reasonable wear and tear and for waste. In the Contractor is required to deliver such materials at a place other than the place less the transportation charges which would have been incurred by the Contractor had such materials been delivered at the place of issue, shall be borne by BHEL.

The Contractor shall bear the cost of loading, transporting to site, unloading storing under covered area as necessary, assembling and joining the several parts together as necessary and incorporating or fixing materials in the work including all preparatory work of whatever description as may be required, and of closing preparing, loading and returning empty cases or containers to the place of issue.

If, in the opinion of the Engineer-in-charge (which shall be final and conclusive) any stores supplied by BHEL have either during currency of the work or after completion of the work whilst under custody, of the contractor, become damaged to such an extent that they cannot be usefully utilised, either in the same work or in other works, the Engineer-in-charge shall not accept the stores and in the rates specified in the contract. The contractor shall not be entitled to any claim whatsoever on this account.

The Engineer-in-charge shall have access to the stores where materials issued by BHEL as per schedule -B of the contract is stored to ensure the balance stock of material on hand after taking into consideration the materials used on the work is as per the issue and usage. If there be any discrepancy, the cost towards the same will be recovered at the double recovery rate indicated for the material concerned. This is without prejudice to and in addition to the overall reconciliation of materials to be made at the completion of work.

If on completion of works, the Contractor fails to return surplus materials out of those supplies by BHEL then, in addition to any other liability which the Contractor would incur, the Engineer-in-charge may, be written notice to the Contractor, require him to pay within a fortnight of receipt of the notice for such un-returned surplus materials given in sub para-4.

The Contractor shall have to build a weather-proof shed ^{for} or the storage of Cement (required for 15 days consumption of the work).

8.3 General

Materials required for the works, whether brought by the Contractor or supplied by BHEL shall be stored by the Contractor only at places approved by the Engineer-in-charge. Storage and safe custody of materials shall be at the risk and the responsibility of the Contractor.

Officials concerned with contract shall be entitled at any time to inspect and examine any materials intended to be used in or in the works either on the site or at factory or workshop or other places where such materials are assembled, fabricated or manufactured or at any place(s) where these are lying or from which these are being obtained and the Contractor shall give such facilities as may be required for such inspection and examination.

All materials brought to the site shall not be removed off the site without the prior written approval of the Engineer-in-charge. But whenever the works are finally completed and advance if any, in respect of any such materials is fully recovered the Contractor shall at his own expense forthwith remove from the site all surplus materials originally supplied by him and upon such removal the same shall revert in and become the property of the Contractor.

Should the Engineer-in-charge consider at any time during the construction or re-construction prior to the expiry of the MAINTENANCE PERIOD that the stores or materials provided by the Contractor are unsound or of a quality inferior to that contracted for or otherwise not in accordance with Contract (in respect where of the decision of the Engineer-in-charge shall be final and conclusive) the Contractor shall on demand in writing from the Engineer-in-charge specifying the Stores or materials complained of notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith remove the Stores or materials so specified and provide other proper and suitable stores or materials at his own expense, to the entire satisfaction of the Engineer-in-charge and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand aforesaid the Engineer-in-charge may replace with others the Stores or materials complained of at the risk and expense in all respects of the Contractor. The liability of the Contractor under this condition shall not extend beyond the maintenance period aforesaid except as regards Stores or materials which the Engineer-in-charge shall have previously given notice of to be Contractor to replace.

9. Delay and Extension of Time

If, in the opinion of Engineer-in-charge the work is delayed :

- i) by reason of abnormally bad weather, OR
- ii) by reason of serious loss or damage by fire OR
- iii) by reason of Civil commotion local combination of workmen, strike or lockout, affecting any of the trades employed on the work, OR
- iv) by delay on the part of the agency or tradesman engaged by BHEL in executing work not forming part of this Contract OR
- v) by reason of any other cause which in the absolute discretion of the Engineer-in-charge is (when he is the Accepting Officer of the Contract), beyond the Contractor's reasonable control, then in such cases the Accepting Officer, on the recommendation of the Engineer-in-charge or higher authority may make fair and reasonable extension in the completion dates of the individual items of work of the Contract as a whole. Such extension which will be communicated to the Contractor by the Engineer-in-charge in writing shall be final and binding on the Contractor. No other claim in this respect for compensation or otherwise howsoever is admissible. Upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer-in-charge but shall nevertheless use constantly his best endeavour to prevent or make good the delay and shall do all that may reasonably be required to the satisfaction of the Engineer-in-charge to proceed with the work.

10. Patent Rights

The Contractor shall fully indemnify BHEL or the agent, servant, employee of BHEL against any action, claim or proceeding relating to infringement or the use of any patent or design or any alleged patent or design rights, and shall pay any royalties which may be payable in respect of any article / or part thereof included in the Contractor. In the event of any claim, being made or action brought against BHEL or any agent, or servant or employee of BHEL in respect of the matters aforesaid, the Contractor shall immediately be notified thereof for taking necessary action provided that payment of indemnity shall not apply when such infringement has taken place in complying with the specific directions issued by the BHEL but the Contractors shall pay any royalties payable in respect of any such use.

11. Octroi and Other Duties

All changes on account of Octroi, Terminal or Sales Tax and / or other duties on materials obtained for the Work (excluding materials provided by BHEL on payment) shall be borne by the Contractor.

12. Royalties

Royalties fixed from time to time as per prevalent local rules will be recovered for materials, which the Contractor may be allowed to remove from quarries situated on land which is in charge of the BHEL authorities.

13. Plant and Equipment

The Contractor, shall at his own expense, supply all tools, plant and equipment (here-in-after referred to as T & P) required for the execution of the contract other than those listed in Schedule - C which subject to their availability may be hired by BHEL to the Contractor or issued free for use in the execution of the work, as specified in Tender documents.

14. Assignments or Transfer of Contract

The Contractor shall not without the prior written approval of the Accepting Officer assign or transfer the Contract or any part thereof, or any share, or interest there in to any other person. No sum of money which may become payable under the Contract shall be payable to any person other than the Contractor unless the prior written approval of the Accepting Officer to the assignment or transfer of such money is given.

14 (a) Sub - Contract

The Contractor shall not sub-let any portion of the Contract without the prior written approval of the Accepting Officer.

15. Compliance to the Regulations and Bye - Laws

The Contractor shall conform to the provision of any statute relating to the work and regulations and bye-laws of any local authority and of any water and lighting Companies or Undertakings with whose system the work is proposed to be connected. He shall, before making any variation from the drawings or the specifications that may be necessitated for such connections give the Engineer-in-charge notice, specifying the variation proposed to be made and the reasons there for and shall not carryout any such variation until he has received instructions from the Engineer-in-charge in respect thereof. The Contractor shall be bound to give all notice required by Statute Regulations of Bye-laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof.

16. BLANK

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CHAPTER – III

PERFORMANCE OF THE CONTRACT

18. Security Deposit

18.1.1 Security Deposit should be collected from the successful tenderer. The rate of Security Deposit will be as below:

Upto Rs. 10 lakhs	10%
Above Rs. 10 lakhs up to Rs.50 lakhs	1 lakh+7.5% of the amount Exceeding Rs. 10 lakhs.
Above Rs. 50 lakhs	Rs.4 lakhs + 5% of the amount Exceeding Rs. 50 lakhs.

The security Deposit should be collected before start of the work by the contractor.

18.1.2 Security Deposit may be furnished in any one of the following:

- i) Pay Order, Demand Draft in favour of BHEL.
- ii) Local cheques of scheduled banks, subject to realization.
- iii) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc.
(Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).
- iv) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. The Bank Guarantee format should have the approval of BHEL.
- v) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
- vi) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and the balance 50% may be recovered from the running bills.
- vii) EMD of the successful tenderer shall be converted and adjusted against the security deposit.
- viii) The security deposit shall not carry any interest.

NOTE: Acceptance of Security Deposit against Sl. No. (iv) and (vi) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

CONTRACTOR

- 18.1.3** Security deposit shall not be refunded to the contractor except in accordance with the terms of the contract.
- 18.1.4** All compensation or other sums of money payable by the contractor to BHEL, under the terms of this contract or under any other contract with BHEL, may be deducted from the security deposit or realized by the sale of the securities or from the interest arising there from or from any sums which may be due or may become due to the contractor payable by BHEL on any account whatsoever against this contract or any other contract with BHEL, and in the event of his security deposit being reduced by reason of such deduction or sale as aforesaid, the contractor shall within seven days thereafter make good in cash or in securities endorsed as aforesaid, any sum or sums by which the security deposit has been so reduced.
- 18.1.5** 50% of the security deposit may be refunded on completion of the work after payment of the final bill and the balance 50% of the security deposit is refundable only after the expiry of the maintenance period of six (6) months from date of completion of work as stipulated in the contract concerned.

19. Orders under the Contract

All orders, notices, etc., to be given under the contract shall be in writing, typescript or printed and if sent by registered post to the address given in the tender of the Contractor, shall be deemed to have been served on the date when in the ordinary course they would have been delivered to him.

The Contractor shall carry out without delay all orders given to him.

20. Admission to Site

The contractor shall not enter on (other than for inspection purposes) or take possession of the site unless permitted to do so by the Engineer-in-charge. The portions of the site to be occupied by the Contractor will be clearly defined and marked on the site plan, and the contractor will on account be allowed to extend his operations beyond these areas. The Contractor shall provide if necessary or required at the site, temporary access there to and shall alter, modify and maintain the same as required from time to time. He shall out and clear away the access route when no longer required restoring the area to its original condition.

The Engineer-in-charge shall have power to execute other works (whether or not connected with the work, in the contract agreement) on the site contemporaneously with the execution of the original work and contractor shall give reasonable facilities for this purpose.

BHEL reserves the right of taking over, at any time, any portion of the site which they may require and the contractor shall at his own expense clear such portion forthwith. No photographs of the site or of the work or any part here of shall be taken published or otherwise circulated without the prior approval of the Engineer-in-charge.

No such approval shall ~~however~~ ^{however} exempt the Contractor from complying with any statutory provision in regard to the taking and publication of such photographs.

BHEL Officials connected with the Contract shall have the right of entry to the site at all times.

Engineer-in-charge shall have the power to exclude from the site any person whose admission there to may, in his opinion be undesirable for any reason whatsoever

The Contract shall be governed by the security regulations of BHEL including the entry exit timings, use of roads as may be in force from time to time. The Contractor should follow these regulations strictly and no claims for any additional payment whatsoever will be entertained under by circumstances.

21. Contractors Supervision

The Contractors shall either himself supervise the execution of the Contractor or shall appoint a competent Agent approved by the Engineer-in-charge to act in his stead. The Contractor shall employ an Engineer/Agent having atleast a Degree of Bachelor of Civil Engineer from a recognised University/on any work with a Contract value exceeding rupees two lakhs, and having atleast a Diploma in civil Engineering from a recognised college, on work with a contract value exceeding Rs. 50,000/- but not exceeding rupees two lakhs.

The Employment of an Engineer/Agent as aforesaid shall not be necessary if the Contractor himself is in possession of a recognised technical qualification and is, in opinion of the Engineer-in-charge, capable of the receiving instructions of the Engineer-in-charge and of the executing the work to the satisfaction of the Engineer-in-charge. If the Contractor fails to appoint a suitable Engineer/Agent as aforesaid, the Engineer-in-charge shall have full powers to suspend the execution of work and stop payment of any advances that may have become due until such date as a suitable Engineer/Agent is appointed and the Contractor shall be held responsible for the delay caused to the work and no extension of time on this account shall be given to him as stipulated in condition (9) above.

Orders given to the Contractor's Agent Engineer shall be considered to have the same force as if they had been given contractor himself.

The Contractor or his Agent shall be in attendance at the site during all working hours and shall superintend the executing of work with such additional assistance in each trade as the Engineer-in-charge may consider necessary.

The Contractor or his accredited agent shall attend when required and without making any claim for doing so, either the Office of the Engineer-in-charge or the work site to receive instructions.

The Engineer-in-charge shall have full powers, and without assigning any reason to require the Contractor immediately to cease to employ in connection with the

Contract any Agent, servant or employee whose continued employment is, in his opinion undesirable

The contractor shall not be allowed any compensation on this account.

22. Labour

The contractor shall employ labour in sufficient number either directly or through sub-contractors to maintain the required rate of progress and of quality ensure workmanship of the degree specified in the contract and to the satisfaction of the Engineer-in-charge. The contractor shall comply with all labour laws in force from time to time.

23. Safety Rules

The Contractor shall comply with all safety rules of BHEL.

24. Water

The Contractor shall allow in his Tender and provide at his cost all water required for the work or his employees on the work, together with all pipes and fittings or other means that may be necessary or required to ensure a proper and ample supply of water for all purposes connected with the work.

In the event of a provision existing in the Tender documents for supply of water on payment by Bharat Heavy Electricals Limited, water will be supplied from the BHEL supply system or other sources at any points fixed by the Engineer-in-charge on the site of work. The contractor shall make necessary arrangement for lifting pumping carrying or conveying the water as required at his own cost. The levy of water charges to be borne by the contractor in such case shall be specifically mentioned in the Tender documents.

25. Temporary workshops, store Etc,

The Contractor shall, during the progress of the work provide, erect and maintain at his own expense all necessary temporary workshops, offices etc., required for the proper and efficient execution of the work. The planning, siting, and erection of these buildings shall have the approval of the Engineer-in-charge and the Contractor shall all at times keep them tidy and in a clean and sanitary condition to the entire satisfaction of the Engineer-in-charge.

On completion of the work all such temporary building shall be cleared away and the site restored and left in a clean and tidy condition to the entire satisfaction of the Engineer-in-charge.

26. Tool and Plant on site

All tools, plant and equipment brought to the site shall not be removed from the site without the prior written approval of the Engineer-in-charge when the work is finally completed or the contract is determined for reasons other than the default of the contractor he shall forthwith remove from the site all tool, plant, equipment etc., (other than those as may have been provided by BHEL)

27. Statments of Hire Charges

A monthly detailed statement of the hire charge incurred in respect of BHEL tools, plant, equipments etc., shall be given to the Contractor by the Engineer-in-charge.

28. Precaution Against risks

The Contractor shall be responsible for providing at his own expense, for all precaution to prevent loss or damage and for the necessary steps to be taken for the said purpose until the works have been handed over complete, in all respects to the Engineer-in-charge.

The Contractor shall provide all watchman necessary for the protection of the site, the work, the materials, tools, plant, equipment and anything else lying on the site during the progress of the work. He shall solely be responsible for and shall take all reasonable and proper steps for protecting, securing, lighting and watching all places on or about the work and the site which may be dangerous to any person whomsoever.

29. Notices and fees

The Contractor shall give all notices required by any Statutory provision or by the regulations and/or bye-laws of any local / or of any same are or will be connected. The contractor shall pay and indemnify BHEL against any statutory fees and charges payable under such Acts. Regulation and / or bye-laws in respect of the work and shall make and supply all drawings and plans required in connetion with any such notice.

30. Setting out of the works and Protective and Maintaining signals and works

The Engineer-in-charge shall supply dimensioned drawings, levels and other information necessary to enable the contractor to set out the work. the contractor shall at his own expense set accurately according to the drawings and figured dimension thereon, all the work comprised in the contract and any extras or additions there to and shall be solely responsible for their being so set out and executed.

All bench marks, pegs, signals on the surface alignment stones, milestones and all similar marks whether put in by BHEL Authorities for the purpose of checking the Contractor's work or in the nature of permanent survey marks will during the tenure of the contract, be under the care of the Contractor who shall at his own expense take all proper and reasonable precautions and care to preserve and maintain them in their true position. In the event of these marks being disturbed or obliterated by accident or due to any other cause whatsoever, the same may, if deemed necessary be replaced by the Engineer-in-charge at the Contractor's expense and the cost thereof deducted from any money then or thereafter becoming due to the Contractor.

Where requested by the Contractor, the level marks, centre line and chainage pegs corresponding to those shown on the Drawing will be pointed out to the Contractor on the ground but all bench marks or chainage pegs additional to those shown on the Drawing will be set out by BHEL authorities.

31. Site Drainage

All water that may accumulate on the site during the progress of the work, or in trenches and excavations shall be removed to the entire satisfaction of the Engineer-in-charge and at Contractor's expense.

32. Excavation, Relics, etc.

Materials of any kind obtained from excavation on the site shall remain the property of BHEL and shall be disposed off as Engineer-in-charge directs.

All gold, silver, oil and other minerals of any description and all precious stones coins treasures, relics, antiquities and other similar items which may be found in or upon the site shall be the property of Bharat Heavy Electricals Limited and the contractors shall duly preserve the same to the satisfaction of the BHEL and shall from time to time deliver the same to such person or persons as the BHEL may appoint to receive the same.

33. Foundations

The Contractor shall not lay any foundations until the excavations for the same have been examined and approved in writing by the Engineer-in-charge.

34. Covering - in work

The Contractor shall give reasonable notice in writing to the Engineer-in-charge whenever any work is to be permanently covered up or concealed, whether by earth or other means so that it can finally be inspected or measured, if necessary. In default of so doing, the Contractor shall if required by the Engineer-in-charge uncover such work at his own expense.

35. Approval of Works by Stages

All work embracing more than one process shall be subject to examination and approval at each stage thereof and the Contractor shall give due notice in writing to the Engineer-in-charge when each stage is ready. In default of such notice being received, the Engineer-in-charge shall be entitled to approve the quality and extent thereof at any time he may choose and in the event of any dispute, the decision of the Engineer-in-charge thereon shall be final conclusive.

36. Execution of the work

The work shall be executed in a workman like manner and to the satisfaction in all respects of the Engineer-in-charge.

The Engineer-in-charge will communicate or confirm his instructions to the Contractor in respect of the execution of the works in a "Work Site Order Book" maintained at his office and the Contractor shall visit this office daily and shall confirm receipt of such instruction by signing the relevant entries in this book. Such entries will rank as order to notices in writing the intent and meaning of these conditions.

37. Day Work

No day - work shall be performed without the prior written instructions of the Accepting Officer.

The Contractor shall give to the Engineer-in-charge reasonable notice of the start of any work ordered to be executed by day-work and shall deliver to the Engineer-in-charge within two days of the end of each pay week a return in duplicate giving full detailed accounts of labour and materials for the payweek. One copy of each of these returns, if found correct will be certified by the Engineer-in-charge and returned to the Contractor and must be produced at the time of adjustment of accounts.

An Invoice in duplicate signed by the Contractor or his agent shall be sent with each delivery of materials for day-work and the Contractor will be furnished with receipt signed by the Engineer-in-charge specifying the description, quantities, weight or measurement (as the case may be) of the articles approved, reference will be made in this receipt in the return aforesaid and the Contractor's Bill.

In the case of Lumpsum Contracts, the rates to be charged and the percentage addition for profit and establishment charges etc. will be agreed upon between the Accepting Officer and the Contractor prior to the execution of the work.

38. Inspection of the Work

BHEL Officers concerned with the contract shall have power at any time to inspect and examine any part of the work and the Contractor shall give such facilities as may be required to be given for such inspection and examination.

Should Engineer-in-charge consider, at any time during the expiry of the maintenance period, that any work has been executed with unsound, imperfect or unskilled workmanship or of a quality inferior to that contracted for or not otherwise in accordance with the contract (in respect). Whereof the decision of the Engineer-in-charge shall be final and conclusive the contractor shall, on demand in writing from the Engineer-in-charge specifying the fault notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or removed and reconstruct the work so specified in whole or in part as the case may require at his own expense to the entire satisfaction of the Engineer-in-charge and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand as aforesaid, the Engineer-in-charge whose decision shall be final and binding may carry out the work by other means at the risk and expense in all respects of the Contractor. However, the liability of the Contractor under this condition shall not extend beyond the maintenance period except as regards workmanship which the Engineer-in-charge shall have previously given notice of to the Contractor to rectify.

39. Responsibility for Building

In the event of any building or part of any building being handed over to the Contractor for the execution of work there to under the provisions of the Contract he shall give a written receipt for all fixtures, glass etc., and he shall be required to make good at his own expense all damages resulting from the cause whatsoever while in his charge and on completion of the work to deliver the said building or part

thereof in a clean state complete in every particular to the entire satisfaction of the Engineer-in-charge.

40. Insurance

The Contractor shall within one month after the date of acceptance of the Contract, insure the work against loss or damages to the contract works, temporary work and materials erected in performance of the contract "all risks" basis from the time of arrival on site until taken over by BHEL on completion of the Contract.

The cover shall also include whenever necessary the risks of testing including breakdown or explosion of plant and machinery undergoing testing, trial and commissioning operations. The insurance shall also specifically cover removal of debris cost. The sum insured shall represent the estimated full value of the contract work inclusive of value of free supply materials by BHEL, transport charges, customs dues, express freight, overtime charges, cost of erection, value of constructional plants and machinery; removal of the debris and excavation of costs. Where the contract includes a maintenance period, the insurance cover shall specifically include the Contractor's liabilities during the maintenance period. The insurance shall also be extended to cover third party personal injury and property damage for a sum to be specified by BHEL. The insurance shall be effected in the name of BHEL and the Contractor shall submit to BHEL a draft of the insurance policy for approval. The policy when issued will be lodged with BHEL together with receipts of premium for such insurance and the contractor shall maintain such policies in force until the obligations of the Contractor are fully discharged.

If the Contractor fails to comply with the terms of this condition the Accepting Officer may insure the work and may deduct the amount of premiums from any money that may become payable to the Contractor or may at his discretion refuse payment of any advances to the Contractor until the Contractor shall have complied with the terms of this condition. This provision does not, however, absolve the Contractor of his responsibility for taking up the insurance. The Contractor is, therefore, primarily responsible for the insurance in time.

41. Damage and Loss to Private Property and Injury to Workmen

The Contractor shall at his own expense reinstate and make good to the satisfaction of the Engineer-in-charge and pay compensation for any injury, loss or damage occasioned to any property or rights whatever including property and rights of BHEL (or agents, servants or employees of BHEL) the injury loss or damage arising out of or in any way in connection with the execution of the contract and further the Contractor shall indemnify BHEL against all claims enforceable against BHEL or any agent, servant, or employee of BHEL a private person, in respect of any such injury (including injury resulting in death loss or damage to any person) who so ever or property, including all claims which may arise under the Workmen's Compensation Act or otherwise, or which would be enforceable against BHEL.

42. Completion

The works shall be completed to the entire satisfaction of the Engineer-in-charge and in accordance with the Contractor's forecast of Time and progress where operative, and all unused stores and materials, tools, plants equipment, temporary Building and things shall be removed from the site and work cleared of rubbish and all

waste materials and levelled up clean and tidy to the satisfaction of the Engineer-in-charge at the Contractor's expense and/or before the Schedule date of completion.

The BHEL shall have power to take over from the Contractor from time to time such sections of the Work as have been completed to the satisfaction of the Engineer-in-charge. In such an event, the contractor is not entitled for any extension of time or any other compensation for executing the balance work.

In case the Contractor fails to remove any of his properties, assets or fails to clear the rubbish and waste materials within 30 days of the completion of the contract, it is lawful for the contractee, that is BHEL to take such action as it deems fit to clear, dispose of such properties, assets or such waste materials and charge the Contractor any expenses incurred thereon.

The Engineer-in-charge shall certify to the Contractor the date on which the work is completed and the state thereof.

The Engineer-in-charge shall also certify to the Contractor the state of the work at the end of maintenance period, where applicable.

43. Compensation for delay

If the Contractor fails to maintain the required progress in terms of condition 7 or to complete the work and clear the site on or before the contracted or extended period of completion, he shall, without prejudice to any other right or remedy of the BHEL on account of such breach pay as agreed compensation an amount calculated as stipulated below or such smaller amount as may be fixed by the BHEL on the contract value of the work for every week that the progress remains below that specified in condition 7 or that the work remains incomplete.

This will also to items or groups of items for which separate period of completion has been specified.

For the purpose the term "Contract Value" shall be the value at contract rates of the work or ordered.

- | | |
|--|------------------------|
| a) Completion period (as originally stipulated) not exceeding 6 months | at 1 per cent per week |
| b) Completion period (as originally stipulated) exceeding 6 months and not exceeding 2 Years | at ½ per cent per week |
| c) Completion period (as originally stipulated) exceeding 2 years | at ¼ per cent per week |

Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed the under noted percentage of the contract value or of the item or group of items of work for which a separate period of completion is given :

- | | |
|---|-------------|
| a) ^{Completion} Complete period (as originally stipulated) not exceeding 6 months | 10 per cent |
|---|-------------|

- | | |
|--|-------------|
| b) Completion period (as originally stipulated) exceeding 6 months and not exceeding 2 Years | 7½ per cent |
| c) Completion period (as originally stipulated) exceeding 2 years | 5 per cent |

The amount of compensation may be adjusted or set-off against any sum payable to the contractor under this or any other contract with the BHEL.

44. Laws Governing the Contract

This Contract shall be governed by the Indian Laws for the time being in force.

45. Cancellation of Contract for Corrupt Acts

The Accepting Officer, whose decision shall be final and conclusive, shall without prejudice to any other right or remedy which shall have accrued or shall accrue thereafter to Bharat Heavy Electricals Limited, cancel the Contract in any of the following cases and the contractor shall be liable to make payment to BHEL for any loss or damage resulting from any such cancellation for default. If the Contractor shall :

- a) Offer or give or agree to give to any person in BHEL service any gift or consideration of any kind as an inducement or reward for doing or for bearing to do or for having done or forborne to do a day act in relation to the obtaining or execution of this or any other contract for BHEL service OR
- b) Enter into a contract with BHEL in connection with which commission has been paid or agreed to be paid by him or with his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to the Accepting Officer, OR
- c) Obtain a contract with BHEL as a result of ring tendering or by non-bonafide methods of competitive tendering without first disclosing the fact in writing to the Accepting Officer.

46. Cancellation of Contract for Insolvency, Assignment or Transfer or Sub-Letting of Contract

The Accepting Officer, without prejudice to any other or remedy which shall accrue thereafter to BHEL shall cancel the contract in any of the following cases :

If the Contractor

- a) being an individual, or if a firm any partner thereof shall at any time be adjudged bankrupt or have a receiving order or orders for administration, of his Estate made against him or shall take and proceedings, for liquidation or composition under any Bankruptcy Act for the time being in force or make any conveyance of assignment of his effects composition or arrangement for the benefit of his credit or purport to do so, or if any application be made under any Bankruptcy Act for the time being in force for sequestration of his Estate or if a trust deed be granted by him on behalf of his creditors, OR

- b) being a company shall pass a resolution or the court shall make an order for the liquidation of its affairs, or a Receiver or Manager on behalf of the debentures holders shall be appointed or circumstances shall arise which entitle the court or debentures holders to appoint a Receiver or Manager OR
- c) assigns, transfer, sub-lets or attempts to assign, transfer or sub-let any portion of the work without the prior written approval of the Accepting Officer OR
- d) Shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days.

Whenever the Accepting Officer, exercises his authority to cancel the contract under this condition, he may complete the work by any means at the Contractor's risk and expense provided always to that in the event of the cost of completion (as certified by Engineer-in-charge which is final and conclusive) being less than the contract cost, the advantage shall accrue to the BHEL and that if the cost of completion exceeds the moneys due to the Contractor under the contract, the contractor shall either pay the excess amount ordered by the Engineer-in-charge or the same shall be recovered from the Contractor by other means.

Engineer-in-charge will have powers to take possession of the site and any materials constructional plant, implements, stores, etc. thereon and carry out the work by any means at the risk and cost of the Contractor.

In case the BHEL completes the work under the provisions of this condition the cost of such completion to be taken into account in determining the excess cost to be charged to the contractor under this condition shall consist of the cost of materials purchased and or labour provided by the BHEL with an addition of such percentage or cover superintendence and establishment charges as may be decided by the General Manager whose decision shall be final and conclusive.

In the Contractor fails to pay the excess sum within a period of 30 days, the Engineer-in-charge shall have the right to sell any or all of the Contractor's unused materials, constructional plant implements, temporary buildings etc. and apply the proceeds of sale thereof towards the satisfaction of any sum due from the Contractor under the contract and if thereafter be any balance outstanding from the Contractor, it shall be recovered in accordance with the provisions of the Contract.

47. Cancellation of contract in part or Full for Contractor's Default

If the contractor :

- a) makes default in commencing the work within a reasonable time from the date of handing over of the site and continue in that state a reasonable notice from Engineer-in-charge OR
- b) in the opinion of the Engineer-in-charge at any time, whether before or after the date extended date for completion, make default in proceeding with the work, without due diligence and continue in the state after a notice of seven days from Engineer-in-charge OR
- c) fails to comply with any of the terms and conditions of the contract or after 7 days notice in writing with orders properly issued thereunder. OR

- d) fails to complete the work order and items of work individual dates for completion and clear the site on or before the date of completion or fails to achieve the progress at set out under clause 7 of these General conditions of contract.

The Accepting Officer may, prejudice to any other right or remedy which shall have accrued or shall accrue after B H E L, Cancel the contract as a whole or in part there or only such work order items of work in default from the contract. Whenever the Accepting officer exercises his authority to cancel the contract as a whole or in part under this condition he may complete the work at the contractor's risk and cost provided always that in the event of the cost of completion (as certified by Engineer-in-charge which is final and conclusive) being less than the contract cost the advantage shall accrue to the BHEL if the cost of completion exceeds, the money due to the contractor under this contract the contractor shall either pay the excess amount ordered by General Manager or the same shall be recovered from the contractor by other means. Engineer-in-charge will have power to take possession of site and materials, constructional plant, implements, stores etc there on.

In case the BHEL completes the work or any part there of under the provisions of the condition the of such completion to be taken in to account in determining the excess cost to be charged to the contract under this condition shall consist of the cost of materials purchased and / or labour provided by the BHEL. with an addition of such percentage to cover superintendance and establishment charges as may be decided by the General Manager whose decision shall be final and conclusive.

If the contract fails to pay the excess sum within a period of 30 days the Engineer-in-charge shall have the right to sell any or of the contractor's unused materials, construction plant, implements, temporary buildings etc and apply the proceeds of sale there of towards the satisfaction of any sum due from the contractor under the contract and if ^{there} ~~not~~ after be any balance out-standing from the contract, it shall be recovered in accordance with the provisions of the contract.

48. Termination of Contract for death

Without prejudice to any of the rights or remedies under this contract. if the contractor dies, the Accepting officer shall have the option of terminating the contract without compensation to the contractor.

49. Special Powers of Determination

If at any time after the acceptance of the tender BHEL shall for any reason whatsoever not require the whole or any part of the work to be ^{carried out} ~~done~~ General Manager shall give notice in writing of the fact to the contractor who shall have no claim to any payment of compensation or otherwise howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he ^{did} ~~did~~ not derive in consequence of the foreclosing of the work.

He shall be paid at contract rates for the full amount of the executed including such additional works, e, g. clearing of site, etc., as may be rendered necessary by the said foreclosing. He shall also be allowed a reasonable payment (as decided by the Accepting office) for any expenses sustained on account of labour and materials collected but which could not be utilised on the work, as verified by the Engineer-in-charge. Neither shall the contractor have any claim for compensation on account of any alterations have been made in the original specifications drawings, designs and instructions, involving any curtailment of the work as original contemplated.

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CHAPTER - IV

VALUATION AND PAYMENT

5). Records and Measurements :

All items having a financial value shall be entered in the BHEL Measurement Book so that a complete record is obtained of all works performed under the contract.

Buildings, etc., priced in schedule 'A' as a unit Lump-sum will be entered by number at the unit Lump-sum.

Work carried out for agreed Lump-sum will be described and similarly recorded.

Lump-sum omissions will be entered for deduction. Measurement shall be restricted to that required to ascertain the financial liability of BHEL under the contract.

Work which fails to be measured in detail shall be measured physically, without reference to any local custom that may obtain excepting where it may otherwise be directed in the tender documents. The measurements shall be taken jointly by any person duly authorised on the part of the BHEL and by the contractor.

The engineer-in-charge shall give reasonable notice in writing to the contractor of appointment of measurement.

The contractor shall without extra charge provide assistance with appliance and other things necessary for measurement.

The contractor shall bear all the cost of measurements of his work.

measurements shall be entered in the BHEL measurement book and signed and dated by both parties each day at the site on completion of measurement. If the contractor objects to any of the measurements recorded on behalf of the BHEL. A note to that effect to be made in the BHEL measurement book or against the item or items objected to; and such note shall be signed and dated by both the parties engaged in taking the measurement.

If as a result of such objection, it becomes necessary to re-measure the work wholly or in part, the expense of such measurement shall be borne by the party requiring the measurement.

Measurement to be re-taken provided that a net error is found by this re-measurement to amount to less than 5% (Five percent) of the value as recorded by the first measurement. But where the net errors amount to 5% and over of the said value, then the cost is to be borne by the other party. In any case if the net value of errors found exceeded to Rs 500 the expense or re-measurement is said to be borne by the other party. If the contractor's representative fails to attend when required, the engineering-in-charge shall have power to proceed by himself to take measurement and in that case those measurements shall be considered as accepted by the contractor as final. The contractor shall, once in every month, submit to the engineer-in-charge with a copy to the accepting officer details of his claims for the work done by him up to and including the previous month which are not covered by his contract agreement in any of the following respects.

- a) Deviation from the items and specifications provided in the contract documents.
- b) Extra Items / Items of work.
- c) Quantities in excess of those provided in the contract schedule.
- d) Items in respect of which rates have not been settled. He should, in addition furnish a clear certificate to the effect that the claims submitted by him as aforesaid cover all his claims and that no further claims shall be raised by him in respect of work done up to and including the period under report.

Except where any general to detailed description of the work in quantities expressly shows to contrary, schedule of quantities shall be deemed to have been prepared and measurements shall be taken in accordance with the procedure set forth in the schedule of rates specification not withstanding any provision in the relevant standard method of measurement or any general or local custom. In the case of items which are not covered by the schedule of rates / specification, measurement shall be taken in accordance with relevant standard method of measurement issued by the Indian Standard Institution or as per Standard engineering practice.

52 Valuation of Deviations

Rates for deviated items of work will be fixed as follows :

- 1) For any item of work required to be carried out after the contract has been awarded and which is not covered by Contractor's Schedule but is covered by B.H.E.L. schedule of Rates the payable for such a fresh item will be derived from B.H.E.L. Schedule by the method of proportion as follows:
 - a) In the same proportion to the BHEL Schedule of rates as the tendered rate for the nearest analogous item of work in contractor's schedule bears to rate for the particular analogous item of work in BHEL schedule of rates. However in case of nearest analogous item of work in contract schedule forms part of individual chapter of the BHEL schedule of rates the above proportion will be worked out only for such items which are found both in contract schedule and BHEL Schedule of rates as group of items under the chapter.
 - b) If a single appropriate analogous item of work is not available in both schedule (contractor's and BHEL schedule) then the method of proportion will be applied to the nearest analogous group items available in both the schedule referred to i.e. in the same proportion as the total tendered cost of that particular group of item (the sum of the products of the tendered rates and the quantities for which orders are placed) bears to the total cost of the same items and quantities and BHEL Schedule of Rates.
 - c) If even an appropriate analogous group of items is not available in contractor's schedule and BHEL Schedule, then the methods of proportion will be applied to all those items of the whole work, which are available in both the schedule and for which orders have been placed on the contractor i. e., in the same proportion as the total cost of all

these items of work (the work of the products of the tendered rates and the quantities for which order are placed) bears to the total cost of the same items and quantities at the BHEL schedule of rates.

The selection of analogous items or analogous group of items referred to above shall be done by the Engineer-in-charge. Where the rates for deviated items or new items of work can be derived by the selection of different analogous items or analogous group of items, the lowest of all such derived rates shall be taken as the correct rate.

In the case of the contracts for which the Engineer-in-charge is the Accepting officer all disputes regarding the settlement of rates of deviated or new items or work shall be referred to the Head of Civil Engineering Department whose decision shall be final and conclusive as the case may be.

II. If any work not covered by any of the foregoing is ordered of the contractor, the basis of payment shall be decided by the Accepting Officer whose decision shall be final and conclusive and binding on the parties.

53. Reimbursement / Refund on variation in Price, Materials

If after submission of the tender and / or during the progress of the works, the price of any material (not being a material supplied from the BHEL store in accordance with the conditions of the contract) is increased or decreased by an Act of Legislature (central or state) and / or any notification thereunder or on account of new duties or levies such as octroi or on account of increase or decrease in such duties affecting the price of materials required for incorporation in the works and made from materials of which the price has increased or decreased as aforesaid and the contractor has thereupon to pay in respect of such material or item a price which is higher or lower than the price of that material or item as prevailing immediately before the passing of such act or levying, increasing / decreasing of such duty, the BHEL shall increase in price or the duty reimbursed to the contractor the increase in price or additional or increased duty paid by the contractor and in case of decrease in price the BHEL shall be entitled to a refund of the reduction in the price or the reduction in duty. This will be applicable only for material which are directly incorporated on the work. The contractor shall however indicate the assumption he has made while submitting the tender. However no reimbursement or refund shall be made if the increase / decrease is not more than + 10% of the said price, and if so the reimbursement or refund shall be made only / on the excess over \pm 10% provide always that any such increase shall not be payable if, in the opinion of the Accepting officer (whose decision shall be final and conclusive) the increase is attributable to the delay in the execution of the contract with the control of the contractor or that any such increase has become operative after the contracted/ or extended date of completion of the works or items of work in question.

The Contractor shall, for the purpose of this condition, keep such books of account and other documents as are necessary to show the amount of any increase or any reduction available and shall allow inspection of the same by any duly authorised representative of the BHEL and further shall at the request of the Engineer-in-charge furnish for verification such other information as the Engineer-in-charge may require.

The Contractor shall within a reasonable time of his becoming aware of any alteration in the prices of any such materials give notice thereof in writing to the Engineer-in-charge stating that the rate is submitted in pursuance to this condition together with all information relating thereto which he may be in a position to supply.

Advance on account

No payment shall be made for work estimated to cost less than Rupees ONE THOUSAND till after the whole of the work shall have been completed and a certificate of completion given by the Competent authority.

In the case of work estimated to cost more than Rupees FIVE THOUSAND the contractor may at intervals of less than one month or as otherwise provided for in the Contract documents, counting from the date on which order to commence work is given by Engineer-in-charge submit claims on BHEL forms for payment of advances on account of work done and of materials delivered in connection with the Contract.

The Contractor shall be paid in respect of such claims to the extent approved and passed by the Engineer-in-charge subject to a maximum of 90% of the value of the work actually executed to the satisfaction of the Engineer-in-charge. The certificate of the Engineer-in-charge regarding such approval and passing of the sums so payable shall be final and conclusive against the contractor.

Notes :

"After the full amount of Security Deposit is made up through the 10% deduction from On account bills, 100% payment of all subsequent bills may be made to the contractor.

The Contractor may also be paid during the progress of the work 75% of the value of any materials which are in the opinion of the Engineer-in-charge in accordance with the Contract, and are actually required for incorporation in the work and which have reasonably been brought to the site in connection therewith and are adequately stored and / or protected against damage by weather or other causes, but which have not at the time of payment of the advance been incorporated the work on furnishing a formal hypothecation deed. Payment of such advances, however shall be purely at the discretion of the Accepting Officer provided always that payment shall not be made under these periodical certificate in respect of materials like lime, cement, timer, sand, kankar, etc.

Any sums, due from the Contractor on account of Tools and Plant, stores or any other items provided by BHEL shall be deducted from the respective advances. The Engineer-in-charge shall from time to time certify the sums payable to the Contractor after retaining the reserves.

Any certificate relating to work done or materials delivered may be modified or corrected by any subsequent interim certificate or by the final certificate of the Engineer-in-charge supporting an advance payment shall itself be conclusive evidence that any any work or materials it relates are in accordance with the contract. All such intermediate payments shall be regarded as advance against the final payment only and shall not be considered an admission of the performance of the contract or any part thereof in any respect or the accruing of any claim whatsoever.

Such intermediate payment shall not conclude determine or affect in any way the powers of the Engineer-in-charge as to the final settlement and adjustment or the account or otherwise or in any way vary or affect the contract.

55. Final Bill

As soon as possible after the completion of the work to the satisfaction of the Engineer-in-charge, the contract shall forward a certified final account on BHEL forms, in duplicate.

It shall be accompanied by all abstracts, vouchers, etc., in support thereof and shall be prepared in the manner prescribed by the Engineer-in-charge.

No claims will be entertained after the receipt of the final bill.

The Contractor shall be entitled to be paid the final sum less the value of payments already made on account, subject to certification of the final bill by the Engineer-in-charge. Any sums due from the Contractor on account of Tools and Plant, Stores or any other items provided by BHEL not yet recovered from the contractor shall be deducted from the final sum aforesaid.

No charge shall be allowed to the Contractor on account of the preparation of the final bill.

56. Payment of Bills

All payment to be made to the Contractor under this contract shall be by "Crossed Cheque" marked "A/c payee only" (within a reasonable time after the certification by the Engineer-in-charge) at the Nationalised Banks/Scheduled banks or their subsidiaries located in the station where either the work is executed or service rendered or at their branch nearest to the station where the Office of the Engineer-in-charge is located.

57. Recovery from Contractor

Whenever under the contract any sum of money shall be recovered from or payable by the Contractor the same may be deducted any sum then due or which at any time thereafter may become due to the Contractor under the contract or under any other contract with BHEL or from his Security Deposit or he shall pay the claim on demand.

58. Post Technical Audit of work and Bills

BHEL reserve the right to carry out a post-payment audit and technical examination of the work and final bill including all supporting vouchers, abstracts etc., and to enforce recovery of any sums becoming due as a result thereof in the manner provided in the preceding sub-paragraphs provided. However, no such recovery shall be enforced after three years of passing the final bill.

59. Refund of Security Deposit

50% of the Security deposit mentioned in condition 18 above, may be refunded to the Contractor in respect of all contract on completion of work and after payment of final bill and the balance 50% on expiry of the maintenance period, provided the

Contractor shall have rendered a "No - Demand" Certificate. In case of work where maintenance period is not involved 100% of the Security Deposit may be refunded after payment or final bill provided that the Contractor shall have rendered a "No Demand" Certificate.

60. Arbitration

Except where otherwise provided for in the contract all questions and disputes relating to the meaning of the specifications, designs, drawings and Instructions herein before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or there conditions or otherwise concerning the work or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the sole arbitration of the General Manager of BHEL and if General Manager is unable or unwilling to act, to the sole arbitration of same other persons appointed by the General Manager, willing to act as such arbitrator.

The cases referred to arbitration shall be other than those for which the decision of the Accepting Officer, or Engineer-in-charge as the case may be, is expressed in the contract to be final and conclusive. There will be no objection if the arbitration, so appointed is an employee of BHEL and that he had to deal with the matters to which the contract relates and that in the course of his duties as such he had expressed views on all or any of the matters in dispute or difference.

The arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, such General Manager as aforesaid at the time of such transfer, vacation of office or inability to act, shall appoint another person to act as arbitrator in accordance with the terms of the contract. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

Subject as aforesaid the provision of the Arbitration Act, 1940 or any statutory modification or re-enactment thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceeding under this clause.

It is a term of the contract that the party involving arbitration shall specify the dispute or disputes to be referred to arbitration under this clause together with the amount or amount claimed in respect of each dispute.

The arbitrator(s) may from time to time with consent of the parties enlarge the time, for making and publishing the award.

The work under the Contractor shall if reasonably possible continue, during the arbitration proceedings and no payment due or payable to the Contractor shall be withheld on account of such proceedings.

The Arbitrator shall be deemed to have entered on the reference on the date he issues notices to both the parties fixing the date of first hearing.

The Arbitration shall give a separate award in respect of each dispute or difference referred to him.

The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.

The award of the Arbitration shall be final, conclusive and binding on all parties to this contract.

In the event of disputes or differences arising between one public sector enterprise and a Govt. Department or between two public sector enterprises the above stipulations shall not apply, the provisions of BPF Office memorandum No. BPF/CL001/76MAN/2(1.10) 75 - BPE (GM - 1) dated 1st January 1976 or its amendments for arbitration shall be applicable.

61. Jurisdiction of Court

For the purpose of Court proceeding if any, same shall be in the Court having jurisdiction over Ranipet - 632 406. (Vellore District, Tamilnadu).

62. Taxes etc. -

All taxes, duties, levies that are payable to the Government or to any other authorities in respect of the works under the contractor at the time of contract or becomes payable in future shall be exclusively borne by the contractor and the BHEL is not liable for any reimbursement / Payment thereof.

ANNEXURE - I

TERMS AND CONDITIONS REGARDING COMPLIANCE WITH VARIOUS LABOUR LAWS BY THE CONTRACTORS FOR BHEL

{Please See Condition - 22}

1. The Contractor shall not employ in connection with the work any person who has not completed 18 years of age.
2. The Contractor shall in respect of labour employed by him either directly or through sub-contractor's comply with or cause to be complied with the following statutory provisions and rules and in regard to all matters provided therein.
 - a) The Contract Labour (Regulation & Abolition) Act 1970 and the related Tamilnadu rules.
 - b) The Minimum wages Act 1948 and the related Tamilnadu Rules.
 - c) The payment of wages Act 1936 and the related Tamilnadu Rules.
 - d) The factories Act 1948 and teh related Tamilnadu Rules.
 - e) The Employees' Provident Fund & Miscellaneous Provisions Act 1952.
 - f) The Employees State Insurance Act 1948.
 - g) The workman's Compensation Act 1923.
 - h) The Industrial Disputes Act 1947 and any other Law or modifications to the above or to the rules made there under from time to time.
 - i) Paymet of Bonus Act 1985.

REGISTRATION AND LICENSING

3. Every Contractor shall register his name with the Welfare Section of BHEL before taking up the work awared to him by giving the following information and getting a code Number :-
 - a) The Name of the Contractor.
 - b) Nature of Contract Work.
 - c) Period of Work.
 - d) Number of maximum labour employed by him on anyone day.
 - e) Licence No. & Date (applicable in case of Contractors employing 20 or moreworkers)
 - f) Whether enrolled for PF, ESI, etc., and enrolment No.

This information is called for the purpose of informing the Inspectorate of Factories whenever they call for information regarding Contracts.

4. The Contractor employing 20 or more workmen is required to obtain licence from the authorities (The Deputy Chief Inspector of Factories / Assistant Commissioner of Labour as the case may be). This licence shall be amended and /or renewed wherever there is an increase in the workmen employed by him or in the event of contract being extended or renewed. The Contractor shall inform the licence number to the BHEL Management before taking up the work.
5. The Contractor (licensed or unlicensed) shall promptly furnish every information and document required by BHEL authorities for the purpose of fulfilling their obligations as principal Employer and / or occupier of the factory and shall render all necessary assistance for the same.

WAGES

6. The Contractor shall pay wages to the workmen employed by him at the rate which shall not be less than the minimum wages applicable under Law from time to time.
7. The Contractor shall fix wage periods in respect of which wages shall be payable. No wage period shall exceed one month.
8. The Contractor shall ensure payment of wages to the Contract labour employed by him within three days from the end of wage period in case the wage period, is one week or a fortnight and in all other cases before 10th day of the following month.
9. All payment of wages shall be made on working days at the work site and during the working time and on dates notified in advance. In case the work is completed before the expiry of the wage period, final payment shall be made within 48 hours of the last working day.
10. Where the employment of any works is terminated by or on behalf of the Contractor, the wages earned by him shall be paid before the expiry of the second working day from the day on which his employment is terminated.
11. Wages due to every worker shall be paid to him direct or to the person authorities by him in this behalf. All wages shall be paid in current coin or currency or in both.
12. The Contractor shall ensure the disbursement of wages in the presence of such authorised representatives of BHEL Management.
13. The above payment shall be verified by the authorised Officers/ representative of BHEL with the following certificates on the payment sheet
 Certified that the amount shown in Column No..... has been paid to the workmen concerned in my presence on..... at
14. A certificate of payment shall be furnished in duplicate by the Contractor to the Engineer-in-charge each month in Form "A" enclosed.

15. A Notice of showing the wage period and the place and time of disbursement of wages shall be displayed at the place of work and a copy to be sent to the welfare department by the Contractor under acknowledgement.
16. Notices showing the rates of wages, weekly rest days, wage period, hours of work, date of payment of wages, and addressed of the Inspectors having jurisdiction the date of unpaid wages shall be displayed in Tamil and English in conspicuous places at the establishment and at worksite the contractor. The contractor shall inform the BHEL Management every month the details of contract labour engaged for each contract in the following form :-
 - a) Serial Number
 - b) Location
 - c) Period of Work
 - d) No. of Contract labour engaged during the work
 - e) No. of days worked
 - f) No. of Mandays worked
 - g) Wages paid to his workers

The above statement shall be furnished to BHEL Management at the end of every month.

REGISTERS AND RECORDS AND COLLECTION OF STATISTICS

17. The following documents/formats under contract labour (Regulation and Abolition) Act 1970 and Tamil Nadu Rules there under shall be maintained by each Contractor.
 - a) Register of Persons employed by the Contractor.
 - b) Employment Card
 - c) Service Certificate
 - d) Muster Roll, Wage Register, Deduction Register, Wage Slip, Over Time Register, Register of Fines, Register of Advances etc.
18. The Contractor shall display the abstract of the contract labour (Regulation and Abolition) Act and the Rules there under both in English and in Tamil.
19. Half Yearly Return shall be sent by the Contractor in duplicate to the Licensing Officer.
20. The Contractor shall submit the returns required under the Contract Labour (Regulation and Abolition) Act 1970 periodically to BHEL Management.
21. The Contractor shall without fail give upto date information in writing of the attendance of the workers employed by him.

22. The Contractor shall ensure that his workers keep and produce their Employment Card when coming to duty and take them back when leaving duty.
23. All the above registers and records shall be preserved in original for a period of Three years. All the Registers, Records and notice maintained under the Act and rules shall be produced on demand by Inspector or any authority under the Act.

WORKING HOURS AND WORKING CONDITIONS

24. NO WORKER SHALL BE REQUIRED OR ALLOWED TO WORK ON SUNDAY UNLESS HE HAS OR WILL HAVE A HOLIDAY ON ANYONE OF THE THREE DAYS BEFORE OR AFTER THE SAID DAY.
25. The contractor shall inform BHEL Management in the prescribed form details of the contract workers scheduled to work on Sunday, the day of rest and also indicate the substituted holiday in lieu thereof. This shall be intimated two days in advance before his workmen are booked for work on Sunday.
26. The contract labour working for more than nine hours in any day or for more than 48 hours in any week shall be paid wages at the rate of twice the ordinary rates of wages in accordance with the provisions of section 59 of the Factories Act 1948.
27. The contractor shall provide all safety devices and personal protective equipment to his workmen at his own cost and shall ensure that his workmen wear/use such devices or equipment provided to them while doing the work and there should not be any relaxation on this.
28. The contractor shall give four paid National Holidays to his workers, viz. 26th January, 1st May, 15th August and 2nd October.
29. The contractor shall ensure that his workmen vacate the premises after the shift is over.
30. No woman worker shall be required or allowed to work in the factory except between the hours of 6.00 a.m and 7.00 p.m.
31. The contractor shall comply with the provisions relating to welfare and Health facilities as provided in the contract labour (Regulation and Abolition) Act 1970 read with the Tamilnadu contract labour Rules 1975.

NOTICES OF ACCIDENTS

32. Notwithstanding any thing contrary to this, in the event of accident the contractor shall be required to fill injury report and submit the Engineer-in-charge immediately and ensure the compliance of ESI/Workmen's Compensation Act, Factories Act and Rules made there under. He shall also maintain a register of accident as per Act.
33. The contractor shall get the contract labour engaged by him insured under workmen's Compensation Policy from General Insurance Corporation of India before actually starting the work of contract. The Insurance coverage should

be for the entire period of contract. The contractor shall comply with the provision of the Workmen's Compensation Act 1923 [This should be read in conjunction with the provision of ESI Act]

34. The contractor shall ensure that all his workmen are covered under the Employees State Insurance Act and produce to BHEL such Registration Number/ Enrolment Number before executing the contract work.
35. The contractor shall regularly pay the amount of contribution i.e. employers contribution as well as employees contribution in pursuance of the above scheme as fixed from time to time. The contribution payable presently is 1.75% of wages to be recovered from the workmen and 4.75% of wages to be contributed by the contractor. Contribution recovered from employee and contribution made by the contractor may be rounded to the next higher multiples of five paise.
36. The contractor shall take note of any amendment that may be brought forth in the above contribution rate and accordingly.
37. The contractor shall ensure that his workmen are covered under the EPF & miscellaneous Provision Act 1952 and accordingly produce to the BHEL Management the registration / enrolment number before awarding of contract work. As per the existing provision every worker who has completed three months continuous service or has actually worked for not less than 60 days within a period of three months or less shall be entitled and required to become a member of the fund. The employees' contribution payable at present is 12% of wage which will be recovered by the contractor from the wages of his workmen and the contractor should pay equal contribution. The contractor is also liable to pay any administrative charges in this behalf that may be decided from time to time, it will be the responsibility of the contractor to ensure such contribution payable in respect of workmen employed through sub-contractors also.
38. The contractor shall take note of any amendment in the rate of contribution payable under the scheme from time to time.
39. The contractor shall within seven days of the close of every month submit to BHEL a statement showing the amount of contribution payable/paid for employees engaged by him or through him and shall also furnish to BHEL such information as Principal Employer is required to furnish under the provision of the ESI Act and PF as well as the schemes made thereunder to the authorities concerned.
40. Whenever any sum of money is found to be recoverable from or payable by the contractor under the above Acts the same shall be deducted from any sum that may be due or which at any time thereafter may become due to the contractor under this contract or under any other contract or from his security deposit in case the recoveries are not sufficient to satisfy the claims, the contractor shall pay the balance thereof on demand. In case any recoveries are made this clause shall be required to replace the shortage caused by such recoveries in the amount of Security Deposit.

41. The contractor shall abide by all the labour and other laws applicable to contract:labour/worken under this contract and shall at all times keep BHEL Indemnified against all losses, claims, prosecutions under any law.
42. in case of non compliance of any of the provisions of the Acts and in case BHEL Haveing complied with the same BHEL will be entitled to recover the same from the contractor / sub contractor.
43. Non exercise of any of the power of or rights available to BHEL here under or under any law, shall not any way operate as waiver thereof.

ACCEPTING OFFICER

FORM - IV

(See Rule 21(1) of Tamil Nadu Contract Labour Rules)

Application for Licence

01. Name and Address of the Contractor
(including his Father's Name in case of
Individuals) :
02. Date of Birth and age (in case of
Individuals) :
03. Particulars of Establishment where
Contract Labour is to be employed :
- a) Name and Address of the
Establishment :
- b) Type of business, trade industry
manufacture :
- c) Number and date of certificate of
Registration of occupation, which is
carried on the Establishment under
the Act. :
- d) Name and address of the Principal
Employer :
04. Particulars of contract labour :
- a) Nature of work in which contract
labour is employed or is to be
employed in the establishment :
- b) Duration of the proposed contract
work (give particulars of proposed
date of commencing and ending) :
- c) Name and address of the agent or
Manager of contractor at the worksite :
- d) Maximum No. of contract labour
proposed to be employed in the
establishment on any date :

- 05. Whether the contractor was convicted of any offence within the preceeding five years, if so give details :
- 06. Whether there was any order against the contractor revoking or suspending licence or forfeiting security deposit in respect of an earlier contract if so the date of such order :
- 07. Whether the contractor has worked in any other establishment within the past five years, if so, give details of the principal employer Establishment and nature of work :
- 08. whether a certificate by the principal Employer in form V is enclosed :
- 09. Amount of licence fee paid No of Treasury challan and Date :
- 10. Particulars of security deposit if any, requested to be adjusted, including Treasury Receipt number :
- 11. The amount of security deposit or balance if any after adjustment of amount to be refunded under rule 31 deposited with treasury Receipt Number and date :

DECLARATION

I hereby declare that the details above are correct to the best of my knowledge and belief.

PLACE :
DATED :

SIGNATURE OF THE APPLICANT
[CONTRACTOR]

NOTE : The application should be accompanied by a treasury Receipt for the appropriate amount and a certificate in Form V From the principal employer.

(To be filled in the office of the Licensing officer)

Date of receipt of the application with challan for fees / security Deposit.

SIGNATURE OF THE LICENSING OFFICER

CONTRACTOR

FORM - XIII

(See Rule 75 of Tamil Nadu Contract Labour Rules 1975)

Register of workman employed by contractor

Name and Address of the Contractor :

Name and location of work :

Name and address of establishment in /under
which contract is carried on :

Name and address of Principal Employer :

01. Serial Number :

02. Name and surname of workman :

03. Age and sex :

04. Father's / Husband's Name :

05. Nature of Employment /Designation :

06. Permanent Home address of workman
(village Taluk and District) :

07. Local Addresss :

08. Date of commencement of Employment :

09. Signature or Thump Impression of workman :

10. Date of termination of Employment :

CONTRACTOR

FORM - XIV

(See Rule 76 of Tamil Nadu Contract Labour Rules)

EMPLOYMENT CARD

Name and Address of contractor : Name and address of
Establishment in/under which
contract is
carried on _____

Nature of work and location of work : Name and address of
Principal Employer

01. Name of the workmen :

02. Sl. No. of register of workmen employed :

03. Name of Employment/Designation :

04. Wage rate (with particulars of unit in case of
Piece work) :

05. Wage period :

06. Tenure of Employment :

07. Remarks :

SIGNATURE OF CONTRACTOR

CONTRACTOR

FORM - XV

{See Rule 77 of Tamil Nadu Contract Labour Rules}

SERVICE CERTIFICATE

Name and Address of the contractor : Name and address of
Establishment in/under which
contract is
carried on _____

Name and location of the work :

Name and address of the workman : Name and address of Principal
Employer

Age or Date of Birth :

Identification marks :

Father's / Husband's Name :

Sl.No	Total period for which employed		Nature of work done		Rate of wage (with particulars units in case of piece of work	Remarks
	From	To	(4)	(5)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)

SIGNATURE

CONTRACTOR

FORM - XVI

(See Rule 78 [1] [a] [i] of Tamil Nadu Contract Labour Rules)

MUSTER ROLL

Name and Address of contractor : Name and address of Establishment in/under which contract is carried on _____

Nature of location of the work : Name and address of Principal Employer _____

For the Month of _____

Sl. No	Name of workmen	Father's/Husbands Name	Sex	Dates					Remarks	
				1	2	3	4	5		
(01)	(02)	(03)	(04)	(05)	(06)					

SIGNATURE OF CONTRACTOR

CONTRACTOR

FORM - XVII

(See Rule 78(1) (a) (i) of Tamil Nadu Contract Labour Rules)

Register of wages

Name and Address of the Contractor :

Nature and location of work :

Name and address of establishment in/under
which contractor is carried on :

Name and address of Principal Employer :

Wage Period : MONTHLY

01. Serial Number :

02. Name of workman :

03. Sl. No. in Register of workman :

04. Designation / Nature of work done :

05. No. of days worked :

06. Units work done :

07. Daily rate of wages / Piece rate :

08. Basic wages :

09. Dearness allowance :

10. Overtime :

11. Other cash Payment
(Nature of payment to be indicated) :

12. Total :

13. Deductions, If any [indicate nature] :

14. Net amount paid :

15. Signature / Thumb impresion of workman :

16. Initials of contractor or his representative :

CONTRACTOR

FORM - XIX

(See Rule 78(1) (b) of Tamil Nadu Contract Labour Rules)

Wage Slip

Name and Address of the Contractor : Name and Father's /
Husband Name of the
workman _____

Name and location of work : For the week / Fortnight /
Month ending

01. No. of days worked :

02. No. of units worked in
case of piece rate workers :

03. Rate of daily wages /piece rate :

04. Amount of over time wages :

05. Gross wages Payable :

06. Deductions, if any :

07. Net amount of wages paid :

**INITIALS OF THE CONTRACTOR OR
HIS REPRESENTATIVE**

CONTRACTOR

FORM - XX

(See Rule 78(1) (a) (ii) of Tamil Nadu Contract Labour Rules)

Register of deductions for damage or loss

Name and Address of the Contractor :

Nature and location of work :

Name and address of establishment in/under
which contractor is carried on :

Name and address of Principal Employer :

01. Serial Number :

02. Name of workman :

03. Father's / Husband's Name :

04. Designation / Nature of employment :

05. Particular of damage or loss :

06. Date of damage or loss :

07. Whether workman showed cause
against deduction :

08. Name of person in which presence
employee's explanation was heard :

09. Amount of deduction imposed :

10. No. of instalments imposed : Date of Recovery

11. First Instalments :

12. Final Instalments :

13. Remarks :

CONTRACTOR

FORM - XXI.

(See Rule 78(1) (a) (ii) of Tamil Nadu Contract Labour Rules)

Register of Fines

Name and Address of the Contractor :

Nature and location of work :

Name and address of establishment in/under
which contractor is carried on :

Name and address of Principal Employer :

01. Serial Number :

02. Name of workman :

03. Father's / Husband's Name :

04. Designation / Nature of employment :

05. Act / Omission for which fine imposed :

06. Date of offence :

07. Whether workman showed cause against
fine :

08. Name of the person in whose presence
employee's explanation was heard :

09. Wage period & Wage payable :

10. Amount of fine imposed :

11. Date on which fine realised :

12. Remarks :

FORM - XXII

(See Rule 78 (1) (a) (ii) of Tamil Nadu Contract Labour Rules)

Register of Advance

- Name and Address of the Contractor :
- Nature and location of work :
- Name and address of establishment in/under which contractor is carried on :
- Name and address of Principal Employer :
01. Serial Number :
02. Name of workman :
03. Father's / Husband's Name :
04. Designation / Nature of employment :
05. Wage period and wages payable :
06. Date and amount of advance given :
07. Purposes (s) for which advance made :
08. No. of instalments by which advance to be repaid :
09. Date and amount of each instalment repaid :
10. Date on which instalment was repaid :
11. Remarks :

CONTRACTOR

FORM - XXIII

(See Rule 78(1) (a) (iii) of Tamil Nadu Contract Labour Rules)

Register of Overtime

Name and Address of the Contractor :

Nature and location of work :

Name and address of establishment in/under
which contractor is carried on :

Name and address of Principal Employer :

01. Serial Number :

02. Name of workman :

03. Father's / Husband's Name :

04. Sex :

05. Designation / Nature of employment :

06. Dates on which overtime worked :

07. Total overtime worked or production
in case of piece -rated :

08. Normal rate of wages :

09. Overtime rate of wages :

10. Overtime earning :

11. Date on which Overtime wages paid :

12. Remarks :

CONTRACTOR

PAYMENT CERTIFICATE

FORM "A"

Certified that :

1. I as contractor of
have made payment to all contract Labourers in full in respect of contract
No. as per terms of my contract
and in no case less than the rates applicable upto the period ending.
2. The above payment have been made by me in the presence of the au-
thorised representative of
of for
Employees amounting to Rs
3. The necessary payment registers attendance register / Form 12 . Leave
register / book under Laboure and industrial Law and other relevant records
have been maintained by me and available with me for production as and
when required .
4. No payment is due / outstanding to any contract Labourers engaged by
me in respect of the aforesaid contract upto the period ending
.....

CONTRACTOR

NAME :
DATE :

SUPERVISOR

NAME :
DESIGN :
DATE :

COUNTERSIGNED
OFFICER INCHARGE

NAME :
DESIGN :
DEPT. :

CONTRACTOR

ANNEXUR II
SAFETY RULES
(See Condition 2)

A BHEL SAFETY CODE

A

1. Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground, or from solid construction except such short period of work as can be done safely from ladder. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and handholds shall be provided on the ladder and the ladder shall be give an inclination not steeper than $\frac{1}{4}$ to 1 ($\frac{1}{2}$ horizontal and 1 vertical)
2. Scaffolding or staging more than 3.25 metres above the ground or floor, swing or suspended from an overhead support or erected with stationary support, shall have a guard rail properly attached, bolted braced and otherwise secured atleast 1 metre high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platform, gangways and stairways shall be so constructed that they do not sag unduly or unequally, and if height of a platform or gangway or stairway is more than 3.25 metres above ground level or floor level it shall be closely boarded, have adequate width and be suitably fenced, as described in 2 above.
4. Every opening in floor of a building or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of 1 metre.
5. Safe means of access shall be provided to all working platform and other working places. Every ladder shall be securely fixed, no portable single ladder shall be over 9 metres in length. Width between side rails in a rung ladder shall in no case be less than 30 cm for ladders upto and including 3 metres in length, For longer ladder this width shall be increased by atleast 6mm for each additional 30cm of length. Uniform step spacing shall not exceed 30cm.

Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and light to protect public from the accident and shall be bound to bear expenses of defence of every suit-action or other proceeding at law that may be brought by any person for injury sustained owing to neglect of the above precautions, and pay any damages and cost which may be awarded in any such suit, action or proceeding to any such person or which may with the consent of the contractor be paid to compromise any claim by such person.

6. Excavation and Trenching

All trenches 1.5 metres or more in depth, shall at all time be supplied with atleast one ladder for each 30m length or fraction there of ladder shall be extended from bottom of trench to atleast 1 metre above surface of the ground . Sides of the trench 1.5 metres or more in depth shall be stepped back to give suitable slope or securely held by timber bracing,so as to avoid the danger of sides collapsing . Excavated materials shall not be placed within 1.5 metres of the edge of trench or half the depth of trench, whichever is more. Cutting shall be from top to bottom under no circumstances shall under mining or under - cutting be done.

7. Demolition :

Before any demolition work is commenced and also during the progress of work.

- a) All roads and open areas adjacent to the work site shall be closed or suitably protected .
 - b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.
 - c) All practical steps shall be taken to prevent danger to person employed from the risk of fire or explosion ,or flooding no floor , or roof or other part of building shall be so overloaded with debris or materials as to render it unsafe.
8. All necessary personal safety equipment as considered adequate by the Engineer-in-charge shall be available for use of person employed on the site and maintained in a condition suitable for immediate use and the contractor shall take adequate steps to ensure proper use of equipment by those concerned.
- a) Workers employed on mixing asphaltic materials cement and lime mortars concrete shall be provided with protective footwear and protective gloves.
 - b) Those engaged in handling any material which is injurious to the eye shall be provided with protective goggles.
 - c) Those engaged in welding work shall be provided with welder's protective eye shells
 - d) Stone breaker shall be protective goggles and protective clothing and seated at sufficiently safe intervals.
 - e) When workers are employed in sewers and manholes which are in use , the contractor shall ensure that manhole covers are opened and manholes are ventiled atleast for an hour before the workers are allowed to get into them manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to public.
 - i) No paint containing lead or lead products shall be except in the form of paste or ready-made paint.
 - ii) Suitable face masks shall be supplied for use by workers when paint applied in the form of spray or surface having lead paint is dry rubbed and scrapped .

f) The contractor shall not employ men below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead painting the following precaution shall be taken :

A f i) No paint containing lead or lead products shall be used except in the form of paste or ready-made paint.

ii) Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or surface having lead paint is dry rubbed and scrapped

iii) Overalls shall be supplied by the contractor to workmen and adequate facilities shall be provided to enable working painters to wash during or cessation of work.

9. When work is done near any place where is risk of drowning ,all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision made for prompt first aid treatment of all injuries likely to be sustained during the during the course of the work.

10. Use of hoisting machine and tackles including their attachments,anchorage and support shall conform to the following

a)

i) These shall be of good mechanical construction, sound materials and adequate strength and free from defects and shall be kept in good working order.

ii) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adeuate strength and free from defects.

b) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 yrs shall be incharged of any hoisting machine including any scaffolding winch or give signals to operator.

c) In case of every hoisting machine and or every chain ,ring , hook, shackle swivel and pull block used in hoisting or lowering as means of suspension safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall have the safe working load plainly marked there on. In case of a hoisting machine having a variable safe working load,each safe working load at the condition under which it is applicable shall be clearly indicated. No part of any machine or gear referred to above in this paragraph shall be loaded be yond the safe working load except for the purpose of testing.

d) In case of department machine ,safe working load shall be notified by the Engineer-in-charge. As regards contractor's machine the contractor shall notify safe working load of each machine to the Engineer-in-charge when ever he brings it to site of work and get it verified by the Engineer-in-charge.

11. Motors , gearing , transmission electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards. Hoisting appliances shall be provided with such means as will reduce to the minimum risk of accident descent of load . Adequate precaution shall be taken to reduce to the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energised insulating mats, working apparel such as gloves, sleeves and boots as may be necessary shall be provided. Workers shall not wear any rings watches , carry keys or other materials which are good conductors of electricity.
12. All scaffolds , ladders and other safety devices mentioned or described here in shall be maintained in a safe condition and no scaffold , ladder or equipment shall be altered or removed while it is use. Adequate washing facilities shall be provided at or near the places of work.
13. These safety provision shall be brought to the notice of all concerned by display on a notice board at a prominent place at the workspot persons responsible for ensuring compliance with the safety code shall be named thereon by the contractor.
14. To ensure effective enforcement of the rules and regulations relating to safety precaution , arrangement made by the contractor shall be open to inspection by the Engineer-in-charge or his representation and the inspecting officers as defined in the contractor's Labour Regulations.
15. Notwithstanding to the above conditions 1 to 14, the contractor is not exempted from the operation of any other Act or Rule in force.

B. GENERAL SAFETY PRECAUTIONS TO BE FOLLOWED AT WORK SITES DURING EXECUTION

The following safety measures should be strictly adhered to during execution of works at sites.

1. Providing the working platform with toe-board and handrail for continuous working at heights.
2. Providing safety belt and lifeline at all times for men working at heights.
3. Providing dust or fume respirator in places where dust and fume concentration exists
4. Providing goggles and welding screens.
5. Providing acid and alkali proof rubber gloves for handling acids, alkali and chemicals, which are corrosive.
6. Providing rubber gloves for working on electrical works.
7. Ensuring proper lashing of the components while being transported in vehicles.
8. The vehicles must have side supports or have body to support the materials conveyed.
9. The materials should not be allowed to extend or overflow the sides of vehicles.
10. Materials should not be allowed to overhang from the rear edge of the body of the vehicle.
11. Driver of the vehicle must possess license.
12. Vehicle must not be overloaded prescribed limits.
13. Red flags and lights for parts projecting from the body of the vehicle must be provided.
14. The speed restrictions within the factory must be strictly adhered to.
15. The gas cylinders must always be handled on trolleys or kept tied down not in use. They should never be rolled as Roller for conveying.
16. Cylinders should not be used without regulators.
17. All excavations may be barricaded and red belts/ lamps must be provided .
18. All electrical connections must be properly earthed.
19. No work should be taken up for execution inside shop floor, without obtaining necessary work permit.
20. Providing helmet for high level work.
21. The contractor should maintain a register regarding the driver license particulars.
22. All Personnel Protective Equipments (PPE) conform to standard specification as per the details given in the code of conduct.
 - (i) Safety helmets confirming to IS-2925: 1984
 - (ii) Safety Belts confirming to IS-3521: 1983
 - (iii) Safety Shoes confirming to IS-1989: 1978
 - (iv) Eye and face protection devices confirming to IS – 8520:1977 & IS – 8940:1978
 - (v) Hand and body protective devices confirming to: IS – 2573: 1975
IS – 6994: 1973
IS – 8807: 1978
IS – 8519: 1977

Contractor including the subcontractors, agents and labours engaged on work are required to scrupulously adhere to the safety regulations, safety precautions and measures. Any violation thereof will invite punitive action being taken against them. Also contractors with frequent violations of safety regulations will not be entrusted with further work in this organization.

General:

All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, safety nets, ladders, equipment etc., used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained, before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item.

C. SAFETY PRECAUTION TO BE OBSERVED WHILE TRANSPORTING MATERIALS

I. Vehicle

1. Vehicle carrying materials should have proper registration documents and must be produced on demand by our Security staff.
2. The light on right side i.e. over the driver's cabin shall be in working condition
3. Both the head light as well as park lamps must be in working condition.

II. Movement of Vehicle

1. The vehicle should not travel at more than 20KMPH in our premises.
2. The driver of the vehicle must possess heavy duty licence and produce on demand by the Security Staff.
3. Vehicles carrying inflammable liquids in the tanks containers should have grounding chain or the tank container should be coated with insulating materials to avoid static electricity.
4. In road junction , speed breaker and Railway crossing the speed should be lowered and vehicles should proceed cautiously.
5. The driving should be ' keep to the left ' at all places.
6. The vehicles should not parked on the road which could obstruct the vehicular traffic.
7. No person other than driver should be allowed to sit or stand on the prime mover or trailer.
8. The vehicle should pass only through the approved routes. Short cuts should be forbidden.
9. There must be a safe distance behind another moving truck.
10. The driver should avoid making quick starts, jerk stop or quick turns at excessive speed .

III Shipping

1. Strong side supports should be provided on both sides of the trailer. The side supports should be fixed in such a way that it cannot be removed even temporarily.
2. Adequate packing must be given for easy slinging operations. The packing materials should be good enough to withstand the load.
3. The stacking of loads on the truck should be evenly placed. The load should not be heaped together or dumped over the chassis.
4. The load on the truck should not be beyond its standard capacity. The carrying capacity must be clearly marked on the trailers also.
5. The loaded materials should be fastened tightly with "WIRE ROPE". Manila rope or coir rope should not at all be used. There must be side packing such as gunny or rubber tyre between the sharp edges of the job and wire rope in order to avoid cut in the wire rope.
6. There must be minimum two fastening and it should be more in case of lengthier loads.
7. The wire rope should be in sound condition i.e there should not be links, knots or bristles etc.
8. The wire rope ends should be clamped with 'U' clamps.
9. The loose pieces should be bundled before loading on the truck.
10. There must be red flags or red lamps for the lengthly loads which extend beyond chassis.
11. The materials should not be stacked too high to avoid hitting against live electric lines.
12. The load should not be overhanging more than 0.9 metres from the end of body.
13. While transporting the scraps, there must be wire net cover to prevent falling of scrap.

IV General

1. The vehicles should not be moved directly inside the production building in case the materials are to be unloaded there. But the vehicles should be parked outside the building and the driver should ascertain the passage as well as the unloading points, with the help of the shop officials. This will avoid the congestion or blocking of traffic in the gangway.

NTPC - TAMILNADU ENERGY COMPANY LTD.
(A Joint Venture Company of NTPC Limited and TNEB)

NTECL POWER PROJECT (3X500 MW)
(VALLUR THERMAL POWER PROJECT 3 X 500 MW)

SECTION – VI

TECHNICAL SPECIFICATION
FOR
ULTRAFILTRATION PLANT PACKAGE

BID DOCUMENT NO.: CS-0260-132G-2

PART - A
SUB-SECTION - IID-01
SCOPE OF SUPPLY & SERVICES
CIVIL WORKS

CLAUSE NO.	CIVIL WORKS SCOPE		
1.00.00	<p>SCOPE OF SUPPLY AND SERVICES</p> <p>The scope of civil works to be furnished and erected under the contract is detailed herein. The items, though not specifically mentioned, but are needed to make the system complete shall be treated as though included and the same shall also be furnished and erected/ constructed unless otherwise specifically excluded.</p>		
2.00.00	<p>CIVIL SCOPE OF WORK</p>		
2.01.01	<p>The scope of work shall include carrying out analysis and detailed design of various structures covered in the scope of works, preparation of general arrangement drawings and construction/ fabrication, architectural, sanitary and plumbing drawings, supply of all materials, equipment, labour & tools etc. and supervision & construction of all civil, structural and architectural works including foundations, sanitary, plumbing and miscellaneous civil works, complete for the Ultrafiltration plant package for VALLUR THERMAL POWER PROJECT.</p> <p>All the works are located within the boundary of Main Plant.</p>		
2.01.02	<p>The nature of work shall generally involves earthwork in excavation and filling in all types of soils, dressing to the required profiles, dewatering till the structures are constructed / erected up to the required level or as directed by the Engineer, shoring, strutting, backfilling around the completed structures and plinth filling, disposal of surplus earth, piling in foundations, concreting including reinforcement and formwork, masonry work, paving, architectural work including walls, roof / floor slabs, rolling shutters, doors, windows, ventilators, finishing of walls / floor and roof, fabrication and erection of structural steel and miscellaneous structural steel (steel ladders, railings, inserts, embedments, gratings, chequered plate covers, platforms, anchor bolts, monorail hoists etc.), R.C.C. Trench & trench covers, expansion joints, rain water pipes, thrust blocks, anchor blocks, pipe pedestals, drainage of buildings and areas around all the buildings in the scope of the contract including peripheral drains around buildings / structures and connecting them to Employer's nearest drain, providing pre-cast R.C.C. pipe / slab culverts at road / rail crossing drains, service pipes, cables etc., laying and testing of water supply lines & sewer lines, manholes, damp proofing, water proofing, acid / alkali resistant lining, painting and other auxiliary / ancillary items, supplying and laying 40mm dia. MS earthing mat, pathways connecting various facilities, final grading and site clearance before handing over and other auxiliary items of work etc. and any other work required for completion and proper functioning of the plant.</p>		
2.01.03	<p>The work to be performed under this specification shall also consist of providing all labour, materials and incidental items neither shown or specified in the Tender documents but reasonably implied or necessary for carrying out successful design & construction and in strict accordance with approved drawings, specifications and</p>		
<p>NTECL POWER PROJECT (3X500 MW) (Vallur Thermal Power Project – 3 X500 MW) ULTRAFILTRATION PLANT PACKAGE BIDDING DOCUMENT NO.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-A</p>	<p>Sub-Section –IID 01 CIVIL WORKS SCOPE</p>	<p>Page 1 of 5</p>

CLAUSE NO.	CIVIL WORKS SCOPE		
2.01.04	<p>Indian Standards listed in the Tender documents and including revisions and amendments thereto as may be required during the execution of work. All material including cement, reinforcement steel, structural steel required for completion of the work covered under the scope of this specification shall be arranged by the contractor within his quoted rate. The material arranged by the contractor shall conform to quality standard specified elsewhere in the specification and shall be procured from licensed agencies / sources only with prior approval of Employer.</p> <p>The construction work shall be carried out according to the design and construction drawings to be developed by the Bidder and approved by the Employer. For all buildings, structures, foundations etc. necessary layout, levels and other details shall be developed by the Bidder keeping in view the availability of area, functional requirement of the plant and facilities and providing enough space and access for operation and maintenance. Certain minimum requirements are indicated in the tender drawings for guidance of the Bidder.</p>		
2.01.05	<p>The scope of work described below is general in nature. The Bidder shall provide all structures/ facilities required for the effective functioning of Remineralisation System plant package, whether or not they are specifically mentioned. The scope of the Bidder for Civil, Structural and Architectural works shall include but not limited to the following:</p> <ul style="list-style-type: none"> a) Detailed basis of design shall be prepared by the Bidder based on various requirements specified elsewhere in the specifications. The documents shall be finalised after Employer's approval and the same shall form the basis of Detailed Engineering Work, b) Entire Civil works associated with Ultrafiltration plant package, c) Civil & structural works for both superstructure and substructure associated with Necessary piping, Valves & fittings d) Civil works for Pedestals / Trestles/tanks as required e) Civil & structural works for both superstructure and substructure associated with Miscellaneous facilities such as Platform, Stairs, Supply & installation of complete Ultrafiltration plant package, Interconnection with existing facilities etc. Civil and structural works for UF shed area and filter shed area. f) Civil & structural works for both superstructure and substructure required for Associated Control & instrumentation System, Electrical drives, Control panels, Various sensors and indicators, etc. g) All civil, structural and architectural works required for completion of the Mech. / Elect. / C&I systems such as Buildings, Control rooms, MCC / Switchgear 		
<p>NTECL POWER PROJECT (3X500 MW) (Vallur Thermal Power Project – 3 X500 MW) ULTRAFILTRATION PLANT PACKAGE BIDDING DOCUMENT NO.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-A</p>	<p>Sub-Section –IID 01 CIVIL WORKS SCOPE</p>	<p>Page 2 of 5</p>

CLAUSE NO.	CIVIL WORKS SCOPE		
	<p>rooms, Valve pit / chambers and foundation for all the equipment, support pedestals and pipe trestles for over-ground piping.</p> <p>h) Supply of all materials for the construction of structures/ facilities (including cement, reinforcement steel and structural steel) in the ultrafiltration plant package. Bidder has to make arrangements for supply of all materials. Employer will not supply any material to the Bidder.</p> <p>i) Plinth protection, Storm water drainage system in and around all buildings/ structures/ area covered under this contract and connecting to the nearest owner's storm water drain,</p> <p>j) All pipe supporting structures, pipe and crossings etc.,</p> <p>k) Civil works for pump foundations and piping support pedestals/ trestles,</p> <p>l) All culverts associated with pipeline crossings across roads, railway tracks, embankments, channels, boundary wall, drains etc.,</p> <p>m) Any other building/ facility/ structure that would be required as per system requirements,</p> <p>n) Disposal of surplus excavated soil outside the Plant boundary.</p> <p>o) Civil & Structural work required for supporting pipes, equipment, valves, fittings etc.</p> <p>p) Final grouting of all equipment.</p> <p>q) Hot dip galvanization (minimum 610gm/sq-m of steel surface) or sealed spray zinc coating of all structural steel parts and gratings shall be carried out by contractor/bidder. Painting and surface protection for all surfaces as specified and as required.</p> <p>r) Making good of sumps / ponds / slab / wall opening constructed by Employer.</p> <p>s) In case any steel embedment, inserts are not embedded at the time of execution of Civil structural work, bidder has to make arrangements to fix these embedment / inserts at desired location either by expandable rawl plug / bolts or by any other acceptable method.</p> <p>t) Any other civil works required for completing the system. All civil, structural and architectural works required for completion of the Mech./Elect./C&I systems such as Buildings, Control rooms, MCC/Switchgear rooms, Pump Houses, sumps, forebays, inlet/outlet channels, Valve pit/chambers and foundation for all the equipment, support pedestals and pipe trestles for over-ground piping,</p>		
<p>NTECL POWER PROJECT (3X500 MW) (Vallur Thermal Power Project – 3 X500 MW) ULTRAFILTRATION PLANT PACKAGE BIDDING DOCUMENT NO.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-A</p>	<p>Sub-Section –IID 01 CIVIL WORKS SCOPE</p>	<p>Page 3 of 5</p>

CLAUSE NO.	CIVIL WORKS SCOPE		
	<p>Cable trenches, support beams, cable slits, insert plates, etc. required for indoor/outdoor cable routing, Cable trenches, cable slits, fire walls and fencing/gates, etc.</p> <p>u) Scope of the Bidder shall also include supply and laying of 40mm dia. MS Rods as earthing mat, placed at a distance of 1.0M away and at depths between 0.60M and 1.00M, all around the periphery of buildings, structures, and outdoor equipments, as per the approved drawings. Risers of 40mm dia. MS Rods and connecting to the above Earthing mat shall also be supplied and laid in position by the Bidder, as per the approved drawings. Risers shall be laid upto a height of 300mm above the local Ground level, at each of the columns of the buildings on outside of the buildings, and minimum 2(Two) numbers for structures and outdoor equipments. Minimum four (4) nos of risers each shall be provided for control room, switchgear room and transformer foundation. The Bidder's scope shall also include supplying and laying of necessary number of 3.0M deep vertical 40mm dia. MS Rods Earthing electrodes and connecting them to the Earthing mat, as per the approved drawings and the supplying and laying of 40mm dia. MS Rods.</p> <p>v) Construction Facilities</p> <p>The following are also in the Bidder's scope of work pertaining to construction facilities for the project.</p> <p>(i.) All Civil and Structural work associated with drinking & service water including pipes, pump house, overhead tank, tube wells etc., wherever required.</p> <p>(ii.) Development of Bidder's temporary staff colony and labour colony along with fencing, etc. wherever required.</p> <p>(iii.) Bidder's temporary construction office, construction stores (open/covered), workshops, material/ field testing laboratory and any other temporary building and construction equipment, labour and materials.</p> <p>(iv.) All necessary fire fighting devices/ equipment/ fire tender etc. required for safety purpose during the project execution stage.</p> <p>(v.) All tools and tackles required for the work.</p> <p>(vi.) Bidder shall arrange skilled/ semiskilled/ unskilled labour from local sources as far as available in this country and supervisory staff for quality execution of all civil, structural and architectural works.</p> <p>(vii.) <u>Construction Water</u>: The Bidder shall make all arrangements for the supply of construction water & also potable water for labour and other personnel at the worksite/ colony. The quality of water should meet the requirements, for which it is proposed to be used. Bidder shall make his own arrangement for construction water, potable water supply. These</p>		
<p>NTECL POWER PROJECT (3X500 MW) (Vallur Thermal Power Project – 3 X500 MW) ULTRAFILTRATION PLANT PACKAGE BIDDING DOCUMENT NO.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-A</p>	<p>Sub-Section –IID 01 CIVIL WORKS SCOPE</p>	<p>Page 4 of 5</p>

CLAUSE NO.	CIVIL WORKS SCOPE		
2.01.06	<p>water supply arrangements may include tube well (if required), pump, piping, valves, overhead tanks etc.</p> <p>Scope of supply shall also include:</p> <ul style="list-style-type: none"> a) All steel/ cast iron inserts, plates, bolts, nuts, sleeves etc. to be grouted in concrete work and used to hold/ support the equipment/ system being supplied and erected under this specifications. b) Monorails, monorail girders and fixtures etc. c) All stairs, railings, walkway platform and approach / access ladders. d) Supply of foundation bolts. e) Any additional works required to make the Remineralisation System plant package. 		
2.02.00	Scope of Services		
2.02.01	Any additional civil works, equipment, materials and services, which though not specially mentioned but are required to make the system complete.		
2.02.02	As built drawing for all system/ arrangements, layout and structures.		
2.02.03	Final Painting.		
2.02.04	The contractor shall be responsible for making all connections at terminal points, and for supplying any necessary jointing material, connectors, nuts, bolts etc.		
2.02.05	Complete services as detailed in specification and tender documents elsewhere.		
<p>NTECL POWER PROJECT (3X500 MW) (Vallur Thermal Power Project – 3 X500 MW) ULTRAFILTRATION PLANT PACKAGE BIDDING DOCUMENT NO.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION-VI, PART-A</p>	<p>Sub-Section –IID 01 CIVIL WORKS SCOPE</p>	<p>Page 5 of 5</p>

PART - B

SUB-SECTION - IIID-01

CIVIL WORKS

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
<p>1.00.00</p> <p>1.01.00</p>	<p style="text-align: center;">TECHNICAL REQUIREMENTS</p> <p>GENERAL</p> <p>This specification covers design, preparation of general arrangement drawings, construction and fabrication drawings, supply of materials and construction of all civil, structural and architectural works.</p> <p>Description of various items of work under this specification and nature of work in detail are given hereinafter. Complete work under this scope is referred to as civil works. List of various civil works covered under the scope of this package is given in portion of technical specification titled “CIVIL WORKS SCOPE”.</p> <p>The work to be performed under this specification consists of design, engineering and providing all labour, materials, consumable, equipment, temporary works, temporary storage sheds, temporary labour and staff colony, temporary site offices, constructional plant, fuel supply, transportation and all incidental items not shown or specified but reasonably implied or necessary for completion and proper functioning of the plant, all in strict accordance with the specifications and including revisions and amendments thereto as may be required during execution of the work.</p> <p>All materials including cement, reinforcement steel and structural steel etc. shall be provided by the Bidder.</p> <p>The contractor shall adopt, for his site office and covered store buildings, pre-engineered/ pre-fabricated constructions made of steel with single/ double skin, insulated or uninsulated roof and wall coverings (fabricated out of permanently color coated metal sheets). Alternatively, contractor can adopt readymade ‘Porta cabin’ or similar constructions. Contractor shall ensure that all such constructions are well engineered, neatly constructed and overall present a pleasing look.</p> <p>Contractor shall establish/ set up at site suitable repair facilities for construction plant, equipment and machinery (like piling rigs, cranes, batching plant, dewatering pumps etc.). In case of piling rigs, cranes, batching plant etc. he will also make arrangements/ tie up with equipment manufacturers/ suppliers for periodic overhaul/ maintenance and for major breakdown, if any. He shall also keep adequate stock of spares at site for various plant, equipment and machinery to meet day to day requirements as recommended by the equipment manufacturer/ suppliers or as instructed by the Engineer. Contractor shall deploy dedicated qualified, full time mechanical/ electrical foreman/ supervisors for manning the repair facilities as specified above.</p> <p>The scope shall also include setting up by the Bidder a complete testing laboratory in the field to carry out all relevant tests required for the civil works for the project. Minimum facilities as specified elsewhere shall be provided by the Bidder in this laboratory.</p> <p>The work shall be carried out according to the design/ drawings to be developed by the Bidder and approved by the Employer. For all building & structures, foundations, etc., necessary layout and details are to be developed by the Bidder keeping in view statutory & functional requirements of the plant & facilities and providing enough space & access for operation, use and maintenance. Certain minimum requirements are indicated in this specification for guidance purpose only. However, the Bidder’s offer shall cover the complete functional requirements as per the best prevailing practices and to the complete satisfaction of the Employer.</p> <p>Layout and levels of all structures shall be made by the Bidder at his own cost from general grid of the plot and nearest GIS bench mark or other acceptable bench mark</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 1 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
1.02.00	<p>of govt. deptt. as per directions of the Engineer. The bidder shall give all help in providing all instruments, materials and personnel to the engineer for checking the layout and correctness of layout & levels. The Bidder shall be solely responsible for the correctness of the layout and levels.</p> <p>All the quality standards, tolerances, welding standards and other technical requirements as covered in this specification shall be strictly adhered to by the Bidder.</p> <p>The Bidder should fully appraise himself of the prevailing conditions at the proposed site, locations of adjoining facilities/ structures, climatic conditions including monsoon pattern, local conditions and site specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may not have been specifically brought out in the specifications.</p> <p>The specifications are intended for general description of work, quality and workmanship. The specifications are not however, exhaustive to cover minute details and the work shall be executed according to relevant latest Indian Standards/ IRC or IRS Specifications. In the absence of the above, the work shall be executed according to the best prevailing practices in the trade, recommendations of relevant American or British Standards or to the instructions of Engineer. The IS standards / IRC or IRS specifications to be followed are mentioned in the technical specifications attached hereto. They shall be latest edition/version of the same issued 7 days prior to the date of opening of this tender. The Bidder is expected to get himself clarified on any doubts about the specifications etc. before bidding, and the discussions recorded in writing with the Employer in respect of interpretation of any portion of this document.</p> <p>During the progress of work, the Engineer will exercise supervision of the work to ensure that the technical provisions of the contract are being followed and the work is being executed accurately and properly. However, such supervision shall in no way relieve the Contractor of the responsibility for executing the work in accordance with the specifications.</p>			
1.03.00	DELETED			
2.00.00	<p>SUBMISSIONS</p> <p>The following documents shall be submitted by the Bidder for approval of the Employer, prior to commencement of fabrication and erection / construction. This list is not exhaustive but indicative only:</p> <ol style="list-style-type: none"> a) General layout drawing with Co-ordinates of all buildings / structures and facilities in the REMINERALISATION SYSTEM PLANT package. b) Basis of design for various structures and buildings, culverts, crossings, facilities and services. c) Design calculations, General arrangement drawings and detailed erection / construction drawings including reinforcement drawings for all buildings, structures and equipment / miscellaneous foundations. d) Drawing showing underground facilities with co-ordinates of all facilities such as buried pipes, buried cables, trenches, ducts, sewers, drains, sumps, pits, culverts, foundations etc. 			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 2 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	<p>e) Drawings for all architectural works including finish schedule, colour scheme (both internal and external), doors & windows, flooring etc.</p> <p>f) Details of plumbing, drainage and sewerage.</p> <p>g) Write-up on various statutory requirements and their compliance for various buildings and facilities.</p> <p>h) All other designs, details/ drawings or any other submission as indicated elsewhere in this specification and as required by the Employer.</p> <p>i) All construction drawings shall include total quantity of concrete (gradewise), reinforcement steel (gradewise and diameterwise) and structural steel (sectionwise).</p> <p>n) Structural steel fabrication drawings and Reinforcement bar bending schedules for reference.</p> <p>o) Soft copy on CD-ROM of all final construction/ architectural and other detail drawings.</p>			
3.00.00	DESIGN CRITERIA			
3.01.00	General			
3.01.01	All structures and buildings including storage & equipment area, sheds with RCC / Corrugated metal deck roof, pump houses, MCC rooms, Control rooms, tanks etc. culverts, bridges, water retaining/ carrying structures and various other works including water supply, drains, sewers, disposal of soil etc. are covered in this specification.			
3.01.02	Structures shall be designed for the most critical combinations of dead loads, imposed loads, equipment loads, crane loads, piping loads (static and dynamic), wind loads, seismic loads and temperature loads. In addition, loads and forces developed due to differential settlement shall also be considered.			
3.02.00	Loading			
3.02.01	Dead Loads			
	Dead loads shall include the weight of structure complete with finishes, fixtures and partitions and shall be taken as per IS: 875 (Part - I).			
3.02.02	<p>Imposed Loads</p> <p>Imposed loads in different areas shall include live, erection, operation and maintenance loads. Equipment loads (which constitute all loads of equipment to be supported on the building frame) are not included in the imposed loads furnished below and shall be considered in addition to imposed loads.</p> <p>For consideration of imposed loads on structures, IS: 875 (Part – II) “Code of practice for design loads (other than earthquake) for buildings & structures” shall be followed. The following minimum imposed loads as indicated for some of the important areas shall, however, be considered for the design. If actual expected load is more than the specified minimum load, then actual load is to be considered.</p>			
NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE	BID DOC. NO. CS-0260-132G-2	TECHNICAL SPECIFICATIONS SECTION VI, PART-B	Sub Section IIID-01 Civil Works	Page 3 of 54

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
3.02.03	<p>(a.) Pump House</p> <p>(1) Operating Floor 1.50 ton/ Sq.m.</p> <p>(2) Maintenance Area 3.00 ton/ Sq.m</p> <p>(b.) Underground Structures such as Channels, Underground Sump, Trenches, Drains etc.</p> <p>In addition to earth pressure and ground water pressure, the surcharge load of 2.5T/sq.m. shall also be considered for design of all underground structures.</p> <p>(c.) Road Culverts and its allied structures including RCC Pipe Crossings & Road Crossings of Trenches</p> <p>Design for class 'AA' loading (wheeled & tracked both) and checked for class 'A' loading as per IRC Standards.</p> <p>(d.) Covers for Channels/ Trenches 0.40 ton/ Sq.m (General)</p> <p>As per IRC Standard (at road crossings for vehicular traffic).</p> <p>(e.) Rail Culverts As per Railway 'Bridge Rules'</p> <p>(f.) General (Unless Specified Otherwise)</p> <p>(1) Stairs, Landings and Balconies. 0.50 ton/ Sq.m</p> <p>(2) Toilets 0.20 ton/ Sq.m</p> <p>(3) Chequered plates, grating floors etc. 0.50 ton/ Sq.m</p> <p>(4) RCC floors (General) outdoor platforms 0.50 ton/ Sq.m</p> <p>(5) Roofs 0.15 ton/ Sq.m</p> <p>(6) Walkways (General) 0.30 ton/ Sq.m</p> <p>(7) Floor of Switch gear building 1.00 ton/ Sq.m</p> <p>(8) Ground floor 2.5 ton / Sq.m</p> <p>(g.) Roads As per IRC and MOST</p> <p>Equipment loads</p> <p>Loads of all equipment like pumps (static & dynamic), butterfly valves, Electrical control and relay panels, Cable load, Pipe load (static and dynamic), Tanks, etc. shall be considered over and above the imposed loads.</p>			
3.02.04	<p>Crane Loads</p> <p>For crane loads, an impact factor of 25% and lateral crane surge of 10% (of lifted weight & trolley weight) shall be considered in design along with other provisions of IS : 875. The longitudinal surge shall be 5% of the static wheel load. For monorails an impact factor of 1.5 shall be considered.</p>			
NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE	BID DOC. NO. CS-0260-132G-2	TECHNICAL SPECIFICATIONS SECTION VI, PART-B	Sub Section IIID-01 Civil Works	Page 4 of 54

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS				
3.02.05	<p>Wind Load</p> <p>For design of all structures, the wind loads shall be taken as specified in Annexure-D of "Project Information" of this specification.</p>				
3.02.06	<p>Seismic Load</p> <p>Seismic forces shall be considered as specified in Annexure-C of "Project Information" of this specification. Response spectrum method shall be used for the seismic analysis using at least first five modes of vibration.</p>				
3.02.07	<p>Temperature Load</p> <p>For temperature loading, the total temperature variation shall be considered as 2/3 of the average maximum annual variation in temperature. The average maximum annual variation in temperature for this purpose shall be taken as the difference between the mean of the daily minimum ambient temperature during the coldest month of the year and mean of daily maximum ambient temperature during the hottest month of the year. The structure shall be designed to withstand stresses due to 50% of the total temperature variation.</p> <p>Suitable expansion joints shall be provided in the longitudinal direction wherever necessary. The maximum distance of the expansion joint shall be as per the provisions of IS: 800 and IS: 456-2000 for steel and concrete structures respectively.</p>				
3.02.08	<p>Increase in permissible stresses</p> <p>The increase in permissible stress of materials and soil bearing pressure for different load combinations under wind, seismic and temperature loads shall be as per relevant IS Codes.</p>				
3.03.00	<p>Design Concepts</p>				
3.03.01	<p>i) All buildings shall have framed super structure.</p> <p>ii) Buildings with sheds shall not have brick cladding. However, kerb wall shall be provided around the plinth/ floor area above the Finished Floor Level (FFL). For other buildings brick wall cladding on exterior face shall be provided.</p> <p>iii) Unless specified, the wall cladding shall be with minimum one brick thick on exterior face.</p>				
3.03.02	<p>Individual members of the frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion, etc.</p>				
3.03.03	<p>The different load combinations shall be taken as per IS: 875 (Part-V) and other relevant IS Codes.</p> <p>(a.) Wind and seismic forces shall not be considered to act simultaneously.</p> <p>(b.) For the design of buildings during seismic condition, the water tanks on the roof shall be considered full upto operating level. However, for other load combinations, water tank on the roof in flooded condition shall be considered.</p>				
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>		<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 5 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
3.03.04	<p>(c.) 'Lifted load' of crane shall not be considered during seismic condition.</p> <p>The design of steel structures shall be done by working stress method. Design and fabrication shall be as per provisions of IS: 800 and other relevant IS standards. Flanges and web of crane girder and monorail hoist beams should not have any joints between the supports.</p>			
3.03.05	<p>Welding shall be used for fabrication and joints. For site connections, welding or High Strength Friction Grip (HSFG) bolts shall be used. In few cases, for shear connections or removable beam connections, bolted joints with M.S. black bolts may be adopted. IS: 4000 shall be followed for HSFG bolt connection. IS: 816 and IS: 9595 shall be followed for welding of structures.</p>			
3.03.06	<p>All structures close to railway line shall have clearances conforming to Railway norms.</p>			
3.03.07	<p>a) Dispersion of load in any direction through soil shall be as per IS: 8009 (relevant part)</p> <p>b) Dispersion of load through concrete shall be considered at an angle of 45 degree with horizontal from the edge of contact area.</p>			
3.03.08	<p>The design and construction of RCC structures shall be carried out as per IS: 456 - 2000. Working stress method shall be adopted for the design wherever specifically mentioned in this specification. Generally limit state method as per IS: 456 shall be used with crack width control limited to 0.2mm under serviceability limit state.</p> <p>For reinforcement detailing, IS: 5525 and SP: 34 shall be followed.</p> <p>Two layers of reinforcement (on inner and outer face) shall be provided for RCC wall sections having thickness more than 150mm.</p>			
3.03.09	<p>For design of all underground structures / foundations, ground water table shall be considered at the finished ground level.</p> <p>All liquid retaining structures, except RW Pump House pump sump and forebay, shall be designed for following load conditions.</p> <p>Underground structures:</p> <p>(a.) Water filled inside up to design level and no earth outside.</p> <p>(b.) Earth pressure with surcharge of 2.5 t / m² and ground water table upto FGL outside and no water inside.</p> <p>(c.) Stability against uplift shall be checked for completed structure and under construction stage with no water inside and ground water table up to FGL, with a minimum factor of safety of 1.20 against uplift. Installation of pressure relief valves shall not be permitted in the base slab of any liquid retaining / conveying structure</p> <p>(d.) The structure shall also be checked for normal working condition with water filled inside up to design level and earth pressure outside with no effect of surcharge and ground water table.</p> <p>For design of over - ground liquid retaining structures appropriate load cases shall be considered.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 6 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS																					
3.03.10	DELETED																					
3.03.11	<p>In design of counterfort retaining walls of underground liquid retaining structures (counterfort provided outside i.e. towards earth side), following shall be considered.</p> <p>Under load combination producing tension on outer face of counter fort (i.e. face in contact with earth) the section shall be designed for cracked conditions with permissible steel stresses as per IS : 3370 (Part - II). Inside face (face in contact with liquid) shall be designed for uncracked conditions. However walls of the liquid retaining structures shall be designed for uncracked conditions for tension on either face.</p>																					
3.03.12	<p>For load condition with earthquake / wind forces, column / beams with minimum thickness / depth of 450mm and acting as a part of liquid retaining structure may be designed by limit state method, as per IS : 456, with Partial Safety Factor for loads equal to 1.5 for all load cases considered in such load combinations.</p>																					
3.03.13	<p>The minimum concrete clear cover to Reinforcement bars in all RCC structures shall not be less than stipulated below.-</p> <table border="0"> <tr> <td style="padding-left: 20px;">i)</td> <td style="padding-left: 20px;">Slab</td> <td style="padding-left: 20px;">40 mm</td> </tr> <tr> <td style="padding-left: 20px;">ii)</td> <td style="padding-left: 20px;">Beam</td> <td style="padding-left: 20px;">40 mm or dia of main reinforcement whichever is greater</td> </tr> <tr> <td style="padding-left: 20px;">iii)</td> <td style="padding-left: 20px;">Foundation / base slab</td> <td style="padding-left: 20px;">All faces - 75 mm.</td> </tr> <tr> <td style="padding-left: 20px;">iv)</td> <td style="padding-left: 20px;">Columns (below and above ground level)</td> <td style="padding-left: 20px;">50 mm</td> </tr> <tr> <td style="padding-left: 20px;">v)</td> <td style="padding-left: 20px;">Sump / pit walls</td> <td style="padding-left: 20px;">40 mm on liquid face & 40 mm on soil face.</td> </tr> <tr> <td style="padding-left: 20px;">vi)</td> <td style="padding-left: 20px;">Walls above ground</td> <td style="padding-left: 20px;">40 mm on either face.</td> </tr> </table>				i)	Slab	40 mm	ii)	Beam	40 mm or dia of main reinforcement whichever is greater	iii)	Foundation / base slab	All faces - 75 mm.	iv)	Columns (below and above ground level)	50 mm	v)	Sump / pit walls	40 mm on liquid face & 40 mm on soil face.	vi)	Walls above ground	40 mm on either face.
i)	Slab	40 mm																				
ii)	Beam	40 mm or dia of main reinforcement whichever is greater																				
iii)	Foundation / base slab	All faces - 75 mm.																				
iv)	Columns (below and above ground level)	50 mm																				
v)	Sump / pit walls	40 mm on liquid face & 40 mm on soil face.																				
vi)	Walls above ground	40 mm on either face.																				
3.03.13	<p>Suitable additional reinforcement and shear keys shall be provided at all construction joints in the wall of liquid retaining structures.</p>																					
3.03.14	<p>Factor of safety against overturning and sliding</p> <p>The structure shall be checked for minimum factor of safety of 1.5 against overturning conditions (ratio of stabilizing moment to overturning moment) and sliding conditions (ratio of horizontal frictional resistance to horizontal sliding force) under static loads. To ensure an adequate factor of safety under earthquake conditions, the factor of safety against sliding shall not be less than 1.2.</p>																					
3.03.15	<p>For detailing of Reinforcement IS: 5525, IS: 13920, IS: 4326 and SP: 34 shall be followed.</p>																					
3.03.16	<p>Two layers of reinforcement (on inner and outer face) shall be provided for RCC sections having thickness of 150 mm and above.</p>																					
3.03.17	<p>Minimum diameter of main and distribution Reinforcement bars in different structural elements shall be as follows::</p> <table border="0"> <thead> <tr> <th style="text-align: center;">Sl. No.</th> <th style="text-align: center;">Structural Element</th> <th style="text-align: center;">Main Reinforcement</th> <th style="text-align: center;">Distribution Reinforcement / Anchor Bars</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">a)</td> <td style="text-align: center;">Foundation</td> <td style="text-align: center;">12 mm</td> <td style="text-align: center;">12 mm</td> </tr> </tbody> </table>				Sl. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Anchor Bars	a)	Foundation	12 mm	12 mm										
Sl. No.	Structural Element	Main Reinforcement	Distribution Reinforcement / Anchor Bars																			
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<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>		<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 7 of 54</p>																	

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	b)	Beams	12 mm	10 mm
	c)	Columns	12 mm	-
3.03.18	Spacing of reinforcement bars in walls and slabs of liquid retaining / conveying structures shall not be more than 200 mm.			
3.03.19	Suitable shrinkage reinforcement shall be provided at top face of foundations. Minimum shrinkage reinforcement shall be 10 mm dia. @ 200mm c / c.			
3.03.20	Minimum Reinforcement in all elements of liquid retaining / conveying structures shall be 0.24 % of cross sectional area.			
3.03.21	Minimum tensile Reinforcement in each direction for all foundation slabs / rafts shall be 0.2% of cross sectional area.			
3.03.22	Minimum thickness of foundation slab / raft and base slab of all liquid retaining tanks / pits/ vessel foundation slab/ lime vessel foundation slab shall not be less than 250 mm.			
3.03.23	Minimum thickness of all elements of RCC liquid retaining / conveying structures (except effluent drains, launders and aerator waste slab) shall be 200mm. Effluent drains (depth more than 500mm), aerator waste slab and launders shall have minimum element thickness of 150mm.			
3.03.24	All Insert plates (except edge protection angles) provided in liquid retaining structures shall be 12 mm thick GI with lugs not less than 12 mm diameter. Edge protection angles shall be provided as specified elsewhere.			
3.03.25	All water retaining structures shall be tested for water tightness as per provisions of IS: 3370 and IS: 6494.			
3.03.26	Storm water drainage shall be designed taking into account the finished grade level of the surrounding area, area drainage pattern around the area, intensity of rainfall etc. The maximum velocity for pipe drains and open drains shall be limited to 2.4m/ sec and 1.8 m/ sec. respectively. However, minimum velocity of 0.6m/ sec. for self cleansing shall be ensured. Bed slope not milder than 1 in 1000 shall be provided. Maximum rainfall intensity for design of drain shall be in line with the provisions given elsewhere in this specification.			
3.03.27	Sewers shall be designed for a minimum self cleansing velocity of 0.75m/ sec and the maximum velocity shall not exceed 2.4m/ sec.			
3.03.28	Surplus excavated earth shall be disposed as directed by the Engineer.			
3.03.29	All roads shall be designed for class 'E' of traffic intensity of 450-1500 per day (heavy vehicles exceeding 3 tonnes laden weight) as per IRC: 37-1984 "Guidelines for the design of flexible pavements". The road shall be designed for 30 years of life and considering a minimum traffic growth of 1%.			
3.03.35	<p>Architectural Concepts</p> <p>All buildings, control rooms, shall be architecturally treated in such a way that it retains a monumental scale, yet presents a pleasing composition of mass and void with suitable and functionally designed projections and recesses. The overall impact</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 8 of 54</p>

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	<p>of the building shall be one of aesthetically unified architectural composition having a comprehensive scale, bending tonal values with the surroundings and taking full consideration of the climatic conditions and the building orientation. All the buildings shall be architecturally treated in such a way so as to be in harmony with the surroundings. The over all composition may have straight or curvilinear profiles.</p> <p>Necessary projections, fins, parapets, chajjas etc. in addition to the minimum area specified elsewhere in this specification shall be provided as required.</p> <p>Nothing extra shall be payable for any changes required while getting the drawings / scheme approved and for executing the same.</p> <p>All buildings and structures shall be designed as per provisions of National Building Code and Local building by - laws as applicable including provisions of the Factories Act of the State concerned, with regard to requirement of free access, stairs, minimum head room, walkways, ventilation, toilets etc. and safety requirements like railings, fire escapes etc. Further all layouts and detailed drawings shall meet the relevant statutory requirements specified in recommendations of Tariff Advisory Committee, Petroleum act, Explosives act and Indian Electricity rules' as applicable.</p>			
4.00.00	FINISHING SCHEDULE			
4.01.00	Flooring			
4.01.01	The nominal total thickness of floor finish shall be 50mm i.e. underbed & topping. The floor shall be laid on an already laid and matured concrete base. The underbed for floors and similar horizontal surfaces shall consist of cement concrete (1 part cement, 2 part sand and 4 part stone chips by volume), Stone chips shall be 12.5mm down well graded.			
4.01.02	Sunken RCC slab shall be provided in false flooring area and toilet area so as to keep the finished floor level of these areas same as that of the surrounding area.			
4.01.03	Wherever specified metallic hardener topping shall be 12mm thick using uniformly graded iron particles, properly treated.			
4.01.04	Wherever specified Heavy duty ceramic tiles of size 300x300x7 mm thick (minimum) of reputed manufacturer (Kajaria, Spartek or equivalent) of approved finish shade and colour to be used. The tiles shall have a scratch resistance of minimum 5 no. Mohr's scale and shall have a bending strength of 350 kg/ sq.cm.			
4.01.05	Skirting in general shall be 150mm high, Dado in toilet shall be upto specified height from finished floor level. Skirting and Dado shall match with the floor finish. Sunken RCC slab shall be provided in toilet area at upper storey so as to keep the floor level same as that of the surrounding area.			
4.01.06	<p>Floor finish & skirting:</p> <p>The nominal thickness of floor finish shall be 50 mm.</p> <p>(1) Floors of toilets, pantries / kitchen, office rooms, laboratories, control rooms, MCC rooms and A / C areas shall be finished with 7mm thick heavy duty vitrified ceramic tiles (matt finish) of approved make, size & colour shade .</p> <p>(2) Suitable supporting arrangement shall be provided with M.S. angles / channels on cable trenches in MCC and Control rooms for mounting Control panels / MCC.</p>			
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4.01.07	<p>(3) Well - polished 20mm thick Kota stone flooring shall be provided for staircases, passages, lobbies and general circulation areas.</p> <p>(4) IPS (Cement concrete flooring) with metallic hardener topping shall be provided in rest of the other areas.</p> <p>(5) Floors and sides of under ground RCC structures like valve pits, trenches and tanks shall have simultaneous (integral) neat cement finish at the time of concreting.</p> <p>(6) The interconnecting walkway between various buildings and facilities shall be finished with 22 mm chequered concrete tiles at top.</p> <p>(7) Skirting shall be minimum 150 mm high and shall match with floor finish.</p> <p>Acid / Alkali Resistant Treatment:</p> <p>Acid / alkali resistant lining treatment shall be provided in different areas as follows:</p> <p>Neutralization Pit : The walls shall be provided with one coat of bitumen primer, followed by 18 mm thick bitumastic layer, 115 mm thick A.R. bricks, 6 mm thick under bed of potassium silicate mortar, pointing the joints of bricks with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing. Suitable pilasters shall be provided with A.R. bricks at regular intervals depending upon the height of lining, as per the specification.</p> <p>The floor of neutralization pit shall be provided with acid / alkali resistant lining treatment as given in the above para, except that the 115 mm thick A.R.tile layer shall be replaced by 75 mm thick A.R. tile layer and pilasters shall be omitted.</p> <p>The ceiling of neutralization pit shall be provided with one coat of epoxy primer followed by 2 coats of epoxy paint (150 micron).</p> <p>Acid / Alkali storage area / projections above the floor, pedestals projecting from the floor / saddles. : The floor shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick under - bed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar up to a depth of 20 mm and bitumastic end sealing. Dado of 1.0M high with above treatment shall also be provided if applicable in case of walls nearby.</p> <p>Alum/Lime Storage area/Lime bed vessels area: One coat of bitumen primer followed by 12mm thick bitumastic layer, 20 mm thick A.R. tiles, 6 mm thick underbed of potassium silicate mortar, 6mm thick pointing of joints of tiles with acid /alkali resistant epoxy /furane mortar up to a depth of 20 mm and bitumastic end sealing.</p> <p>Alum solution preparation tank (if applicable): The wall shall be provided with one coat of bitumen primer followed by 12 mm thick bitumastic layer, 75 mm thick A.R. tiles, 6 mm thick underbed by potassium silicate mortar, 6mm thick pointing of joints of tiles with acid / alkali resistant epoxy / furane mortar upto a depth of 20 mm and bitumastic end sealing.</p>			
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	<p>The floor shall be provided with acid / alkali resistant lining treatment as given in the above para except that the 75 mm thick A.R. tile layer shall be replaced by 12 mm thick A.R. tile layer.</p> <p>Basket of Alum solution preparation tank(if applicable): 5 mm thick epoxy lining over a coat of epoxy primer.</p> <p>Curved surfaces of saddles shall have minimum 12 MM thick bitumastic layer to support the vessel / tanks.</p> <p>Effluent Drains: Acid Resistant lining treatment indicated for the storage area shall be provided on the bed as well as walls of the drains with 38 MM AR tiles. The underside of the pre-cast slab cover shall be applied with one coat of epoxy primer and two coats of epoxy coating, total DFT 150 microns.</p>				
4.02.00	Roof				
4.02.01	<p>a) Roof over buildings/ structures as applicable shall have cast - in - situ RCC slab.</p> <p>b) Roof consisting of permanently colour coated metal decking as roof decking shall consist of steel feed material of minimum bare metal thickness of 0.8mm (i.e. excluding thickness of coating and galvanizing), galvanized to grade 275 (minimum) as per IS : 277 of minimum yield strength of 250 MPa of drawing grade as per IS :513, colour coated total minimum coating thickness of 35 microns (nominal) comprising of Silicon Modified Polyester (SMP with silicon content of 30% to 50%) paint of minimum 20 microns(nominal) Dry Film Thickness (DFT) on one side over 5 micron (nominal) primer coat and 5 micron (nominal) SMP over 5 micron (nominal) primer coat on back surface (SMP shall be of category 3 of AS2728), and approved profile, sectional properties (suitable for the specified loading / deflection and purlins / runner spacing). Fasteners shall be of specialized coating tested for 1000 hours salt spray test and conforming to Class 3 of AS3566. RCC slab of minimum 50mm thickness shall be provided over the metal decking.</p>				
4.02.02	<p>For efficient disposal of rain water, the run off gradient for the roof shall not be less than 1:100. This gradient can be provided either in structure or subsequently by screed concrete M-15 (using 12.5 mm coarse aggregate) and/ or cement mortar (1:4). However, minimum 25 mm thick cement mortar (1:4) shall be provided on top to achieve smooth surface.</p>				
4.02.03	<p>Roof water proofing treatment shall be provided using high solid content liquid applied elastomeric water proofing membrane with separate wearing course as per ASTM C - 898. Thickness of the membrane shall be 1.5 mm. This treatment shall include application of polymerised mastic over the roof to achieve smooth surface and primer coat. Wearing course on the top of membrane shall consist of 25 mm thick PCC (M-15) cast in panels of maximum 1.2x1.2m size and reinforced with 0.55 mm dia. galvanised chicken wire mesh and sealing of joints using sealing compound/ elastomeric water proofing membrane. Pathways for handling of materials and movement of personnel shall be provided with 22 mm thick chequered cement concrete tiles as per IS: 13801 for width of 1000 mm in place of PCC. Slope of the roof shall not be less 1 in 100.</p>				
4.02.04	<p>Medium class galvanised mild steel pipes conforming to IS: 1239/ IS: 3589 with welded joints shall be provided for rain water downcomers to drain off rain water</p>				
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	<p>from the roof. These shall be suitably concealed with masonry work, to match with the exterior finish. The number and size of downcomers shall be governed by IS: 1742 and IS: 2527. RCC roof shall be provided with 45 x 45 cm size Khurras having minimum thickness of 30 mm with M-15 concrete over PVC sheet of 1mx1mx400micron and finished with 12 mm thick cement sand plaster 1:3.</p>			
4.02.05	<p>Roof of all buldings / structures shall be provided with access through ladder.</p>			
4.02.06	<p>RCC parapet wall of minimum 900 mm height for all accessible roofs and 600 mm height for all non - accessible roofs shall be provided.</p>			
4.02.07	<p>The permanently colour coated sheets used for metal deck and exposed roof and metal cladding shall meet the general requirements of IS:14246 and shall conform to Class 3 for durability</p>			
4.02.08	<p>Fillets at junction of roof and vertical walls shall be provided with cast - in - situ cement concrete (M-15) nominal mix followed by 12 mm thick 1:4 cement sand plaster.</p>			
4.02.09	<p>The rainwater down comers shall be provided with suitable C.I. grating at inlet point.</p>			
4.03.00	<p>Walls</p>			
4.03.01	<p>All walls shall be non-load bearing infilled panel walls. External wall shall be minimum one brick thick masonry wall.</p>			
4.03.02	<p>All internal walls shall be with brick masonry and all toilets shall be provided with minimum one brick thick masonry walls.</p>			
4.03.03	<p>For all air conditioned areas/ rooms, wherever metal cladding is envisaged as cladding material, additional brick masonry wall (230m thick) shall also be provided in addition to metal cladding for effective air conditioning. This brick wall shall be plastered & painted as specified elsewhere in the specification.</p>			
4.03.04	<p>RCC transoms and mullions of size 115x115mm with suitable reinforcement shall be provided wherever necessary to reinforce the brickwork.</p>			
4.03.05	<p>50 mm thick DPC in Cement concrete (M-20) with water proofing compound followed by two layers of bitumen coating 85/ 25 grade as per IS: 702 @ 1.7 kg/ sq.m. shall be provided at plinth level before starting the masonry work.</p>			
4.03.06	<p>The bricks used shall be of minimum class designation 75. The bricks shall be laid with cement mortar (1:6) for one brick thick walls and (1:4) for half brick thick walls IS: 1905, IS: 2212 and SP -- 20 shall be followed for brick work design and construction.</p>			
4.03.07	<p>External metal cladding wherever required shall consist of troughed permanently colour coated sheet for side sheeting, covering of exposed metal/ concrete/ brick surfaces, having steel feed material of minimum bare metal thickness of 0.6mm (i.e. excluding galvanizing and colour coating) using cold rolled galvanized (to Grade 275 minimum as per IS :277) of minimum yield strength 250 MPa and of drawing Grade as per IS : 513, coated with Zinc Aluminium alloy @ 150 gm/Sq.M as per AS1397, colour coated to total minimum coating thickness of 35 microns (nominal) comprising of Silicon Modified Polyester (SMP with silicon content of 30% to 50%) paint of minimum 20 microns (nominal) Dry Film Thickness (DFT) on one side over 5 micron</p>			
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<p>4.04.00</p> <p>4.04.01</p> <p>4.04.02</p> <p>4.04.03</p> <p>4.04.04</p> <p>4.04.05</p> <p>4.05.00</p> <p>4.05.01</p> <p>4.05.02</p> <p>4.05.03</p> <p>4.05.04</p> <p>4.05.05</p>	<p>(nominal) primer coat and 5 micron (nominal) SMP over 5 micron (nominal) primer coat on back surface (SMP shall be of category 3 of AS2728), and approved profile, sectional properties (suitable for the specified loading/ deflection and runner spacing). Fasteners shall be of specialized coating tested for 1000 hours salt spray test and conforming to Class 3 of AS3566. All sheds shall have side sheeting on complete side faces of sheds to prevent the ingress of rain water, dust etc.</p> <p>Plastering</p> <p>External (rough) surface of walls shall be plastered with 18 mm thick cement plaster, consisting first (base) layer of 12 mm thick plaster in cement sand mortar (1:6) and second (finishing) layer of 6 mm thick plaster in cement sand mortar (1:4).</p> <p>The internal (smooth) surface of walls shall have 12 mm thick plaster in cement sand mortar (1:6).</p> <p>All RCC ceilings shall have plaster with 6 mm thick plaster in cement sand mortar (1:4).</p> <p>All external / internal RCC surfaces including RCC parapet walls shall be provided with minimum 12mm thick plaster in cement sand mortar (1:4) except walls of underground structures like cable trenches / valve pits etc.</p> <p>Air-conditioned areas, the plaster of paris (Gypsum Anhydrous) conforming to IS: 2547 shall be used for plaster of paris punning. The finish surface shall be smooth and shall be of 2 mm nominal thickness. All other areas shall be provided with 2mm thick neat lime punning over plastered surface.</p> <p>All exposed faces of R.C.C. walls of buildings shall have minimum 12 mm thick cement sand plaster 1:6.</p> <p>All RCC ceilings (except areas provided with false ceilings and cable vault ceiling) shall be provided with 6 mm thick cement sand plaster 1:4.</p> <p>All plastering work shall conform to IS: 1661.</p> <p>Painting</p> <p>All painting on masonry or concrete surface shall preferably be applied by roller. If applied by brush then same be finished off with roller.</p> <p>All paints shall be of approved make including chemical resistant chlorinated rubber paint.</p> <p>Minimum two finishing coats of paint shall be applied over a coat of primer.</p> <p>The thinner shall not be used with textured paint (Sandtex Matt or equivalent) finish.</p> <p>Internal Finish</p> <p>Acrylic emulsion paint shall be as per IS: 5411 (Part - 1). Oil bound distemper shall be as per IS: 428. Air - conditioned areas shall be applied with minimum 2 coats of acrylic emulsion paint. All other areas shall be applied with minimum 2 coats of oil bound distemper.</p>	<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 13 of 54</p>

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4.05.06	<p>Toilet, Pantry / Kitchen areas shall have dado with 5mm thick vitrified ceramic tiles (matt finish) upto 2.2 m height and shall match with floor finish. Above dado, oil bound distemper shall be applied.</p> <p>Areas coming in contact with chlorine fumes or acid / alkali shall have two coats of acid / alkali resistant chlorinated rubber paint over suitable primer.</p> <p>The paint shall be of approved colour shade and make.</p> <p>External Wall Finish</p> <p>Water proof textured cement paint (Sandtex matt or equivalent) with a combination of resin bonded granular finish (Vineratext or equivalent) shall be applied on external faces of buildings. This combination shall generally be in the proportion of 3 : 1.</p> <p>Toe wall of chain link fencing shall be provided with two coats of water proof cement paint.</p> <p>The finish shall be of approved colour shade and make.</p>			
4.05.07	<p>Ceiling Finish</p> <p>Ceiling shall have Three (3) coats of white wash.</p>			
4.05.06	<p>Fire resistant transparent paint (conforming to IS: 162) shall be provided on all wood work over French polish or flat oil paint. French polish shall conform to IS: 348. Flat oil paint shall conform to IS: 1237.</p>			
4.05.07	<p>For painting on concrete, masonry and plastered & surface, IS: 2395 shall be followed. For painting on steel work and ferrous metals, IS: 1477 shall be followed. For painting on wood work IS: 2338 shall be followed.</p>			
4.06.00	Doors, Windows, Ventilators, Louvers, Rolling Shutters & Glazing			
4.06.01	<p>Adequate Doors, Windows, Louvers and Ventilators shall be provided for proper lighting and ventilation of all buildings. The area of windows shall be at least 10% of the floor area of the respective building. In addition to the above, wherever room height is more than 3.5 m, a band of ventilators of 600 mm height (minimum) shall be provided at the top.</p>			
4.06.02	<p>Unless specified all doors, windows and ventilators of air conditioned areas, entrance lobby of all buildings and windows/ ventilators provided on the outer face of all buildings shall have electro colour coated (anodized) aluminium frame work with glazing. All doors of office and toilet areas shall be of factory made pre - laminated particle board (MDF exterior grade). All other doors (unless otherwise specified) shall be of steel.</p>			
4.06.03	<p>All steel doors shall consist of double plate flush door shutters. The door shutter shall be 45 mm thick with two outer sheets of 18 G rigidly connected with continuous vertical 20 G stiffeners at the rate of 150 mm centre to centre. Side, top and bottom edges of shutters shall be reinforced by continuous pressed steel channel with minimum 18 G. The door shall be sound deadened by filling the inside void with mineral wool. Doors shall be complete with all hardware and fixtures like door closer, tower bolts, handles, stoppers, aldrops, etc.</p>			
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4.06.04	Steel windows and ventilators shall be as per IS: 1038.			
4.06.05	Wherever functionally required, rolling shutters of suitable size approved by the Employer, with suitable operating arrangement manual/ electric shall be provided to facilitate smooth operations. Rolling shutters shall conform to IS: 6248.			
4.06.06	All windows and ventilators shall be provided with suitable anodised aluminum grill.			
4.06.07	Fire proof doors with panic devices shall be provided at all fire exit points as per the recommendations of Tarrif Advisory committee (TAC). These doors shall generally be as per IS: 3614 (Part – I and Part – II). Fire rating of the doors shall be as per TAC requirements. However minimum rating shall be 2 hours. These doors shall be double cover plated type with mineral wool insulation.			
4.06.08	Hollow excluded Section of minimum 3 mm wall thickness as manufactured by INDAL or equivalent shall be used for all aluminium doors, windows and ventilators.			
4.06.09	Toilet and office area shall have pre - laminated (MDF Exterior grade) pressed teak wood particleboard wooden flush doors. Control room and all air - conditioned rooms / areas shall have coloured anodised Aluminum door / partitions. All other doors except at main entrance shall have MS double plate flush shutters. All doors except Aluminium doors shall have pressed steel door frames - type - D.			
	Main entrance door of all the buildings shall be of Aluminium in coloured anodised aluminium frame work and glazing.			
4.06.10	All windows on ground floor shall be provided with fixed M.S. grill of approved design.			
4.06.11	The door and window frames shall be suitable for glazing. Aluminium doors and partitions shall be provided with minimum 5.5mm thick clear float glass glazing. All accessible windows and ventilators shall be provided with minimum 4mm thick clear float glass glazing. However windows in toilet areas shall have 6mm thick ground glass glazing. Windows and ventilators at inaccessible locations shall have transparent, fire retardant and U.V resistant polycarbonate sheet glazing.			
4.06.12	Doors and windows on external walls shall be provided with sunshade over the openings with width 600 mm more than the opening width. The projection from the finished face of the wall for sunshade shall generally be 450 mm over window openings & 750 mm over door openings or as decided and approved by the Engineer.			
4.06.10	Ground glass of minimum 4 mm thickness shall be used for all windows/ ventilators in toilets.			
4.06.11	Unless specified otherwise in this specification minimum thickness of plain sheet glass used for windows/ ventilators shall be 4 mm.			
4.06.12	Float glass or flat transparent sheet glass shall conform to IS: 2835.			
4.06.13	All glazing work shall conform to IS: 1083 and IS: 3548.			
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5.00.00	WATER SUPPLY, DRAINAGE AND SANITATION																											
5.01.00	Polyethylene water storage tank conforming to IS: 12701 shall be provided (for the use of toilet) over the roof, with adequate capacity depending on the number of users and 8 hours requirement complete with all fittings including float valve, stop cock etc. The capacity of tank shall be minimum 500 litres.																											
5.02.00	Galvanised MS pipe of medium class conforming to IS: 1239 shall be used for internal piping works for potable water supply.																											
5.03.00	Sand C.I. pipes with lead joints conforming to IS: 1729 shall be used for sanitary works above ground level.																											
5.04.00	One toilet each shall be provided in Chemical House, Desalination building, Office room and all Control rooms.																											
5.05.00	The facilities provided in the toilet block shall depend on the number of users. However, minimum facilities to be provided shall be as stipulated below. IS: 1172 shall be followed for working out the basic requirements for water supply, drainage and sanitation. In addition, IS: 2064 and IS: 2065 shall be also be followed.																											
5.06.00	<p>Each toilet block shall have the following minimum facilities. Unless specified all the fittings shall be of chromium plated brass (fancy type).</p> <p>The common toilet area shall have finished floor level at 15 mm below the finished floor level of surrounding area.</p> <p>Following minimum fittings & fixtures together with associated plumbing works shall be provided as specified below.</p>																											
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
5.07.00	Sl. No.	Type of Fitting / Fixtures	Toilet	
		(cylindrical/vertical) molded seamless type		
	ix)	Eye and face fountain with receptacle, automisers, flow compensators, stay open valve & other requisite fittings	1 No.	
	<p>One No. drinking water connection with C.P. brass valve for fixing water cooler by Employer.</p> <p>Required plumbing work from Employer's service water terminal point to the service water tank and from tank to the toilet accessories mentioned above.</p> <p>Required plumbing work from Employer's potable water terminal point to the drinking water tank and from tank up to the water coolers.</p> <p>Janitor room.</p> <p>Provision for installation of water cooler.</p>			
5.08.00	<p>All buildings, liquid storage tanks & sumps shall be provided with peripheral open surface brick drains of minimum size 200 mm (width) x 300 mm (average depth) all around periphery and suitably connected to nearest Employer's drain. Overflow and drains from storage tanks shall be laid to and suitably connected to Owner's open surface drains.</p> <p>The other storm water drains to be provided in the area shall have suitable size & bed slope as per the design requirements for effective disposal of storm water run - off.</p>			
5.08.00	<p>The sewerage and waste water disposal system shall consist of providing all associated plumbing and underground pipe works together with all fittings and fixtures and inclusive of ancillary works such as connections, manholes and inspection chambers, including connection to Employer's nearest main sewer line or as directed by Engineer. If required, R.C.C. septic tank and soak pit of required capacity shall be provided by the Bidder.</p>			
6.00.00	<p>MISCELLANEOUS ARCHITECTURAL ITEMS</p> <p>(a.) In all buildings suitable arrangement with provision of floor traps for draining the water collected from leakage, floor washing, fire fighting etc. shall be provided on all floors which shall be connected to rain water downcomers.</p> <p>(b.) Wherever required minimum 900 high hand railing with 32 NB M.S. pipes medium class as per IS : 1239 shall be provided, with toe & knee rail and toe guard plate, around all floor / roof openings, around periphery of Neutralisation Pit, projections of balconies, walkways, platforms, steel staircase etc. All handrail pipes, ladders and rungs shall be galvanised as per specifications.</p> <p>(c.) However for RCC staircases in buildings, railings with 20 mm square MS bar balustrades with suitable galvanised MS flats for knee & toe guard with Aluminium hand rail at top shall be provided.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 17 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	<p>(d.) All air conditioned areas / common corridors shall be provided with false ceiling constructed from 12 mm thick flat pre - laminated pressed teak wood particle board (MDF exterior grade) panels of size 600 mm x 600 mm with coloured anodised aluminum grid of 32 mm x 32 mm tees. 50 mm thick mineral wool insulation (conforming to IS : 8183) bound in ploythene bags shall be laid on top of panels. Additional hangers and height adjustment clips shall be provided for return air grills, light fixtures, Air conditioning ducts etc. Minimum headroom below false ceiling shall be 2.7 m.</p> <p>(e.) Suitable MS channel (minimum MC - 75) grid with 1200 mm x 1200 mm panels hung from top floor / roof slab shall be provided above the false ceiling level for movement of personnel to facilitate maintenance of lighting fixtures, A / C ducts etc.</p> <p>(f.) Under - deck insulation shall be provided on the ceiling (underside of roof slab) and underside of floor slab of air - conditioned areas depending upon the functional / air - conditioning requirements. The under - deck insulation shall consist of 50 mm thick mineral wool insulation conforming to IS : 8183 backed with 0.05 mm thick aluminium foil & 24 G x 25 mm mesh wire netting and shall be fixed to ceiling with 24 G wire ties.</p> <p>(g.) Parapets, chajjas, window / door heads, architectural facias, fins etc., shall be provided with drip course in cement mortar (1 : 3).</p> <p>(h.) 150mm thick fillets at junction of roof slab / chajja slab and parapet / vertical walls shall be provided with cast - in - situ cement concrete 1 : 2 : 4 nominal mix, followed by 12 mm thick cement sand plaster (1 : 4).</p> <p>(i.) Suitable provision shall be made for fixing of ceiling fans in office areas of different buildings.</p>			
7.00.00	<p>CORROSION PROTECTION MEASURES</p> <p>All structural steel and RCC members/ structures shall have to be provided with corrosion protection treatment.</p>			
7.01.00	<p>Structural Steel</p> <p>Corrosion Protection</p> <p>i) All Steel structures (except those embedded in Concrete) shall be hot dip galvanised. The Minimum Coating of zinc shall be 610 gms/ Sq. M. for galvanised Structures and shall comply with IS: 4759 and other relevant Codes. Galvanising shall be checked and tested in accordance with IS: 2629.</p> <p style="text-align: center;">OR</p> <p>All mild steel parts coming in contact with water or water vapour shall be coated with sealed sprayed zinc coating, conforming to BS:5493 (Table -3, part-8) for very long (20 or more) years of maintenance interval.</p> <p>All coating/ Paints shall be of high build constitution.</p> <p>ii) Painting of Steel Surfaces embedded in Concrete</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 18 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
7.02.00	<p>For the portion of Steel surfaces embedded in Concrete, the surface shall be prepared by Manual Cleaning and provided with Primer Coat of Chlorinated Rubber based Zinc Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT).</p> <p>iii) Gratings</p> <p>All gratings shall be blast cleaned to Sa 2 ½ finish of Swedish standard SIS-05-5900 and shall be hot dip galvanised at the rate of 610 gms/ Sq. M.</p> <p>iv) Hand Railings and Ladders</p> <p>a) All handrails and ladders shall be galvanised at the rate of 610 gms/ Sq-m</p> <p>RCC Members (Superstructure)</p> <p>The following preventive measures are required to be adopted by the bidder as minimum requirement.</p> <p>a) For Indoor RCC Members</p> <p>i) Dense and durable concrete is to be used. Minimum grade of concrete shall be M30.</p> <p>ii) Water/ cement ratio shall generally be restricted to 0.45 Plasticizer, if required may be used.</p> <p>b) For Outdoor (or exposed) RCC Members</p> <p>i) Dense and durable concrete is to be used. Minimum grade of concrete shall be M30.</p> <p>ii) Water/ cement ratio shall generally be restricted to 0.45. Plasticizer, if required may be used.</p> <p>iii) Clear cover to reinforcement shall be increased by minimum 10 mm over and above the values specified for normal conditions in relevant IS Codes.</p> <p>iv) A coat of water repellent silicate based (transparent) paint shall be applied over the final finished surface.</p>			
7.03.00	<p>RCC Members (Underground Sub-Soil Condition)</p> <p>Protective measures for underground facilities/ structures shall be on the basis of results of detailed chemical analysis of soil and underground water. This analysis has to be carried out by the bidder by a reputed laboratory/ agency to be approved by the owner. The type of corrosion protection measures for concrete reinforcement steel and structural steel for under ground structures/ facilities so arrived are subject to owner's approval. The reinforcement steel used for underground structures/ facilities shall necessarily have protective coating.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 19 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	<p>Protective measures shall be according to Geotechnical investigation and foundation system. In addition the following shall also be adopted:</p> <p>i) Water/ cement ratio shall generally be restricted to 0.45.</p> <p>ii) Clear cover to reinforcement shall be minimum 50 mm for thin sections like trenches.</p>			
8.00.00	MISCELLANEOUS SPECIFICATIONS			
8.01.00	<p>Ground Floor Slab & Area / Walkway Paving:</p> <p>For Ground floor / Area paving or path - way having earthen sub-grade, the paving work shall consist of following parts i.e. 150 mm thick RCC M - 30 Grade base slab, 75 mm thick PCC (1: 4: 8), 275 mm thick (compacted thickness) stone / rubble soling sub base with 63 mm down aggregate compacted to 85% of original volume and interstices filled with well graded selected sand on compacted and dressed sub - grade. Reinforcement of the RCC slab shall consists of minimum 8mm dia bars @ 200 mm c / c at top in both directions.</p>			
8.02.00	As required suitable steel frames shall be provided around openings in the roof and external walls for mounting exhaust fans.			
8.03.00	All foundation embedments, inserts, blockouts required for mounting of equipments and supporting any other facility like pipes etc. shall be provided.			
8.04.00	MS Angles of minimum size 50 x 50 x 6 mm with 8mm dia - 150mm Long MS lugs @ 150mm c / c shall be provided for edge protection around all cutouts / openings in floor slabs / walls, edges of drains supporting grating / pre-cast covers, edges of cable trench supporting pre-cast covers or chequered plates, edges of manhole supporting covers, around periphery of all removable pre-cast covers and any other place where breakage of corners of concrete is expected.			
8.05.00	Grouting of all pockets, blockouts, sleeves and the openings around the embedment, inserts, bolts etc. and under pinning below the base / sole plate shall be with non - shrink flowable grout. Grade of grout shall be one grade higher than concrete. However minimum grade of grout shall be M - 30.			
8.06.00	All cable trenches shall be provided with suitable insert plates for fixing support angles of cable trays.			
8.07.00	All internal cable trenches shall have minimum 6mm thick (o / p) chequered plate covers while external cable trenches shall have pre - cast RCC covers. However, the portion of the cable trench behind and sides of control panel / MCC shall be provided with suitable chequered plate covers as directed by the Engineer.			
8.08.00	Earthing mat shall be provided around buildings and structures as per specifications / drawings.			
8.09.00	All steel platforms / railings above ground level shall be provided with 100 x 6 thick MS kick plates at the edges of the platform.			
8.10.00	Excavated earth shall not be dumped within the plant area. Earth shall be transported immediately after the excavation, to disposal areas as directed by the Engineer. A maximum lead of about 5Km for disposal of surplus earth is envisaged.			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 20 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS				
8.11.00	Anti - termite treatment shall be provided to foundations including column pits, wall trenches, filling below the floors etc. for all the buildings conforming to IS : 6313 and other relevant Indian standards.				
8.12.00	All foundations and surfaces of substructures coming in contact with earth shall be applied with three coats of hot applied industrial bitumen conforming to IS : 702 (latest), of Grade 85 / 25, at the rate 1.7 Kg / Sq.m / coat.				
8.13.00	The liquid retaining face and face in contact with earth of the walls of liquid retaining / conveying structures shall be heavily trowled when concrete is wet to give a dense and smooth surface free from pores.				
8.14.00	All the liquid retaining structures shall be tested for leak proof ness with full water level in accordance with clause no. 10 of IS : 3370 (Part - I) and IS : 6494.				
8.15.00	All structures receiving acid / alkali resistant lining shall be tested for water tightness and made leakproof before lining work.				
8.16.00	No vertical joints shall be allowed in the wall of liquid retaining structures.				
8.17.00	Base slab of large tanks may be cast in number of panels viz. I, II, III etc. Starting with I, the slab panels shall be cast alternately in chess board fashion, with proper construction joints. Adjacent panels shall be cast with sufficient time interval, so that first cast concrete would have undergone most of its shrinking before the second cast concrete is poured against it. The construction joints shall be provided with chemical injection grouting treatment. The construction joints shall have continuity of reinforcement and shall be provided with suitably keys. The size of panels shall be as per IS : 3370 recommendations.				
8.18.00	For construction joint in concrete wall, the maximum height of any lift should not exceed 2 meters. However, the time interval between the successive lifts should be as small possible and the wall should be built to its full height in the least possible time.				
8.19.00	1000mm wide x 100 mm thick plinth protection in PCC (M-15) shall be provided around all buildings, pits / sumps, clarifiers, tanks, etc.				
8.20.00	All masonry walls shall be provided with Damp Proof Course at plinth level. 2.0m wide walkway with concrete paving shall be provided connecting all buildings and facilities. The top of walkway shall be minimum 200mm above FGL. For all buildings, finished floor level (FFL) shall be minimum 500mm above finished ground level (FGL).				
8.21.00	Wherever required PVC coated chain - link fencing shall be provided as per specifications.				
8.22.00	Expansion joints for all underground structures shall be made water tight by using ribbed PVC water stops with central bulb or of kicker type. The thickness and width of PVC water stops shall be as per the requirement of design. However, the minimum thickness and width shall be 6mm and 230mm respectively. Two - part polysulphide sealant conforming to IS: 12118 shall be used for sealing of joints.				
NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE		BID DOC. NO. CS-0260-132G-2	TECHNICAL SPECIFICATIONS SECTION VI, PART-B	Sub Section IIID-01 Civil Works	Page 21 of 54

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
8.23.00	<p>Preformed bitumen impregnated fibre board conforming to IS: 1838 shall be used as joint filler.</p> <p>A screed or concrete layer not less than 100mm thick and of grade not weaker than M10 conforming to IS: 456 shall be provided below all water retaining structures. A sliding layer of bitumen paper or craft paper shall be provided over the screed layer to destroy the bond between the screed and the base slab concrete of the water retaining structure.</p> <p>Minimum 75mm thick lean concrete (M-10) shall be provided below all other underground structures, foundations, trenches etc. to provide a base for construction.</p>			
8.24.00	<p>Doors and windows on external brick walls of buildings shall be provided with RCC sunshade over the opening extending 300mm on either side of the opening. Projection of sunshade from the wall shall be minimum 450mm over window openings and 750mm over door openings and 900mm over rolling shutters.</p>			
8.25.00	<p>Monorails, monorail girders and fixtures shall be provided, wherever required to facilitate erection/ maintenance of equipment.</p>			
8.26.00	<p>All monorail openings in the walls shall be provided with double plate flush steel door shutters with suitable access platform and ladder as required.</p>			
8.27.00	<p>All staircases shall have a riser height not more than 180 mm and minimum tread width of 250 mm. The minimum width of staircase shall be 1200 mm. Aluminium angle nosing with minimum 50x25x3mm angle shall be provided for edge protection in RCC stairs. Steel staircase shall have stringers of rolled MS channels and treads shall be of galvanised MS gratings and shall be provided with anti skid nosing.</p>			
8.28.00	<p>In design of all buildings, fire safety requirements conforming to IS: 1641 and IS: 1642 shall be followed in addition to TAC requirements. The height of RCC fire protection wall between transformers shall be atleast 300mm more than the height of transformers.</p>			
8.29.00	<p>Wherever possible all floor openings shall be provided with 100mm thick 150 mm high RCC kerb all around. Angles 50x50x6mm (minimum) with lugs shall be provided for edge protection all around cut outs/ openings in floor slabs, edges of concrete drains supporting grating/ covers, edges of RCC cable/ pipe trenches supporting covers/ chequered plates, edges of manholes supporting covers, supporting edges of precast RCC covers and any other place where breakage of corners of concrete is expected.</p>			
8.30.00	<p>a) All drains inside the building shall have minimum 40mm thick grating covers. In areas where heavy equipment loads would be coming, precast RCC covers shall be provided in place of steel grating.</p> <p>b) All drains outside building shall have perforated precast RCC covers of minimum 50mm thickness with provision of openable steel grating cover at about 4.0m interval. In areas where vehicular loads would be coming precast RCC covers of suitable thickness without perforations and designed for the vehicular loading shall be provided.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 22 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
8.31.00	Floor of switchgear room shall be provided with embedded M.S. channel suitable for easy movement of breaker panels.			
8.32.00	<p>Wherever possible minimum 900 mm high hand railing shall be provided around all floor/ roof openings, projections/ balconies, platforms, walkways, steel stairs, water channels, forebay etc. All handrails and ladder pipes shall be 32 mm nominal bore MS pipes (medium class) conforming to IS: 1161 and shall be galvanised as per IS: 4736 and IS: 1239. All rungs and ladders shall also be galvanised. Minimum weight of galvanising shall be 610g/ sq.m.</p> <p>For RCC stairs, hand railing with 20 mm square M.S. bar balustrades with suitable M.S. flats and aluminium hand rail shall be provided. All buildings having metal cladding shall be provided with a 150 mm high M.S. toe curb at the edge of the floor towards the cladding.</p>			
8.33.00	In all buildings, suitable arrangement for draining out water collected from equipment blowdowns, leakages, floor washings, fire fighting etc. shall be provided for each floor with suitable floor drains.			
8.34.00	<p>All cable & pipe routing in outlying area shall be clubbed and shall run over ground on steel trestles or other supporting structures at a height of not less than 3000 mm above grade for easy inspection & maintenance except in some localised area (as approved by Employer) where the same can run in trenches. In case cable route is not envisaged in the area, pipe shall be routed on ground over RCC pedestals at a height of not less than 500 mm. All trenches shall be of RCC with removable RCC covers.</p> <p>Trenches located outside buildings shall project atleast 200 mm above the finished formation level so that no storm water shall enter into the trench. The bottom of the trench shall be provided with a slope of 1 in 500 for draining out the collected water into a sump pit to be provided at suitable location. The precast covers shall not be more than 300 mm in width. The pre-cast RCC slab covers shall not generally weigh not more than 65 kgs. Lifting hooks shall be provided in the precast covers. The trenches shall be given a slope of 1 in 200 in the direction perpendicular to the run of the trenches. PVC water stops shall be provided at all expansion joints of all trenches, with joint filler and sealing compound.</p>			
8.35.00	All steel platforms above grade shall be provided with kick plates at edge of platform to prevent tools or materials from falling off platform.			
8.36.00	Duct banks consisting of PVC conduits for cables shall be provided with proper sealing arrangement consisting of fire retardant sealing compound.			
8.37.00	Water supply line & drainage of pump house shall be connected with the nearest Employer's water supply & drainage line.			
8.38.00	<p>Unless specified all sand filling shall be compacted to minimum 75% of the relative density and backfilled earth shall be compacted to minimum 90% of the Standard proctor density at OMC.</p> <p>However, sub - grade for the roads shall be compacted to minimum 95% of the Standard Proctor density at Optimum moisture content (OMC).</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 23 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
8.39.00	Detailed scheme for dewatering shall be prepared before starting of deep excavation work. IS: 9758 shall be followed as general guidance for dewatering.			
8.40.00	<p>All liquid retaining structures shall be leak-proof. Water proofing of all liquid retaining structures shall be done by addition of plastciser cum water proofing admixture conforming to IS : 9103, in the concrete at the time of mixing and through external treatment by chemical injection grouting at all construction joints as described in the specification. Addition of admixture should not reduce the strength of the concrete below the specified strength in any case. In addition, limit on permeability as given in IS : 2645 shall also be met with.</p> <p>Further if required, chemical injection grouting treatment shall be applied to make the structure leak proof, if leakage is observed during hydro - test or otherwise, with no cost implication to the Employer.</p>			
8.41.00	Plywood formwork shall be used for all water retaining/ conveying structures (only on the face having contact with water) and for all overground concrete works. It shall also be used for the inner face of sump of pump (i.e. faces of piers back walls, breast walls and baffle walls having contact with water. For all other areas steel/ plywood formwork shall be used.			
8.42.00	All buildings shall be provided with peripheral drains by the side of plinth protection for catering to the rain water from roofs and storm water from adjacent area.			
8.43.00	Parapet, Chajjas over window and door heads, architectural facias, fins etc. shall be provided with drip course in cement sand mortar 1:3.			
8.44.00	Structural steel column base plates and bolts, gussets etc. shall not project above the floor level. These shall be encased by concrete cover upto floor level with concrete grade M-30.			
8.45.00	Non - shrink flowable grout shall be used for under - pinning work below base plate of columns. Nominal thickness of grout shall be 50 mm. Non - shrink cum plasticizer admixture shall be added in the grout. Crushing strength of the grout shall generally be one grade higher than that of the base concrete. Minimum grade of grout shall be M-30.			
8.46.00	Under drainage arrangement for under ground structures shall be provided as applicable in line with relevant codal provisions.			
9.00.00	MISCELLANEOUS ITEMS AND REQUIREMENTS			
9.01.00	Acid/ Alkali Resistant Lining			
9.01.01	The acid / alkali resistant lining shall be provided broadly in the areas identified elsewhere.			
9.01.02	<p>Guarantee</p> <p>The Contractor shall give a guarantee for satisfactory functioning of the lining for a period of 36 months from the date of completion of the work or date of handing over the site to the Engineer, whichever is later.</p>			
9.01.03	The Contractor shall replace / rectify defects is any, observed in the lining to the satisfaction of the Engineer without any extra cost during this period.			
<p>NTECL POWER PROJECT (3X500 MW)</p> <p>(VALLUR THERMAL POWER PROJECT 3X500 MW)</p> <p>ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO.</p> <p>CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS</p> <p>SECTION VI,</p> <p>PART-B</p>	<p>Sub Section IIID-01</p> <p>Civil Works</p>	<p>Page 24 of 54</p>

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9.02.00	Bituminous Coating			
9.02.01	Bituminous coating shall be applied on the inside faces of the water retaining structures and also on that portion of water retaining structure which are in contact with ground water. Surface to be treated shall be absolutely dry, clean and dust free. The surface shall be sand papered, before applying the coating.			
9.02.02	The external surfaces of concrete which are in contact with ground water shall be applied with hot industrial bitumen conforming to IS : 702, of grade 85 / 25. Anti stripping compound shall be added wherever necessary. After application of third coat and before it is dried up, sand shall be spread on the surface to cover it completely. Sufficient time shall be allowed after spreading sand, before back filling is done in order to allow the final coat to dry up completely.			
9.02.03	The internal surfaces of water retaining structure which are in contact with water shall be applied with two coats of bitumen paint conforming to IS : 9862.			
9.03.00	Khurras			
9.03.01	The Khurras shall be constructed before the brick masonry work in parapet wall is taken up, and it shall be 45 cm x 45 cm and shall be formed of cement concrete 1 : 2 : 4 (1 cement : 2 coarse sand and 4 graded stone aggregate 20 mm nominal size).			
9.03.02	Laying A P.V.C. sheet 1 M x 1M x 400 micron shall be laid under khurras and then cement concrete shall be laid over it to a minimum thickness of 3 cm with its top surface lower than the level of adjoining roof surface by not less than 50 mm.			
9.03.03	The concrete shall be laid to a size greater than the stipulated size of khurras in such a way that the adjoining terracing overlaps the concrete on its 3 edges by not less than 7.5 cm. The concrete shall be continued at the same slope through the width of the wall into outlet opening to ensure a watertight joint.			
9.03.04	The Khurras and the sides of outlet shall then be meandered with 12 mm coat of cement plaster 1 : 3 (1 cement : 3 coarse sand). This shall be done when the concrete is still green and shall be finished with a floating coat of neat cement. The sides of Khurras and the sides of openings shall be well rounded. The size of the finished outlet opening shall be 10 cm wide by 20 cm high or as directed by Engineer.			
9.03.05	Iron gratings shall be provided at the mouth of rain water down comer pipes to prevent choking. The grating shall be 20 x 25 cm with an outer frame of 15 x 3 mm M.S. flat to which 4 nos. M.S. bars of 10 mm dia. shall be welded in a vertical direction, keeping an equal clear spacing of 2.5 cm.			
10.00.00	PAVING IN GROUND FLOOR AND OTHER AREA PAVING			
10.01.00	General			
10.01.01	Paving work shall consist of 4 parts i.e. Base slab, PCC, rubble soling sub base and sand on compacted and dressed sub - grade. The total thickness of base slab, sub - base and rubble soling shall be approximately 575 mm. The work shall include furnishing of all labour, material and equipment necessary to complete the paving work in ground floor of all Pre - treatment plant buildings as per relevant drawing and as described herein.			
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10.01.02	<p>Sub - Grade</p> <p>The sub - grade shall be prepared and compacted up to the required level as shown in the drawing. Soft area in the sub - grade shall be removed and replaced by crushed stone, gravel or such material as directed by the Engineer. The formation surface of sand layer shall first be cut to the required depth below the finished level and dressed off parallel to the finished profile; surplus earth shall be disposed off, leveled and dressed as directed by the Engineer. The sub - grade shall be sloped to provide for effective drainage in the area.</p> <p>The sub - grade shall be consolidated by ramming or by use of suitable mechanical compactor and consolidated to attain 95% of dry density at optimum moisture content of natural soil as decided by Engineer. All undulations in the surface that develop due to ramming or use of mechanical compactor shall be made good with earth or quarry spoils as the case may be and the sub - grade shall be re - compacted to the satisfaction of the Engineer. Over the compacted and dressed sub - grade 100 mm thick well - graded sand shall be laid and compacted to not less than 90% relative density.</p>				
10.01.03	<p>Sub - Base</p> <p>Soling with Rubble</p> <p>Rubbles shall be clean, hard, free from decay and weathering. Stone aggregate of maximum size of 250 mm down and graded shall be used to make up the soling course of specified depth with a tolerance of 10 mm. Rubbles brought to site of work shall be broken to the specified sizes with hammers and all Kachha and rejected stones shall be separated out and removed away from site as per the instructions of Engineer.</p>				
10.01.04	<p>Laying of soling course</p> <p>The sub - grade with completed sand layer shall be checked and approved by the Engineer before any soling stone shall be laid thereon. For 250 mm soling actually 280 mm layer shall be hand packed with greatest length across the paving area. These shall be laid closely in positions on the sub - grade, with its broadest side downwards and to make up the specified thickness of sub - base with single stones to correct slope. Projections in rubbles which would result in excessive voids shall be knocked off with a hammer and / or selected stones used to fit the shape of the stones already laid. The joints shall be staggered. All interstices between rubbles shall be wedged in with smaller rubbles of suitable sizes, well drive - in to enable tight packing and complete filling in positions of soling rubble and shall not lag behind. All projecting corners above the surface level of the soling shall be rapped off with hammer to bring them into home. The surface shall be checked with template of approved design (to be provided by the Contractor) and high and low spots corrected by removing soling and re - packing as specified above.</p>				
10.01.05	<p>Consolidation of Soling Course</p> <p>The soling shall be thoroughly consolidated with the suitable mechanical compactor or by hand compaction, starting at edges and working towards the centre. The operations shall be repeated till the soling course is well consolidated. The surface shall be checked by templates, corrected after rolling and finally consolidated.</p>				
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10.01.06	<p>Cushion</p> <p>25 mm thick or specified layer of moorum or sand, free from excess of clay, as directed by the Engineer, shall be laid on top of soling course. This shall be hand compacted so that the fine particles fill up the voids in the soling course.</p>			
10.02.00	<p>P.C.C. Sub - Base</p>			
10.02.01	<p>The P.C.C. Sub - base is to be laid on top of the consolidated soling course to give a plain surface ready for receiving the base slab. The P.C.C. sub - base shall be 75 mm thick and shall be made up of concrete of 1 : 4 : 8 proportion.</p>			
10.02.02	<p>Base Slab</p> <p>The base slab shall be structural concrete slab 150 mm thick with reinforcement. The grade of concrete and other details shall be as shown in relevant drawings, which shall be, deemed to form a part of the paving specifications also.</p>			
10.03.00	<p>Joints</p> <p>a) Isolation joints shall be provided at junctions with walls, columns, machine foundations and footings or other restraint. These joints shall be filled with preformed bitumen impregnated fiber boards conforming to I.S. 1838 (Latest Edition). Control joints shall be spaced at 5 to 6 M intervals along the length and shall be capable to accommodate differential movements in the plane of the slab caused by drying, shrinkage and thermal gradient across the thickness. The control joints may be formed either by sawing or by pressing a T - section of mild steel while the concrete is still in the plastic stage. Control joints shall be filled with hot applied sealing compounds conforming to IS : 1834 (latest edition).</p> <p>b) Expansion joints shall be spaced at intervals of 25 to 30 metres and the clear gap between the adjacent slabs shall be provided for the full depth.</p> <p>The clear gap shall be filled with expansion joint filler which is compressible enough to accommodate the expansion of adjacent parts. Preformed bitumen impregnated fibre filler conforming to I.S. 1838 (latest edition) or equivalent materials shall be used for this purpose.</p> <p>c) All joints shall be provided as shown in drawing or as directed by the Engineer. In all types of joints the edges shall be made round with the help of a Kneading tool after the concrete is laid and leveled to avoid any damage at these locations.</p>			
10.04.00	<p>Cleaning and Finishing</p>			
10.04.01	<p>Except where special finish is called for, all exposed, concrete shall be finished as follows. All fins and other projections shall be neatly chipped, rubbed down and made smooth; form oil shall be entirely removed by stiff fibre brushes. The use of acid shall not be permitted. All exposed corners shall be slightly rounded or chamfered. Air holes, cavities and similar imperfections shall be first saturated with water and filled with a mortar mixture of the same composition as that used in the concrete. After initial set of mortar the surface shall be rubbed down with burlap. Surface shall be floated and steel troweled after achieving initial set to prevent excess fine materials from working to the surface. The finish shall be brought to a smooth dense surface free from defects and blemishes.</p>			
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10.04.02	<p>When the base slab is to receive a separate floor hardening treatment, the treatment of surface shall be as follows. When the base - slab has partially hardend so that it will retain the impression of a broom, it shall be brushed with a steel bristle broom to remove any scum or laitance and swept clean so that the coarse aggreage is exposed. Before laying the topping, the surface shall be thoroughly cleaned and soaked with water, at lest for twelve hours and surplus water shall be removed by mopping immediately before topping is laid in position.</p>			
11.00.00	EARTHING MAT			
11.01.00	<p>The general earthing work shall conform to the provision of Indian Electricity Rules and applicable code of practice for earthing (IS : 3043) as ammended upto date.</p>			
11.02.00	<p>Where the ground conductor passes through reinforcement or steel plate it shall be bonded to the same.</p>			
11.03.00	<p>Electrical Continuity</p>			
	<p>All steel columns of building shall be connected directly to the earthing grid whether specifically shown or not. Riser shall be provided for connection to each building. Column joints shall be bonded to make it electrically continuous.</p>			
11.04.00	<p>Welding</p>			
	<p>All ground conductor connections shall be made by electric arc welding as per IS : 9595.</p>			
	<p>All arc welding of 40 mm Dia MS Rod shall be carried out with low hydrogen content electrode.</p>			
	<p>All welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any load on it. No artificial cooling should be adopted to cool welded joints.</p>			
	<p>The welding required for grounding shall serve three purposes :</p>			
	<p>a) Sufficient mechanical strength between the jointing materials</p>			
	<p>b) Sufficient electrical area for the flow of system short circuit current (welding drawing in subject to Employer’s approval) and</p>			
	<p>c) Sufficient electrical area available after commission during the life time of the plant.</p>			
	<p>Welded area of riser / pigtails shall be thickly coated with bitumen compound to prevent corrosion.</p>			
	<p>Bending of 40 mm dia rods where necessary will be done preferably by gas heating.</p>			
	<p>Before applying bitumen compound, two coats redoxide primer shall be applied.</p>			
	<p>The Contractor shall submit detail construction drawings for grounding mat for approval by Employer / Engineer prior to construction of the grounding system.</p>			
12.00.00	SUSPENDED CEILING			
	<p>Suspension system shall consist of the grid supporting the ceiling panels, intermediate runner supports for the grid, if any, and hangers, wall angles etc. required to be suspended to grid or the runners from structural walls, slabs and beams or trusses. All members of the suspension system shall be of sufficient strength and rigidity to carry the ceiling board or sheets in a true and level plane</p>			
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<p>12.01.00</p> <p>12.02.00</p> <p>12.03.00</p> <p>13.00.00</p> <p>13.01.00</p> <p>13.02.00</p> <p>13.03.00</p> <p>13.04.00</p> <p>13.05.00</p>	<p>without exceeding a deflection of 1 / 500th of their span. All joints in ceiling panels shall run straight and cross joint shall be securely fixed to walls. All drilling of structural concrete or welding to steel for installation of suspension system is included in the scope. All M. S. sections used for supports etc. shall be given one coat of synthetic enamel paint over a coat of red zinc chromate primer.</p> <p>Aluminium Grid Suspension System</p> <p>Aluminium grid ceiling system shall be of best quality, from approved manufacturers.</p> <p>Anodised aluminium grid construction of 32 mm x 32 mm ceiling tees forming 600 mm x 600 mm panels with various members for fastening and fittings to minute tolerances suspended from RCC slab with 12 mm aluminium painted mild steel rods spaced 1200 mm c / c both ways and 25 mm x 25 mm anodised aluminium angles serewed into walls with rawl plugs, including all ancillary work and fixing panels to aluminium grid with suitable clips.</p> <p>Ceiling Panels</p> <p>Panels shall be 12 mm thick flat pressed teak wood pre-laminated particle board panels of size 600 x 600 mm of approved quality for suspended ceiling system including painting with one coat of approved primer on all sides and two or more coats of synthetic enamel paint of approved colour on underside only.</p> <p>Insulated Mat</p> <p>Insulated mat shall be 50 mm thick with mineral wool conforming to IS : 8183 or equivalent, backed with 0.05 mm thick aluminium foil and 24G x 25 mm mesh wire netting, a under - deck insulation at various elevation complete with 50 x 6 thick slotted MS. plates welded to 100 x 100 x 10 mm thick MS. plate inserts embedded at soffit of slab @ 600 c / c, 14 G wire drawn through slots and fixing to wire netting etc. including all labour, material complete.</p> <p>CHAIN LINK FENCING</p> <p>The fence shall comprise of PVC coated G.I. chain link fencing of minimum 8G (including PVC coating) of mesh size 75 mm and of height 2.4 m above toe wall with a 600 mm high galvanised concertina at the top, such that total fence height of 3.0m above toe wall is achieved. The diameter of the steel wire for chain link fence (excluding PVC coating) shall not be less than 12G.</p> <p>The PVC coated chain link will be stretched by the clips at 0.5m intervals to three strands of galvanised high tensile spring steel wire (HTSSW) of 12G interwoven chain link wire mesh and kept under tension which in turn are attached to the fence post with security nuts and bolts. On every fourth post a clamping strip will be threaded through the links of chain link and bolted to the fence post with the help of security nuts and bolts.</p> <p>Above the chain link a 600 mm high tensile serrated galvanised wire (HTSW) concertina will be stretched to 6m and attached to two strands of galvanised HTSSW by means of clips at 1 m intervals. These two HTSSW strands will be attached to the fence posts with 1 / 2" security fasteners.</p> <p>All nuts, bolts, fasteners, clamping strips, clamps, clips, etc. shall be hot dip galvanised. Weight of zinc coating shall be at least 900 gms / Sq. M.</p> <p>All fence posts shall be pre-cast RCC of minimum M20 grade. All corner posts will have two stay posts and every tenth post will have transverse stay post suitable</p>			
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13.06.00	RCC foundations for the post and stays shall be provided based on the prevailing soil conditions.			
13.06.00	Toe walls either of brick masonry with bricks of class designation 50 with minimum crushing strength 50 Kg / M ² or of hollow concrete block masonry shall be provided between the fence posts all along the run of the fence with suitable foundation. Toe wall shall be minimum 200 mm above the formation level with 50 thick PCC coping (1 : 2 : 4) and shall extend minimum 300 below formation level. Toe wall shall be plastered with cement sand mortar (1 : 6) on both sides and shall be painted with coats of texture cement paint (Sandtex matt or equivalent) of approved colour & make. Toe wall shall be provided with weep holes at appropriate spacing. One number structural steel gate of size 3.0 m (minimum width) x 2.6 m (height) shall be provided for each enclosure of fencing and shall be provided with corrosion protection measures as specified elsewhere.			
14.00.00	<p>M. S. GATE</p> <p>M. S. Gate of 3.0 M wide x 2.6 M height shall be provided to provide access through the fencing to the transformer. It shall be made in two leaf, with locking arrangements. The gate shall be made with outer frame of 50 NB (Medium) M. S. Pipe, vertical & horizontal runners with 40x6 M. S. flat and weld mesh of opening size 50 x 25 mm and nominal size of mesh 4 mm dia. Hinges, al-drops and other accessories shall be provided for effective working of the gate.</p>			
15.00.00	<p>STAIRWAYS, INTERMEDIATE LANDINGS AND GRATINGS</p> <p>All stairways and intermediate landings shown on the drawings shall be fabricated as a complete unit and shall include grating treads, landing, hangers, brackets, struts, clips, bracing etc. as detailed or as necessary for connections to structural steel framing in places.</p> <p>Treads and landing shall be suitable for the prescribed loading and be furnished complete with one - piece standards non-slip abrasive nosing of approved type. The maximum width of openings in gratings shall not exceed 40mm. The minimum thickness of main bars shall be 6mm. The usual span of gratings will not generally exceed 1.5 metres.</p>			
16.00.00	<p>HANDRAILS</p>			
16.01.00	Handrails shall be provided on open sides of platforms, stairways and around all openings as shown on drawings. In conveyor galleries, handrails shall be provided for side walkways only on the girder side. Handrails shall be of standard weight steel pipe of flush welded constructions, ground smooth using 32 mm nominal bore medium class pipe provided with double rail, top rail about 1 metre above platform level and pipe posts spaced not more than 1.5 metres apart. Angle handrail post may be provided when specifically called for in drawings approved by Engineer. Handrails around openings should have toe plates.			
16.02.00	Smooth uniform curves and bends shall be provided at stair returns and also where-so-ever required. Posts connected to curb plates shall have a neat closure at the bottom and a 6mm thick plate neatly welded to posts for attachment to curb plate. All necessary fittings including inner dowels at splices, brackets, belts, bends, flanges and chains, where required shall be plugged and welded. A minimum radius of 3 times the pipe diameter shall be provided at all points of direction changes in the handrail.			
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17.00.00	CHEQUERED PLATE			
17.01.00	Chequered plates used shall be minimum 6mm thick or as indicated on drawings. The chequered plate pattern shall be approved by Employer / Engineer. Mild steel flats of suitable size shall be welded to the bottom portion of chequered plates at a designed spacing to stiffen chequered plates suitably. Chequered plates shall be fixed by staggered welding of suitable size.			
18.00.00	REQUIREMENTS FOR CONCRETE AND REINFORCEMENT			
	Structural concrete shall be of design mix complying with the relevant provisions of IS Codes or any International Code of Practice as approved by the Employer. All concreting shall be carried out using centralized batching plant, transit mixers and concrete pumps. Numbers and capacity of batching plant, transit mixers and concrete pumps to be deployed by the bidder to achieve the required progress of work shall be specified in the relevant schedules of the bid documents.			
	Durability of the concrete shall conform to severe exposure category as per Table 3 of IS: 456 except noted specifically otherwise. Minimum cement content of all RCC structures shall be as per Table - 5, applicable for "Severe" exposure condition. However, minimum grade of concrete shall be as specified elsewhere in the specification.			
	Reinforcement shall be of grade Corrosion Resistant Steel grade conforming to grade Fe 415/ 500 as per IS: 1786 except noted otherwise. The anchoring length shall not be less than 50 times the diameter of the bars.			
	All foundation structures shall be provided on all sides with a minimum reinforcement of 0.12% of gross cross - sectional area distributed over top and bottom faces.			
18.01.00	The minimum grade of concrete for structural components for other structures shall be as follows in accordance with IS 456 : -			
	a) Precast pre - stressed elements	-	M -- 30 grade	
	b) All other RCC concrete	-	M -- 30 grade unless otherwise specified	
	c) Lightly loaded structures such as Storm water drains, cable trenches, etc. (Minimum cement content for such structures shall not be as per "severe" exposure condition, but shall be as per design mix subject to minimum cement content as per IS: 456)	-	M – 30	
	d) Mud Mat PCC	-	M – 10 grade	
18.02.00	Coarse and fine aggregates shall be specially selected to ensure that they are not susceptible to alkali/ chloride attack or prone to disintegration at high temperatures. In particular, limestone aggregates shall never be used. The maximum size of coarse aggregate shall not be larger than 1/8th of narrowest dimension between reinforcement bars nor more than 20 mm.			
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18.03.00	Washing and screening of coarse and fine aggregates to remove fines, dirt of other deleterious materials shall be carried out by approved means if desired by the Employer.			
18.04.00	The maximum water cement ratio by weight shall be 0.45 or 0.50 as specified elsewhere, including moisture in the aggregates, and slump should be suitably decided to provide good quality concrete work, as specified elsewhere in the specification.			
18.05.00	<p>Admixture</p> <p>Admixtures may be permitted to be used in accordance with relevant IS codes to modify the rate of hardening or setting, to improve workability or as an aid to control concrete quality. The Employer reserves the right to direct the Bidder to conduct laboratory tests or use test data, or other satisfactory reference before granting approval. The cost of all tests conducted shall be borne by the Bidder. The admixture shall be used in strict accordance with the manufacturer's directions and/ or as directed by the Employer. No extra payment will be made to the Bidder on account of using admixtures.</p>			
18.06.00	Removal of air and water at the form surface shall be by vibration and rodding. Particular attention shall be paid to accurately shape the corners at the openings.			
18.07.00	Point of discharge of the concrete in to the forms shall be 1500 mm above the concrete surface. Concrete shall be deposited in layers of approximately uniform level not greater than 400 mm deep unless permitted otherwise.			
18.08.00	Sampling and testing of concrete shall be carried out as stated elsewhere in Technical Specification and as per relevant Indian Standard Codes.			
18.09.00	<p>Cover to Reinforcement</p> <p>Unless indicated otherwise the clear concrete cover for reinforcement shall be as per IS Codes. However, minimum clear cover to reinforcement has been stipulated elsewhere in the specs.</p>			
18.10.00	The correct cover shall be maintained by cement mortar cubes or other approved means. Reinforcement for footings/ pile caps, grade beam, and slabs on subgrade shall be supported on precast concrete cover block as approved by Employer. The use of pebbles or stones as cover blocks shall not be permitted.			
18.11.00	The 28 days crushing strength of cement mortar cubes/ precast concrete cover block shall be atleast equal to the specified strength of concrete in which the cubes/ blocks are embedded.			
18.12.00	The minimum clear distance between reinforcing bars shall be in accordance with IS: 456 (Latest edition) or as specified elsewhere in this specification.			
18.13.00	All lapping of reinforcement bars shall be by lapping as per relevant codal provisions. Prior approval of the Employer shall be taken for deciding the method of lapping the reinforcement bars.			
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19.00.00	<p>CONSTRUCTION WATER</p> <p>The Bidder shall make all arrangements himself for the supply of construction water at the worksite as described in relevant clause in Civil Scope .</p>				
20.00.00	<p>MATERIALS</p>				
20.01.00	<p>Cement</p> <p>Ordinary portland cement of Grade 43 conforming to IS : 8112 or fly ash based portland pozzolana cement conforming to (IS : 1489 Part -1) with minimum 28 days compressive strength of 43N/mm² shall be used for all concrete construction. However, in place of fly ash based portland pozzolana cement, OPC mixed with fly ash can be used. Batching plant shall have facility for mixing fly ash. Fly ash shall conform to IS 3812 (Part I & Part II). Percentage of fly ash to be mixed in concrete shall be based on trial mix. Mix design shall be done with varying percentage of fly ash with cement.</p>				
20.02.00	<p>Aggregates</p> <p>a) Coarse aggregate - Coarse aggregate for concrete shall be chemically inert, hard, strong durable against weathering, of limited porosity and free from deleterious materials. It shall be properly graded. It shall meet the requirements of IS: 383.</p> <p>b) Sand - Sand shall be hard, durable, clean and free from adherent coatings of organic matter and clay balls or pellets. Sand, when used as fine aggregate in concrete shall conform to IS: 383. For plaster, it shall conform to IS: 1542 and for masonry work to IS: 2116.</p>				
20.03.00	<p>Reinforcement Steel</p> <p>All reinforcement bars shall be TMT (Thermo Mechanically Treated) of grade Fe 500 conforming to IS : 1786 with minimum percentage of elongation of 14.5%.</p> <p>Mild steel & medium tensile steel bars and hard drawn steel wire shall conform to grade - 1 of IS: 432 (Part - I). Welded wire fabric shall conform to IS: 1566.</p>				
20.04.00	<p>Structural Steel</p> <p>a) Structural steel (including embedded steel) shall be straight, sound, free from twists, cracks, flaw, laminations and all other defects. Structural steel shall be of tested quality. Rolled sections shall conform to grade designation E250, Quality A and shall be semi-killed/ killed conforming to IS: 2062. Plates shall be of Grade designation E250, Quality BR, killed, tested for impact resistance conforming to IS: 2062. Plates beyond 20mm thickness and upto 40mm thickness shall be controlled rolling. Plates beyond 40mm thickness shall be normalizing rolling and shall also be ultrasonically tested as per ASTM-A578 level B.</p> <p>b) Pipes for handrail shall conform to medium grade IS: 1161.</p> <p>c) Hollow (square and rectangular) steel sections shall be hot formed conforming to IS: 4923 and shall be of minimum Grade YST 240.</p>				
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20.05.00	<p>d) Chequered plate shall conform to IS 3502 and steel shall conform to grade E250 Quality A of IS 2062.</p> <p>Bricks</p> <p>Bricks shall be table moulded/ machine made of uniform size, shape and sharp edges and shall have minimum compressive strength of 75 kg/cm². Burnt clay fly ash bricks and fly ash lime bricks shall conform to IS:13757 and IS:12894 respectively. Minimum fly ash content in fly ash based bricks shall be minimum 25%. Common burnt clay bricks shall conform to IS : 1077.</p>			
20.06.00	<p>Water</p> <p>Water used for cement concrete, mortar, plaster, grout, washing of coarse aggregate, soaking of bricks, etc., shall be clean and free from oil, acids, alkalis, organic matters or other harmful substances in such amounts that may impair the strength or durability of the structure. Potable water shall generally be considered satisfactory for all masonry and concrete works, including curing. The Bidder shall carry out necessary tests in advance to prove the suitability of the water proposed to be used. When water from the proposed sources is used for making the concrete, the maximum permissible impurities, development of strength and initial setting time of concrete shall meet the requirements of IS: 456.</p>			
21.00.00	<p>TESTS FOR MATERIAL / WORKMANSHIP</p> <p>All tests required for various bought out items, materials, quality of workmanship or any other tests as desired by Project Manager and as specified in technical specification shall be carried out by the Contractor at his own cost in the presence of the authorised representative of the Engineer.</p> <p>The quality assurance check lists are indicated elsewhere in these specifications. The Contractor shall submit comprehensive Quality Assurance plan for all materials, equipment, workmanship, services etc. and get it approved from the Engineer. This shall include setting up a test laboratory at site. However, such check list shall in no way limit the liability and responsibility of the Contractor in regard to quality of workmanship as detailed out in the specifications.</p>			
22.00.00	<p>STATUTORY REQUIREMENTS</p>			
22.01.00	<p>Bidder shall comply with all the applicable statutory rules pertaining to Factories Act (as applicable for the state of Madhya Pradesh), Fire Safety Rules of Tariff Advisory Committee, Water Act for pollution control, Explosives Act, etc.</p>			
22.02.00	<p>Provisions of safety, health and welfare according to Factories Act shall be complied with. These shall include provision of continuous walkway of minimum 500mm wide along the crane - girder level on both sides of building/ pump house, comfortable approach to EOT crane cabin, railing, fire escape, toilets, etc.</p>			
22.03.00	<p>Statutory clearances and norms of State Pollution Control Board shall be followed.</p>			
22.04.00	<p>Bidder shall obtain approval of Civil/ Architectural drawings from concerned authorities before taking up the construction work.</p>			
22.05.00	<p>In line with Gazette Notification on Ash utilization issued by MOEF and its amendment thereafter, contractor shall use ash and ash based products in works as specified in these specifications, drawings and as per instructions of the Engineer.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 34 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
<p>23.00.00</p>	<p>He shall also use ash and ash based products in construction of his offices, stores, staff quarters and labour huts etc. He shall furnish a compliance report along with all details of use of ash and ash based products along with each bill.</p> <p>GENERAL LAYOUT</p> <p>The general layout plan proposed for the project is shown in drawing no. 0260 - 999 - POC - F - 001, titled, "General Layout Plan". It shall form the basis for further elaboration by the Bidder for the plant facilities which are in his scope.</p> <p>Bidder shall prepare the detailed layout of the plant facilities which are in his scope and shall submit the same for Employer's approval.</p> <p>While preparing the detailed layout, planning his facilities and deciding upon the transportation and erection strategy he shall ensure the following aspects.</p> <ol style="list-style-type: none"> a) All Statutory requirements including safe distances between various facilities as per applicable rules/ laws/ acts are met. b) Face of the buildings and facilities are located in such a way so as to have an offset of minimum 25 m with respect to centre line of double lane road and 20 metre with respect to centre line of single lane road. c) The entire construction activity shall take into account the commissioning of the unit matching with the phased commissioning of the plant. d) The interface requirements with the plant and construction/ erection activities of other contracting agencies engaged by the Employer. These agencies will be working parallelly with the Bidder within the plant premises. 			
<p>24.00.00</p>	<p>FOUNDATION SYSTEM</p> <p>Finished Ground Level (FGL) is corresponds to RL 4.10 within the plant area as shown in General Layout Plan (GLP). Excavated material from adjoining area has been filled in the ultrafiltration system plant area for a thickness of about 3.5m to 4.0m.</p> <p>All structures/equipment shall be supported on suitable combined raft. Isolated foundations are not permitted.</p> <p>All foundations shall be designed in accordance with relevant parts of the latest revisions of Indian Standards.</p> <p>For design purpose and for the calculation of gross bearing capacity, water table shall be considered at Finished Ground Level (FGL).</p> <p>The platform supporting columns and the pipe supporting pedestals may be either combined with the raft of the lime bed vessels foundation or they may be supported on the flooring/ slab on grade with local thickening of flooring/ grade slab at such locations. The thickening of the ground floor slab may be done upto an extent of about 600 mm beyond the plan area of the pedestals on all side.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 35 of 54</p>

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<p>25.00.00</p> <p>26.00.00</p>	<p>For UF shed, Filter shed area and others, net allowable bearing capacity of 4 tonnes/sq-m. at 1.5m below FGL for raft/strip footing shall be adopted.</p> <p>DRAWINGS</p> <p>The successful tenderer shall first submit the structural design calculations along with general arrangement drawings for approval. After the approval of the design calculations by the Employer, detailed construction drawings shall be prepared and submitted for Employer's approval along with revised design calculations, if required, within 15 days. Required number of sets of design calculations, drawings and documents shall be submitted by the Contractor. All documents including design calculations shall be prepared in MS Word and all drawings shall be drafted using AutoCAD (Release - 2004 or higher version). During every submission one soft copy of the document (Design Calculations in .doc type file and all drawings in .dwg and .pdf format) shall also be submitted. When final approval is obtained from the Employer the Contractor shall submit all the documents in TWO sets of CD ROM (One + One Back - up) together with minimum three sets of distribution prints well documented and page controlled with details of Owner's approval marked thereon. Approval of drawings / documents shall not relieve the contractor of the responsibility regarding the adequacy of design and correctness of drawings.</p> <p>ALTERATION IN SPECIFICATION AND DESIGN</p> <p>The Project Manager shall have the power to make any alteration and omissions from, additions to or substitution for, the original specifications, drawings, designs and instructions that may appear to him to be necessary during the progress of the work, and the Contractor shall carry out the work in accordance with any instruction which may be given to him in writing signed by the Project Manager and such alterations, omissions, additions or substitutions shall not invalidate the contract and any altered, added or substituted work which the Contractor may be directed to do in the manner above specified as part of the work shall be carried out by the Contractor on the same conditions in all respects on which the Contractor agreed to do the original contract work. The time for completion of work shall be altered in the proportion that the altered, added or substituted work bears to the original contract work, and the certificate of the Project Manager shall be conclusive as to such proportion.</p> <p>The rates for the altered items of work shall be worked out on the following basis and necessary alternations in the total amount shall be made on that basis:</p> <ul style="list-style-type: none"> i) The rates to be reimbursed or recovered shall be taken as same as those given in CPWD - DSR (latest) for those items for which the rates are available in CPWD - DSR (latest). However, the premium as officially declared by CPWD's official circulars, at the time of carrying out these works, the same shall also be applicable. ii) Rates for the items not covered under CPWD - DSR (latest) shall be derived from the rates of similar items of CPWD schedule of rates. However, the premium as officially declared by CPWD on the above DSR rates if existing or prevalent through CPWD's official circulars, at the time of carrying out these works, the same shall be applicable. iii) In the event there is no similar class of work specified in the CPWD - DSR (latest) the Contractor shall work on a rate for such an item on the basis of 			
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	<p>the prevalent market rates for materials / men / machines and submit the same together with the detailed analysis to the Project Manager with in 7 days. The Project Manager shall thereafter review the correctness and then conduct necessary negotiations with the Contractor to arrive at a mutually agreeable rate. Engineer's decision in regard to rates of such items shall be final and binding on the Contractor.</p> <p>In case of conflict between this Sub-section and other sub-section of Technical Specifications, provisions given this sub-section shall govern.</p>			
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 37 of 54</p>

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	APPENDIX - I			
1.00.00	INTRODUCTION			
1.00.00	The codes and/or standards referred to in these specifications shall govern, in all the cases, wherever such references are made. In case of conflict between such codes and/or standards and the specifications, the latter shall govern. Such codes and/or standards referred to shall mean the latest revisions/amendments/changes adopted and published by the relevant agencies. In case of any further conflict in this matter, the same shall be referred to the Engineer, whose decision shall be final and binding.			
1.02.00	Other internationally acceptable standards which ensure equal or higher performance than those specified shall also be accepted.			
1.03.00	Abbreviations have been used for denoting International and National Standardizations Organisations.			
	Reference Abbreviation		Name & Address	
	ASA		American Standards Association American National Standards Institute 1430 Broadway, New York, N.Y 110018, USA	
	ASTM		American Society of Testing and Materials 1916, Race Street, Philadelphia Pennsylvania - 19103, USA	
	BS		British Standards British Standards Institution 101, Pentonvite Road, London N 16 ND, U.K	
	CEE		Commission on rules for the approval of Electrical Equipment (Netherlands) Netherlands Normilisatie- Institute Polkwege, Rijswijk (ZH)-2016, Netherlands	
	DIN		Deutscher Normenausschuss Beuth Verlag BMBH Auzlieferugn, Burggra Fenstrape-4-7 1000 Berlin 30, Germany	
	IEC		International Electronical Commission Bureque Central Delta CommissionElectrotechnique Internationale, 1, rue de Varrmbe Geneva, Switzerland	
	IS		Indian Standards Manak Bhawan, 9 Bahadur Shah Zafar Marg New Delhi - 100 001	
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS: 1786 IS: 2062 IS: 2116 IS: 2386 (Parts-I to VIII) IS: 3150 IS: 3495 (Parts-I to IV) IS: 3812 IS: 4031 IS: 4032 IS: 4082 IS: 8112 IS: 8500 IS: 12269 IS: 12894 (C) CAST-IN-SITU CONCRETE AND ALLIED WORKS IS: 280 IS: 456 IS: 457 IS: 516 IS: 650 IS: 1199 IS: 1791	Specification for high strength deformed bars for concrete reinforcement. Specification for steel for general structural purposes. Specification for sand for masonry mortars. Testing of aggregates for concrete. Hexagonal wire netting for general purpose. Methods of tests of burnt clay building bricks. Specification for fly ash, for use as pozzolana and admixture. Methods of physical tests for hydraulic cement. Methods of chemical analysis of hydraulic cement. Recommendations on stacking and storage of construction materials at site. Specification for 43 grade ordinary portland cement. Medium and high strength structural steel. 53 grade ordinary portland cement. Specification for Fly ash lime bricks.		
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS: 1838 (Part-I)		Specification for preformed fillers for expansion joints in concrete pavements and structures (non-extruding and resilient type).	
	IS: 2438		Specification for roller pan mixer.	
	IS: 2502		Code of practice for bending and fixing of bars for concrete reinforcement.	
	IS: 2505		General requirements for concrete vibrators, immersion type.	
	IS: 2506		General requirements for concrete vibrators, screed board type.	
	IS: 2514		Specification for concrete vibrating tables.	
	IS: 2645		Specification for Integral cement water proofing compounds.	
	IS: 2722		Specification for portable swing weigh batches for concrete. (single and double bucket type)	
	IS: 2750		Specification for Steel scaffolding.	
	IS: 2751		Code of practice for welding of mild steel plain and deformed bars for reinforced concrete construction.	
	IS: 3025		Methods of sampling and test waste water.	
	IS: 3366		Specification for Pan vibrators.	
	IS: 3370 (Part I to IV)		Code of practice for concrete structures for the storage of liquids.	
	IS: 3414		Code of practice for design and installation of joints in buildings.	
	IS: 3550		Methods of test for routine control for water used in industry.	
	IS: 3558		Code of practice for use of immersion vibrators for consolidating concrete.	
	IS: 4014 (Parts I & II)		Code of practice for steel tubular scaffolding.	
	IS: 4326		Code of practice for earthquake resistant design and construction of buildings.	
	IS: 4656		Specification for form vibrators for concrete.	
	IS: 4925		Specification for batching and mixing plant.	
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS: 4990		Specification for plywood for concrete shuttering work.	
	IS: 5256		Code or practice for sealing joints in concrete lining on canals.	
	IS: 5525		Recommendations for detailing of reinforcement in reinforced concrete work.	
	IS: 5624		Specification for foundation bolts.	
	IS: 6461		Glossary of terms relating to cement concrete.	
	IS: 6494		Code of practice for water proofing of underground water reservoirs and swimming pools.	
	IS: 6509		Code of practice for installation of joints in concrete pavements.	
	IS: 7861		Code of practice for extreme weather concreting. (Parts I & II)	
	IS: 9012		Recommended practice for shot concreting.	
	IS: 9103		Specification for admixtures for concrete.	
	IS: 9417		Recommendations for welding cold worked steel bars for reinforced concrete construction.	
	IS: 10262		Recommended guidelines for concrete mix design.	
	IS: 11384		Code of practice for composite construction in structural steel and concrete.	
	IS: 12118		Specification for two-parts poly sulphide.	
	IS: 12200		Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams.	
	IS: 13311		Method of non-destructive testing of concrete.	
	Part-1		Ultrasonic pulse velocity.	
	Part-2		Rebound hammer.	
	SP:23		Handbook of concrete mixes	
	SP: 24		Explanatory Handbook on IS: 456-1978	
	SP: 34		Handbook on concrete reinforcement and detailing.	
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 42 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	(D) PRECAST CONCRETE WORKS			
	SP: 7(PartVI/ Sec.7)		National Building Code- Structural design of prefabrication and systems building.	
	IS: 10297		Code of practice for design and construction of floors and roofs using precast reinforced/prestressed concrete ribbed or cored slab units.	
	IS: 10505		Code of practice for construction of floors and roofs using pre-cast reinforced concrete units.	
	(E) MASONRY AND ALLIED WORKS			
	IS: 1905		Code of Practice for Structural Safety of Buildings-Masonry walls.	
	IS: 2212		Code of Practice for Brickwork.	
	IS: 2250		Code of Practice for Preparation and use of Masonry Mortar.	
	SP: 20		Explanatory hand book on masonry code.	
	(F) SHEETING WORKS			
	IS:277		Galvanised steel sheets (plain or corrugated).	
	IS: 459		Unreinforced corrugated and semi-corrugated asbestos cement sheets.	
	IS: 513		Cold-rolled carbon steel sheets.	
	IS: 730		Specification for fixing accessories for corrugated sheet roofing.	
	IS: 1626		Specification for Asbestos cement building pipes and pipe fittings, gutters and gutter fittings and roofing fittings.	
	IS: 2527		Code of practice for fixing rain water gutters and down pipe for roof drainage.	
	IS: 3007		Code of practice for laying of asbestos cement sheets.	
	IS: 5913		Methods of test for asbestos cement products.	
	IS: 7178		Technical supply conditions for tapping screw.	
	IS: 8183		Bonded mineral wool.	
	IS: 8869		Washers for corrugated sheet roofing.	
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS: 12093	Code of practice for laying and fixing of sloped roof covering using plain and corrugated galvanised steel sheets.		
	IS: 12866	Plastic translucent sheets made from thermosetting polyester resin (glass fibre reinforced).		
	IS: 14246	Specification for continuously pre-painted galvanised steel sheets and coils.		
	(G) FABRICATION AND ERECTION OF STRUCTURAL STEEL WORK			
	IS: 2016	Specification for plain washers.		
	IS: 814	Specification for covered Electrodes for Metal Arc Welding for weld steel.		
	IS: 1852	Specification for Rolling and Cutting Tolerances for Hot rolled steel products.		
	IS: 3502	Specifications for chequered plate.		
	IS: 6911	Specification for stainless steel plate, sheet and strip.		
	IS: 3757	Specification for high strength structural bolts		
	IS: 6623	Specification for high strength structural nuts.		
	IS: 6649	High Tensile friction grip washers.		
	IS: 800	Code of practice for use of structural steel in general building construction.		
	IS: 816	Code of practice for use of Metal Arc Welding for General Construction.		
	IS: 4000	Code of practice for assembly of structural joints using high tensile friction grip fasteners.		
	IS: 9595	Code of procedure of Manual Metal Arc Welding of Mild Steel.		
	IS: 817	Code of practice for Training and Testing of Metal Arc Welders.		
	IS: 1811	Qualifying tests for Metal Arc Welders (engaged in welding structures other than pipes).		
	IS: 7215	Tolerances for fabrication steel structures.		
	IS: 12843	Tolerance for erection of structural steel.		
	IS: 4353	Recommendations for submerged arc welding of mild steel and low alloy steels.		
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	SP: 6 (Part 1 to 7) IS: 1608 IS: 1599 IS : 228 IS : 2595 IS : 1182 IS : 3664 IS : 3613 IS : 3658 IS : 5334	ISI Hand book for structural Engineers. Method of Tensile Testing of Steel products other than sheets, strip, wire and tube. Method of Bend Tests for Steel products other than sheet, strip, wire and tube Methods of chemical Analysis of pig iron, cast iron and plain carbon and low alloy steel. Code of Practice for Radio graphic testing. Recommended practice for Radiographic Examination of fusion welded butt joints in steel plates. Code of practice for Ultra sonic Testing by pulse echo method. Acceptance tests for wire flux combination for submerged Arc Welding. Code of practice for Liquid penetrant Flaw Detection. Code of practice for Magnetic Particle Flaw Detection of Welds.		
	<p>(H) PLASTERING AND ALLIED WORKS</p> IS : 1635 Code of practice for field slaking of Building lime and preparation of putty. IS : 1661 Application of cement and cement lime plaster finishes. IS : 2333 Plaster-of-paris. IS : 2402 Code of practice for external rendered finishes. IS : 2547 Gypsum building plaster. IS : 3150 Hexagonal wire netting for general purpose.			
	<p>(I) WATER SUPPLY, DRAINAGE AND SANITATION</p> IS : 458 Specification for concrete pipes. IS : 554 Dimensions for pipe threads, where pressure tight joints are made on thread. IS : 651 Specification for salt glazed stoneware pipes. IS : 774 Flushing cisterns for water closets and urinals.			
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
IS : 775				Cast iron brackets and supports for wash basins and sinks.
IS : 778				Copper alloy gate, globe and check valves for water works purposes.
IS : 781				Cast copper alloy screw down bib taps and stop valves for water services.
IS : 782				Caulking lead.
IS : 783				Code of practice for laying of concrete pipes.
IS : 1172				Basic requirements for water supply, drainage and sanitation.
IS : 1230				Cast iron rain water pipes and fittings.
IS : 1239				Mild steel tubes, tubulars and other wrought steel fittings.
IS : 1536				Centrifugally cast (Spun) iron pressure pipes for water, gas and sewage.
IS : 1537				Vertically cast iron pressure pipes for water, gas and sewage.
IS : 1538				Cast iron fittings for pressure pipe for water, gas and sewage.
IS : 1703				Ball valves (horizontal plunger type) including float for water supply purposes.
IS : 1726				Cast iron manhole covers and frames.
IS : 1729				Sand cast iron spigot and socket, soil, water and ventilating pipes, fittings and accessories.
IS : 1742				Code of practice for building drainage.
IS : 1795				Pillar taps for water supply purposes.
IS : 1879				Malleable cast iron pipe fittings.
IS : 2064				Code of practice for selection, installation and maintenance of sanitary appliances.
IS : 2065				Code of practice for water supply in building.
IS : 2326				Automatic flushing cisterns for urinals.
IS : 2470 (Part-I & II)				Code of practice for installation of septic tanks.
IS : 2501				Copper tubes for general engineering purposes.
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS : 2548		Plastic seat and cover for water-closets.	
	IS : 2556 (Part 1 to 15)		Vitreous sanitary appliances (vitreous china).	
	IS : 2963		Non-ferrous waste fittings for wash basins and sinks.	
	IS : 3114		Code of practice for laying of cast iron pipes.	
	IS : 3311		Waste plug and its accessories for sinks and wash basins.	
	IS : 3438		Silvered glass mirrors for general purposes.	
	IS : 3486		Cast iron spigot and socket drain pipes.	
	IS : 3589		Electrically welded steel pipes for water, gas and sewage (200mm to 2000mm nominal diameter).	
	IS : 3989		Centrifugally cast (Spun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.	
	IS : 4111 (Part I to IV)		Code of practice for ancillary structure in sewerage system.	
	IS : 4127		Code of practice for laying of glazed stone-ware pipes.	
	IS : 4764		Tolerance limits for sewage effluents discharged into inland-surface waters.	
	IS : 4827		Electro plated coating of nickel and chromium on copper and copper alloys.	
	IS : 5329		Code of practice for sanitary pipe work above ground for buildings.	
	IS : 5382		Rubber sealing rings for gas mains, water mains and sewers.	
	IS : 5822		Code of practice for laying of welded steel pipes for water supply.	
	IS : 5961		Cast iron grating for drainage purpose.	
	IS : 7740		Code of practice for road gullies.	
	IS : 8931		Cast copper alloy fancy bib taps and stop valves for water services.	
	IS : 8934		Cast copper alloy fancy pillar taps for water services.	
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS : 9762	Polyethylene floats for ball valves.		
	IS : 10446	Glossary of terms for water supply and sanitation.		
	IS : 10592	Industrial emergency showers, eye and face fountains and combination units.		
	IS : 12592	Specification for precast concrete manhole covers and frames.		
	IS : 12701	Rotational moulded polyethylene water storage tanks.		
	SP: 35	Hand book on water supply and drainage.		
	-	Manual on Sewerage and sewage treatment (Published by CPH & EEO) As updated.		
(I) DOORS, WINDOWS AND ALLIED WORKS				
	IS : 204	Tower Bolts		
	Part-I	Ferrous metals.		
	Part-II	Nonferrous metals.		
	IS : 208	Door Handles.		
	IS : 281	Mild steel sliding door bolts for use with padlocks.		
	IS : 362	Parliament Hinges.		
	IS : 420	Specification for putty, for use on metal frames.		
	IS : 1003 (Part-I)	Specification for timber panelled and glazed shutters-Part-I door shutters.		
	IS : 1038	Steel doors, windows and ventilators.		
	IS : 1081	Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.		
	IS : 1341	Steel butt hinges.		
	IS : 1361	Steel windows for industrial buildings.		
	IS : 1823	Floor door stoppers.		
	IS : 1868	Anodic coatings on Aluminium and its alloys.		
	IS : 2202 (Part-II)	Specification for wooden flush door shutters (solid core type); particle board face panels and hard board face panels		
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IS:2209	Mortice locks (vertical type).		
	IS:2553	Safety glass		
	IS:2835	Flat transparent sheet glass.		
	IS:3548	Code of practice for glazing in buildings.		
	IS:3564	Door closers (Hydraulically regulated).		
	IS : 3614	Fire check doors; plate, metal covered and rolling type.		
	IS:4351	Steel door frames.		
	IS:5187	Flush bolts.		
	IS:5437	Wired and figured glass		
	IS:6248	Metal rolling shutters and rolling grills.		
	IS:6315	Floor springs (hydraulically regulated) for heavy doors.		
	IS:7196	Hold fasts.		
	IS:7452	Hot rolled steel sections for doors, windows and ventilators.		
	IS:10019	Mild steel stays and fasteners.		
	IS:10451	Steel sliding shutters (top hung type).		
	IS:10521	Collapsible gates.		
	(J) ROOF WATER PROOFING AND ALLIED WORKS			
	IS:1203	Methods of testing tar and bitumen.		
	IS:1322	Specification for bitumen felts for water proofing and damp proofing.		
	IS:1346	Code of practice for water proofing of roofs with bitumen felts.		
	IS:1580	Specification for bituminous compound for water proofing and caulking purposes.		
	IS:3067	Code of practice for general design details and preparatory work for damp proofing and water proofing of buildings.		
	IS:3384	Specification for bitumen primer for use in water proofing and damp proofing.		
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	(K) FLOOR FINISHES AND ALLIED WORKS			
IS:1237	Specification for cement concrete flooring tiles.			
IS:1443	Code of practice for laying and finishing of cement concrete flooring tiles.			
IS:2114	Code of practice for laying in-situ terrazzo floor finish.			
IS:2571	Code of practice for laying in-situ cement concrete flooring.			
IS:3462	Specification for unbacked flexible PVC flooring.			
IS:4971	Recommendations for selection of industrial floor finishes.			
IS:5318	Code of practice for laying of flexible PVC sheet and tile flooring.			
IS:8042	Specification for white portland cement.			
IS:13801	Specification for chequered cement concrete flooring tiles.			
	(L) PAINTING AND ALLIED WORKS			
IS:162	Specification for fire resisting silicate type, brushing, for use on wood, colour as required.			
IS:1477	Code of practice for painting of ferrous metals in buildings.			
Part-I	Pretreatment.			
Part-II	Painting.			
IS:1650	Specification for colours for building and decorative finishes.			
IS:2074	Specification for red oxide-zinc chrome, priming, ready mixed paint air drying.			
IS:2338	Code of practice for finishing of wood and wood based materials.			
Part-I	Operations and workmanship			
Part-II	Schedules			
IS:2395	Code of practice for painting concrete, masonry and plaster surfaces.			
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CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	Part-I		Operations and workmanship.	
	Part-II		Schedule.	
	IS:2524		Code of practice for painting of nonferrous metals in buildings.	
	Part-I		Pretreatment.	
	Part-II		Painting.	
	IS:2932		Specification of synthetic enamel paint, exterior, under-coating and finishing.	
	IS:2933		Specification enamel paint, under coating and finishing.	
	IS:4759		Code of practice for hot dip zinc coating on structural steel and other allied products.	
	IS:5410 IS:5411 (Part-I)		Specification for cement paint Specification for plastic emulsion paint-for exterior use	
	IS:6278		Code of practices for white washing and colour washing.	
	IS:10403		Glossary of terms relating to building finishes.	
	IS 12054		Code of practice for application of silicon based water repellent	
	IS 12027		Specification for silicone-based water repellents	
(M) PILING AND FOUNDATION				
	IS:1080		Code of practice for design and construction of simple spread foundations.	
	IS:1904		Code of practice for design and construction of foundations in Soils; General Requirements.	
	IS:2950 (Part-I)		Code of practice for designs and construction of Raft foundation.	
	IS:2974 (Part-I to V)		Code of practice for design and construction of machine foundations.	
	IS:6403		Code of practice for determination of Allowable Bearing pressure on Shallow foundation.	
	IS:8009		Code of practice for calculation of settlement of foundation subjected to symmetrical vertical loads.	
	Part-I		Shallow foundations.	
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 51 of 54</p>

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS				
	Part-II IS:12070 DIN:4024 VDI:2056 VDI:2060 (N) STOP LOG AND TRASH RACK IS:4622 IS:5620 IS:11388 IS:11855 (O) INTAKE WELL AND ROADS IRC:5 IRC:14 IRC:16 IRC:19 IRC:21 IRC:37 IRC:86 IRC:SP:13	Deep foundations. Code of practice for design and construction of shallow foundations on rocks. Flexible supporting structures for machines with rotating machines. Criteria for assessing mechanical vibrations of machines. Criteria for assessing rotating imbalances in machines. Recommendations for fixed-wheel gates structural design. Recommendations for structural design criteria for low head slide gates. Recommendations for design of trash rack for intakes. General requirements for rubber seals for hydraulic gates. Standard specifications and Code of practice for road bridges, section-I general Features of Design. Recommended practice of 2cm thick bitumen and tar carpets. Specification for priming of base course with bituminous primers. Standard specifications and code of practice for water bound macadam. Standard specifications and Code of practice for road bridges, section-III - Cement concrete (plain and reinforced). Guidelines for the Design of flexible pavements. Geometric Design standards for urban roads in plains. Guidelines for the design of small bridges & culverts.			
NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE	BID DOC. NO. CS-0260-132G-2	TECHNICAL SPECIFICATIONS SECTION VI, PART-B	Sub Section IIID-01 Civil Works	Page 52 of 54	

CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
	IRC - Publication		Ministry of Surface Transport (Roads Wing), Specifications for Road and Bridge works.	
	IS:73		Specification for paving bitumen	
	IRC:45		Recommendations for Estimatign the Resistance of Soil below the Maximum Scour Level in the Design of Well Foundations of Bridges	
	IRC:78, Section VII		Foundations and Substructure	
	(P) LOADING			
	IS:875 (Pt. I to V)		Code of practice for design loads other than earthquake) for buildings and structures.	
	IS:1893		Criteria for earthquake resistant design of structures.	
	IS:4091		Code of Practice for design and construction of foundation for transmission line towers & poles.	
	IRC:6		Standard specifications & code of practice for road bridges, Section-II Loads and stresses.	
	M.O.T.		Deptt. of Railways Bridge Rules.	
	(Q) SAFETY			
	IS:3696 (Part I & II)		Safety code for scaffolds and ladders.	
	IS:3764		Safety code for excavation work.	
	IS:4081		Safety code for blasting and related drilling operations.	
	IS:4130		Safety code for demolition of buildings.	
	IS:5121		Safety code for piling and other deep foundations.	
	IS:5916		Safety code for construction involving use of hot bituminous materials.	
	IS:7205		Safety code for erection on structural steelwork.	
	IS:7293		Safety code for working with construction machinery.	
	IS:7969		Safety code for handling and storage of building materials	
	IS:11769		Guidelines for safe use of products containing asbestos.	
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>BID DOC. NO. CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p>Sub Section IIID-01 Civil Works</p>	<p>Page 53 of 54</p>


CLAUSE NO.	TECHNICAL REQUIREMENTS – CIVIL WORKS			
1.05.00	<p style="text-align: center;">Indian Explosives Act. 1940 as updated.</p> <p>Other Standards which ensure equal or better quality than the standards specified may also be acceptable. In that case, however, the Bidder shall supply copies of the specification adopted by them and shall mention clearly in what respects such standard specifications differ from the corresponding Indian Standards mentioned here.</p>			
<p style="text-align: center;">NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p style="text-align: center;">BID DOC. NO. CS-0260-132G-2</p>	<p style="text-align: center;">TECHNICAL SPECIFICATIONS SECTION VI, PART-B</p>	<p style="text-align: center;">Sub Section IIID-01 Civil Works</p>	<p style="text-align: center;">Page 54 of 54</p>


PART - B
QUALITY ASSURANCE
SUB-SECTION - IIIE-20
CIVIL WORKS

CLAUSE NO.	Quality Assurance for Civil Works				
<p>1.0.0</p> <p>1.1.0</p> <p>1.2.0</p> <p>1.3.0</p> <p>1.4.0</p> <p>2.0.0</p> <p>2.1.0</p> <p>2.2.0</p> <p>2.3.0</p>	<p>INTRODUCTION</p> <p>This part of the specification covers the sampling, testing and quality assurance requirement (including construction tolerances and acceptance criteria) for all civil and structural works covered in this specification.</p> <p>This part of the technical specification shall be read in conjunction with other parts of the technical specifications, general technical requirements & erection conditions of the contract. Wherever IS code or standards have been referred they shall be the latest revisions.</p> <p>The rate for respective items of work or price shall include the cost for all works, activities, equipment, instrument, personnel, material etc. whatsoever associated to comply with sampling, testing and quality assurance requirement including construction tolerances and acceptance criteria and as specified in subsequent clauses of this part of the technical specifications. The QA and QC activities in all respects as specified in the technical specifications/ drawings / data sheets / quality plans / contract documents shall be carried out at no extra cost to the owner.</p> <p>The contractor shall prepare detailed construction and erection methodology scheme which shall be compatible to the requirements of the desired progress of work execution, quality measures, prior approvals if any and the same shall be got approved by the Engineer. If required, work methodology may be revised/ reviewed at every stage of execution of work at site, to suit the site conditions by the contractor at no extra cost to the owner.</p> <p>QA AND QC MANPOWER</p> <p>The contractor shall nominate one overall QA coordinator for the contract detailing the name, designation, contact details and address at the time of post bid discussions. All correspondence related to Quality Assurance shall be addressed by the contractor's QA coordinator to NTPC. NTPC shall address all correspondence related to Quality issues to the contractor's QA coordinator. The contractor's QA coordinator shall be responsible for co-ordination of Quality activities between various divisions of the contractor and their sub-vendors on one hand & with NTPC on the other hand.</p> <p>The contractor shall appoint a dedicated, experienced and competent QA&QC in-charge at site, preferably directly reporting to the Project Manager, supported as necessary by experienced personnel, to ensure the effective implementation of the approved QAP. An indicative structure of contractor's QA&QC manpower required to be deployed at site is enclosed at Annexure-I. Based on the finalized L-2 network and the approved Field Quality plan, the contractor shall finalize and submit a deployment schedule of QA&QC personnel along with their details to NTPC for approval/ acceptance and further shall ensure their availability well before the start of the concern activity.</p> <p>The QA&QC in-charge shall have the organizational freedom and authority to implement the requirements of these quality assurance arrangements, free from commercial and programme restraints. The QA&QC setup of the contractor shall consist of qualified and experienced Civil, Electrical, Mechanical Engineers and Laboratory assistants with their supporting staff both at their works and site.</p>				
<p>NTECL POWER PROJECT (3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>Bid Doc. No.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI PART - B</p>	<p>SUB SECTION – III E -20</p>	<p>Page 1 of 13</p>	

CLAUSE NO.	Quality Assurance for Civil Works			
2.4.0	The deployment of man power for QA & QC set up shall be affected on the basis of agreed manpower deployment schedule, which shall be prepared by the contractor based on the L-2 network and the same shall be submitted to the engineer-in-charge for acceptance.			
3.0.0	SAMPLING AND TESTING OF CONSTRUCTION MATERIALS			
3.1.0	The method of sampling for testing of construction materials and work / job samples shall be as per the relevant IS / standards / codes and in line with the requirements of the technical specifications / quality plans. All samples shall be jointly drawn, signed and sealed wherever required, by the contractor and the engineer or his authorized representative.			
3.2.0	The contractor shall carry out testing in accordance with the relevant IS / standards / codes and in line with the requirements of the technical specifications / quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer. All testing shall be done in the presence of the engineer or his authorized representative.			
3.3.0	Before execution of any civil work the contractor shall conduct full-scale suitability tests on various construction and building material such as fine and coarse aggregates, cement, reinforcement, construction chemicals, supplementary cementitious materials and construction water to ascertain their suitability for use and the concrete mix designs conducted from reputed institutes such as NCB-Ballabgarh, CSMRS-Delhi, selected IIT's, etc. as agreed by the engineer. A list of NTPC acceptable specialist laboratories is enclosed at Annexure-II . The test samples for such full scale testing shall be jointly sampled and sealed by the engineer and contractor, thereafter these shall be sent to the concerned laboratory through the covering letter signed by field quality assurance (FQA) representative of the engineer. Format for sampling and testing of cement, coarse aggregate, fine aggregate, chemical admixture, fly ash, water, concrete mix design is enclosed at Annexure-III .			
3.4.0	The contractor shall timely initiate the action with regard to the evaluation of aggregates and other building material including concrete mix design, so as to ensure completion of these tests before start of civil works at site, thereby not affecting any project work. The test reports and recommendations for suitability of the materials including concrete mix design shall be promptly submitted by the contractor to the engineer.			
3.5.0	<p>Evaluation of aggregate for potential alkali-aggregate reactivity shall be carried out as per following scope of work</p> <p>A. Evaluation of Aggregates for Mechanical / Physical Properties</p> <ol style="list-style-type: none"> a) To carry out different tests on coarse aggregate sample i.e. specific gravity, water absorption, sieve analysis, deleterious material; soundness, crushing value, impact value, abrasion value, elongation index and flakiness index, as per IS: 2386. b) To carry out different tests on fine aggregate sample i.e. specific gravity, water absorption, sieve analysis, deleterious material, soundness, silt content, clay content and organic impurities as per IS: 2386. c) To prepare evaluation report based on test results of a) and b) above and to advise regarding suitability of fine and coarse aggregates. <p>B. Evaluation of Aggregates for Potential Alkali-Aggregate Reactivity:</p>			
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	<p>a) To carry out petrographic analysis and accelerated Mortar bar Test on aggregate samples (1N NaOH at 80 deg. Centigrade for 14 days as per ASTM 1260, or the method established/ developed by CSMRS for 22days test).</p> <p>b) To prepare a report based on test results of a) above and to advise regarding suitability of aggregates to be used and further testing required if any.</p> <p>4.0.0 LABORATORY AND FIELD TESTING</p> <p>4.1.0 The field laboratory for QA and QC activities shall be constructed and set-up by the contractor in line with the indicative field QA&QC laboratory set-up enclosed at Annexure-IV. The Laboratory building shall be constructed and installed with the adequate facilities to meet the requirement of envisaged test setup. Temperature and humidity controls shall be available wherever necessary during testing of samples. The quality plan shall identify the testing equipments/ instrument, which the contractor shall deploy and equip the field quality laboratory for meeting the field quality plan requirements. The contractor shall furnish a comprehensive list of testing equipments/ instrument required to meet the planned/scheduled tests for the execution of works for NTPC acceptance/ approval. The contractor shall mobilize the requisite laboratory equipment and QA&QC manpower at least 15 days prior to the planned test activity as per the schedule of tests.</p> <p>4.2.0 All equipments and instruments in the field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the NTPC. The calibration certificates shall specify the fitness of the equipments and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipments and instruments by an NABL / NPL accredited agency and the calibration report shall be submitted to NTPC.</p> <p>4.3.0 The tests which cannot be carried out in the field laboratory shall be done at a laboratory of repute. This includes selected IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by NTPC engineer. The test report along with the recommendations shall be obtained from the laboratories without delay and submitted to NTPC.</p> <p>4.4.0 Based on the schedule of work agreed with the engineer-in-charge and the approved FQP, the contractor shall prepare a schedule of tests and submit them to the engineer-in-charge and organize to carry out the tests as scheduled / agreed.</p> <p>5.0.0 PURCHASE AND SERVICE</p> <p>5.1.0 An indicative list of major bought out items (not exhaustive) for civil works is enclosed at Annexure- V, for which the contractor shall submit the requisite details / lists of manufacturer's in their bid proposal. General Technical Requirements (GTR) may be referred for further details.</p> <p>5.2.0 Structural / Reinforcement steel supply if in the scope of the contractor shall be procured from Main Steel Producers like SAIL, TISCO, RINL, Essar Steel Ltd, Ispat Industries Ltd, JSW Steel Ltd, Uttam Value Steels Ltd, Jindal Steel & Power and Jai Balaji Industries Ltd, Durgapur (for 8-40mm reinforcement steel only), Sunflag Steel & Iron Co., Bhandra</p>			
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<p>6.0.0</p> <p>7.0.0</p> <p>7.1.1</p> <p>7.1.2</p>	<p>[Only for rounds(15-105mm), Flats(45-120mm width & 4.75 – 28 mm thick), Hex Rods (15.5 – 42 mm) and wire rods (5.5 – 38 mm)].</p> <p>MANUFACTURING QUALITY PLAN AND FIELD QUALITY PLAN</p> <p>Well before the start of the work, the contractor shall prepare and submit the Field Quality Plans (FQP) on the format No. QS-01-QAI-P-09/F2-R1, and obtain approval of NTPC, which shall detail out for all the works, equipments, services, quality practices and procedures etc in line with the requirement of the technical specifications to be followed by the contractor at site. This FQP shall cover for all the items / activities covered in the contract / schedule of items required, right from material procurement to completion of the work at site. An Indicative Field Quality Plan for civil works is enclosed at Annexure – VI-A (Indicative FQP for civil works) & Annexure –VI-B (Indicative FQP for structural steel works).</p> <p>GENERAL QA REQUIREMENTS</p> <p>The contractor shall ensure that the works, BOIs and services under the scope of contract whether manufactured or performed within contractor's works or at his sub-contractor's premises or at the NTPC's site or at any other place of work are in accordance with the NTPC technical specification, applicable standards / codes, approved drawings / data sheets / quality plans and BOQ. All the works, BOIs and services shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer.</p> <p>STORAGE AND HANDLING OF CONSTRUCTION MATERIALS</p> <p>All materials shall be stacked and stored by the Contractor as per IS-4082 and as per the requirements specified in NTPC Technical Specification.</p> <p>EXCAVATION AND FILLING WORKS</p> <p>The contractor shall submit a work methodology covering various items of works for all stages of excavation and filling works. This methodology shall broadly include the quantity wise and classification wise identification of source of excavation and filling, suitability tests as per specification requirements, method of stockpiling, transportation, placement, spreading , compaction, equipment, list of protocols, in-situ tests, third party lab test if required, acceptance checks for final clearance.</p> <p>For blasting work at site if required, the contractor shall associate themselves with the reputed specialized blasting agency such as CMRI, NIRM for trials blasts, design blasts, blasting pattern, monitoring of blast during the blasting operations at site. The contractor shall install and operate equipment (such as tri-axial seismograph) for continuous monitoring and control of blast induced vibrations, noise level/ air pressure, dust, silica and noxious gases during all blasting operations in line with the technical specification requirements in association with the specialized blasting agency. The contractor shall submit the un-priced copy of the award on the specialized blasting agencies to NTPC, highlighting the scope of services / work awarded to them by contractor. The services of such specialized blasting agency shall be available through out the period in which the blasting work is undertaken at site. The blasting operation shall remain in charge of a responsible, competent, authorized and experienced supervisor (man-in-charge) and thoroughly acquainted workmen. All blasting work shall be done as per approved blasting scheme/ design/ pattern in line with the technical specification requirements and</p>	<p>NTECL POWER PROJECT (3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>Bid Doc. No.: CS-0260-132G-2</p>	<p>TECHNICALSPECIFICATIONS SECTION – VI PART - B</p>	<p>SUB SECTION – III E -02</p>	<p>Page 4 of 13</p>

all statutory laws, rules, regulations, relevant standards pertaining to the acquisition, transport, storage, handling along with use of explosives shall be strictly followed by the contractor.

Tolerance for finished surface level shall be within 20 mm of the level shown in the drawing. For an unimportant area, tolerance up to +75mm shall be acceptable at the discretion of the engineer. However, these tolerances shall be applicable for localized areas only.

Acceptance criteria shall be

- a) When only one set of sample is tested, then all individual samples collected and tested should pass without any deviation
- b) For retest of any sample two additional samples shall be collected and tested, and both should pass without any deviation.
- c) Where a large number of samples are tested for a particular test then 9 samples out of every 10 consecutive samples tested shall meet the specification requirement.


7.1.3

MASONRY AND ALLIED WORKS

The execution, finishing, testing and acceptance of masonry related works shall be as per the provisions of technical specifications / relevant practices IS code. Local depressions on account of faulty workmanship, broken / chipped edges shall not be acceptable.

All masonry shall be built true and plumb within the tolerances prescribed as below. Care shall be taken to keep the perpends properly aligned. Unless specified otherwise the tolerances in construction of masonry works shall be as below:

Type of Check	Tolerance
Deviation in verticality in total height of any wall of a building	Shall not exceed $\pm 12.5\text{mm}$ (more than one storey) $\pm 6\text{mm}$ per 3m height (within a storey)
Deviation from the position shown on the plan of any brickwork	Shall not exceed 12.5mm (more than one storey)
Relative displacement between load bearing walls in adjacent storeys intended to be in vertical alignment	Shall not exceed 6mm
Deviation of bed joint from horizontal in any length, and it	Shall not exceed 6mm (upto 12m) Shall not exceed 12.5mm total (in any length over 12m)
Deviation from the specified thickness of bed-joints, cross-joints or perpends	Shall not exceed $\pm 3\text{mm}$
Finished plastered surface	Deviation not more than 4 mm when checked with a straight edge of 2 m length placed against the surface
The average thickness of plaster	Not be less than the specified thickness
The minimum thickness over any portion of the surface	Not less than the specified thickness by more than 3 mm for plaster thickness above 12mm and 1 mm for

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7.1.4	ceiling plaster			
	<p>CONCRETE WORKS</p> <p>For concreting works provisions of technical specifications and IS: 456 shall apply. A detailed methodology for concrete works shall be submitted by the contractor to NTPC for approval. The methodology may require change / modification based on the site conditions, for which suitable revisions shall be submitted.</p> <p>The methodology for concrete works shall broadly contain the suitability of source of aggregates, cement, admixture, water and reinforcement steel, etc. The available concrete mix design recommended from a specialist institute, results of trial mix carried out at site, method / control of batching, mixing, transportation, layer wise placement, compaction, fixing / removal of form work, staging, fixing of water stops at appropriate locations along with specials, expansion joints, contraction joints and construction joints, cover blocks and method of curing, methodology of repair of newly placed hardened concrete, testing and sampling of concrete during production and placement and acceptance checks for final clearance.</p> <p>The equipment, deployment of manpower and machinery shall arranged by the contractor to ensure the continuous rate of placement of specified grade of concrete so as to prevent segregation, bleeding, formation of cold joints, temperature control for concreting in extreme weather conditions and for mass concreting works.</p> <p>Exposed surfaces of concrete shall be kept continuously in a damp or wet condition for at least seven days from the date of placing concrete in case of ordinary Portland cement, not be less than 10 days for concrete exposed to dry and hot weather conditions, at least 10 days or period may be extended to 14 days where mineral admixtures or blended cements are used. Approved curing compounds may be used in lieu of moist curing with the permission of engineer-in-charge.</p> <p>Reinforcement steel shall conform to relevant IS codes. Lapping / spacing of reinforcement shall be so staggered that under no circumstances more than 50% of bars at any cross section shall be lapped. Corrosion resistance Steel shall be used for the foundations wherever specified in the technical specification. Sample test for 3% of the number of mechanical bars grips subject to a minimum of three, shall be carried out up to the yield strength of reinforcement of bars.</p> <p>Test shall be conducted for the water tightness of the liquid retaining structures as per technical specifications, IS 3370 and IS 6494.</p> <p>All the materials, equipments, processes used in pre cast concrete work shall conform to the requirements for the cast-in-situ concrete.</p> <p>If fly ash is used in concrete, source of supply shall be checked for suitability as per IS 3812 (Part-I). Routine tests for retention of particles on 45μ sieve and loss on ignition shall be carried out on each lot of fly ash before its use. The storage of fly ash shall be similar to that of cement. Separate Silo for fly ash shall be provided in the batching plant. Validation of Mix design using fly ash shall be carried out by an approved specialist agency, before start of concrete production.</p> <p>The acceptance criteria of concrete shall be in accordance with clause no.16 of IS 456. However in exceptional circumstances and that too in non-critical areas, the engineer may accept concrete work which is marginally unacceptable as per the criteria laid down in IS 456. For such accepted work, payment shall be made at a reduced rate pro rata to the concrete cube strength obtained, against that stipulated.</p>			
NTECL POWER PROJECT (3X500 MW) ULTRAFILTRATION PLANT PACKAGE	Bid Doc. No.: CS-0260-132G-2	TECHNICALSPECIFICATIONS SECTION – VI PART - B	SUB SECTION – III E -20	Page 6 of 13

All records of concreting, reinforcement, testing of materials, as-built dimensions, the details of the rectification, etc, shall be maintained as given below. Four copies of such record in a bound form shall be submitted to owner for their record and future reference.

- a. Testing data / report of aggregates including petrographic examination & potential reactivity of aggregate and repeated temperature cycle tests wherever specified
- b. Mix design details and record of trial mixes carried out at site
- c. Testing records of admixture as per IS-9103 / ASTM C494 including third party test reports.
- d. Approved scheme for concreting
- e. Hourly records of concreting including pour card
- f. Protocol indicating the dimensional tolerance and details of inserts
- g. Records giving the details of rectification giving the location of grouting, the quantity of grout used at each location, type of grout used
- h. Bar bending schedule
- i. Location and details of mechanical anchoring used for reinforcement
- j. Protocol giving the details of checking of reinforcements before concreting and conformance to the reinforcement details as shown in the construction drawings
- k. Photographs showing the areas where rectification works have been carried out. Photographs should be taken before and after rectification
- l. Temperature control record of concrete at the time of placement if applicable
- m. Details of curing, staging and fixing / removal of formwork, checklist for formwork as per Clause 9.9 and Annexure-C of IS 14687 including all machine foundations
- n. Batching Plant shall be calibrated regularly at least once in a 3 months. Computerized output shall be taken for each batch of production of concrete. For concreting works of ash pipe pedestals, mixer with weight batcher may be used.
- o. Dimensions (length, cross sectional dimensions, straightness, squareness, and flatness) and tolerances for pre cast members as per NTPC Technical Specification. Load test on Pre cast members (except pre- cast tiles to be laid in the reservoir) shall be carried out @ 1% up to 1000 nos., @0.5% from more than 1000 nos. precast members of one type. The load test shall be carried out as per the provisions of IS-456 and relevant IS code.

TOLERANCES			
Description of Item/ Structural Element		Max (mm)	Min (mm)
Cast In Situ Concrete			
1.	Faces of concrete in foundations and structural members against which back fill is placed	+25	-10
2.	Eccentricity of footing as percentage of footing width in the direction of placement	2% but limited to 50mm	
3.	Top surfaces of slabs and of concrete to receive base plates to be grouted	+5	-5
4.	Alignment of beams, lintels, columns, walls, slabs and similar structural elements	+5	-5
5.	Cross sectional dimensions of walls, slabs and similar structural elements	+5	-5
6.	Deviation from specified dimensions of cross-section of columns and beams	+12	-6

TOLERANCES			
Description of Item/ Structural Element		Max (mm)	Min (mm)
7.	Alignment of holding down bolts without sleeves	+1.5	-1.5
8.	Alignment of holding down bolts with sleeves	+5	-5
9.	Level of holding down bolt assemblies	+10	-10
10.	Embedded Parts (in any direction).	+5	-5
11.	Level of embedment for equipment support	+1.5	0
12.	Level of embedment for other embedded parts	+5	-5
13.	Centers of pockets or holes with greatest lateral dimension not exceeding 150mm	+10	-10
14.	Variation in steps <ul style="list-style-type: none"> • Riser • Tread 	+1.5 +3.0	-1.5 -3.0
Pre- Cast Concrete			
15.	Length:	+/- 0.1 percent	+/- 5 + 10
16.	Straightness or Bow	1/750 of the length	+/- 5 +/- 10
17.	Cross-sectional dimensions	+/- 3 mm or +/- 0.1 percent whichever is greater	
18.	Squareness:	When considering the squareness of the corner the length of the two adjacent sides being checked shall be taken as the base line. The shorter side shall not vary in length from the perpendicular by more than 5 mm.	
19.	Flatness:	The maximum deviation from a 1.5m straight edge placed in any position on a nominal plant surface shall not exceed 5 mm.	
Placing of reinforcement and for cover (Cover blocks shall be of same grade of concrete in which these would be embedded)		Clause 12.3.1 and 12.3.2 of IS 456	
Formwork		Clause 9.6 of IS 14687 and 11.1 of IS 456	
Batching		Clause 10.2.2 of IS 456	

7.1.5

STRUCTURAL STEEL WORK



For structural steel works provisions of technical specifications and IS: 800 shall apply. A detailed methodology for structural steel works shall be submitted by the contractor to NTPC for approval. The methodology may require change / modification based on the site conditions, for which suitable revisions shall be submitted.

The contractor shall submit the welding procedures specification (WPS), heat treatment procedures, NDT procedures etc. at least ninety days before scheduled start of erection work at site. All welding and brazing shall be submitted to the NTPC and carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/BS-4870 or other International equivalent standard acceptable to the NTPC.

All brazers, welders and welding operators employed on any part of the contract either in the contractor's / sub-contractor's works or at site or elsewhere shall be qualified as per AWS D1.1/ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the NTPC.

The records of welding procedure qualification and welder qualification test results shall be furnished to the NTPC for approval. However, where required by the NTPC, the tests shall be conducted in presence of NTPC / authorized representative.

No welding shall be carried out on cast iron components for repair. All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.

All Non-destructive examination shall be performed in accordance with written procedures as per International Standards and as mentioned elsewhere in the technical specification. The NDT operator shall be qualified as per SNT-TC-IA (of the American Society of non-destructive examination). NDT shall be recorded in a report, which includes details of methods and equipment used, result/evaluation, job data and identification of personnel employed and details of co-relation of the test report with the job. The records of RT (Films) and UT (inspection records or printed reports if possible) shall be documented and produced to NTPC.

Low hydrogen electrode (AWS E-7018) for welding of High/Medium tensile steel, for M.S (IS 2062) sections thickness above 20mm shall be used. Preheating and Post weld heat treatment requirements shall be complied as specified in the technical specification / approved WPS.

The requirements of pre-heating shall be

Thickness of thickest part at the area of welding / heat affected zone	Welding using other than low hydrogen welding electrodes IS 2062	Welding using low hydrogen welding electrodes or submerged arc welding IS 2062
Upto 20 mm (including)	None	None
Over 20 mm to 40 mm (including)	Not allowed	20° C
Over 40 mm to 63 mm (including)	Not allowed	66° C
Over 63 mm	Not allowed	110° C

The following tests / checks shall be carried out for structural steel works

SL. NO.	TESTS / CHECKS	QUANTUM / STANDARD
1.	Physical and chemical properties of material if supply in the scope of	As per relevant codes, review of correlated mill test certificates or

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SL. NO.	TESTS / CHECKS	QUANTUM / STANDARD
	contractor	check testing in absence of MTC
2.	Ultrasonic test on plates above 40mm	As per ASTM A435
3.	Welding procedure & welders qualification test	AWSD1.1/ASME Section-IX or BS-4871 or other equivalent International Standards
Fillet Weld		
4.	Macro-etch examination on production test coupons for main fillet welds	Minimum one joint per built up beams, columns and crane girder etc.
5.	Tension member of crane girder	Dye penetration test on 25% weld length
6.	All other fillet welds	DPT on 5% of weld length with minimum 300mm at each location
Butt Weld		
7.	DPT	100% after back gouging on all butt welds
8.	Mechanical testing of production test coupons	Minimum one joint per built up beam, column and crane girder.
9.	Radiography test on butt welds (In case of failure of any welds in SPOT/RT or UT the % of retesting shall be doubled at that particular location. Acceptance criteria of NDT on welds shall be as per AWS D1.1. Wherever RT is not feasible UT to be carried out with the approval of the engineer)	100% RT on butt welds of tension flange (bottom flange) of crane girders 10% RT weld length of each welder on butt welds,
10.	Ultrasonic testing on full penetration welds (other than butt welds)	100% UT on the web to flange joint of crane girder 10% UT on other full penetration joints
11.	Control assembly check in shop before erection	1 st and further every 10 th set of identical structure
12.	Dimensional tolerances during fabrication and erection	as per IS-7215 and IS-12843
13.	Surface Preparation and Paint thickness	SA 2 1/2 , By elcometer random after each coat, each member


7.1.6

PAINTING WORKS

Painting works shall be carried out as per the provisions of technical specifications. A detailed methodology for painting works shall be submitted by the contractor to NTPC

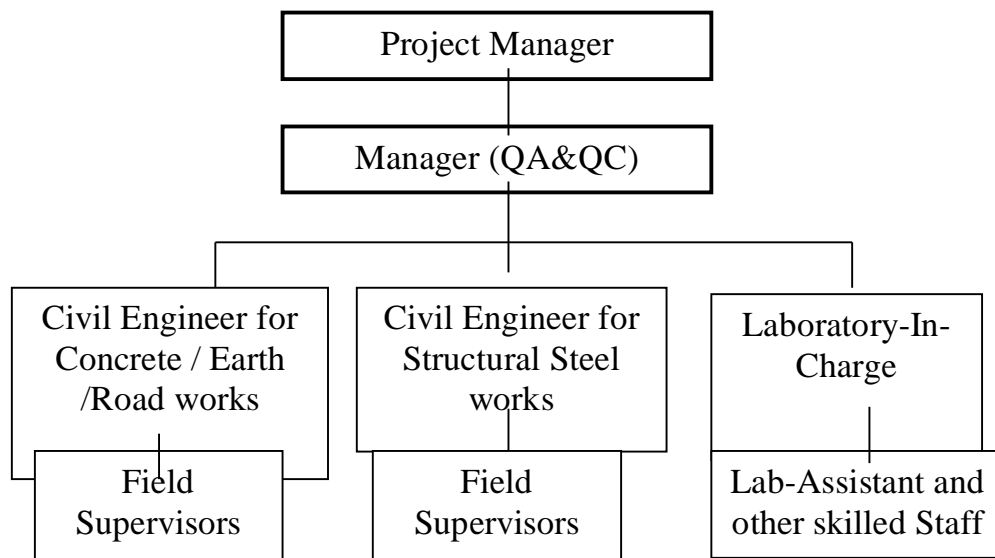
CLAUSE NO.	Quality Assurance for Civil Works 				
<p>7.1.7</p> <p>7.1.8</p> <p>7.1.9</p>	<p>for approval. The methodology may require change / modification based on the site conditions, for which suitable revisions shall be submitted.</p> <p>The methodology for painting works shall broadly contain the source of approved brand of paints, shot / sand blasting as specified, minimum acceptable size of shot used for blasting, application of primer, intermediate coat and final coat, experience of applicator, etc. testing of painting work and acceptance checks for final clearance.</p> <p>SHEETING WORKS</p> <p>All bought out items shall be procured from the manufacturer's approved by engineer and tested as per relevant AS/ASTM/EN Codes/ Specification. Raw material of colour coated sheets shall meet the chemical & physical properties as per relevant standards / codes referred in the approved data sheet. It shall be tested for colour match, bare metal thickness, weight of Z/AZ coating, thickness of painting system, reverse impact, T-Bend adhesion, scratch resistance, salt spray test for 1000 Hrs and any other test / properties as specified in the technical specifications. Colour coated sheets shall be marked with video jet printing at the interval not more than 2m bearing manufacturer's name, date and time of manufacturing. Fasteners shall also be tested for 1000 hrs salt spray test as per the requirement of technical specifications.</p> <p>Bonded Mineral Wool Insulation shall meet the requirements of thickness, density, thermal Conductivity, all other tests as per the technical specifications and IS-8183.</p> <p>For sheet installation no gas cut opening shall be allowed at the site, whenever opening is specified these shall be properly cut in the factory and shall be filled with lipping / flashing for true shape / dimension etc. The sheets/ packets shall be stacked neatly clear off the ground at an angle to the ground, over a base pallet to provide drainage. Water / moisture should not be allowed to stagnate on surface, or in between layers. This can damage the coating, and cause corrosion.</p> <p>TILE WORKS</p> <p>The contractor shall submit the work methodology which shall include the type, grade and make of materials along with their technical data sheets, details, etc, clearance from E-I-C regarding leak proofness and damp proofness of parent concrete surface, surface preparation, the procedure of application, curing, testing and acceptance.</p> <p>The agencies having adequate experience to execute the acid / alkali resistant lining works shall be engaged for executing the acid / alkali resistant lining works after obtaining the approval from the E-I-C.</p> <p>The execution, finishing, testing and acceptance of tile works shall be as per the provisions of technical specifications. The material for tile works shall be procured from the NTPC approved brand / source. Local depressions on account of faulty workmanship, tiles / natural stones with cracked or broken / chipped edges shall not be acceptable.</p> <p>The tests shall be carried out on acid resistant bricks / tile- water absorption, compressive strength, resistance to acid, flexural strength, dimensions and all other tests as per IS 4860 and IS 4457, bitumastic ready mixed paint as per IS 158, bitumastic as per IS 9510, potassium silicate, resin type and sulphur type mortars as per IS 4832, part I, II and III, surface preparation for painting as per IS 2395, epoxy painting shall be carried for required coating thickness and dry film thickness.</p> <p>FIRE PROOF DOORS</p>	<p>Bid Doc. No.: CS-0260-132G-2</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI PART - B</p>	<p>SUB SECTION – III E -20</p>	<p>Page 11 of 13</p>
<p>NTECL POWER PROJECT (3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>					

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7.1.10	<p>Fire Proof doors shall be tested for the requirements mentioned in the Technical Specification. The type test of the doors shall be carried out at CBRI Roorkee for minimum 2 hours fire rating and its Fabrication drawing shall also be approved by CBRI, Roorkee. DFT of paint of Fire Proof Doors and its fittings and fixtures as per BOQ shall be checked. The doors shall be finished with suitable fire retardant painting system</p> <p>WATER PROOFING</p> <p>The execution, finishing, testing and acceptance of water proofing works shall be as per the provisions of technical specifications. The material for the works shall be procured from the NTPC approved brand / source and the works shall be executed by the authorized applicator of the supplier.</p> <p>Water proofing shall be tested for water tightness by creating a pond of water minimum 25 mm height on area of 6 m x 6 m, for the period of 48 hrs on fully dried elastomeric membrane surfaces. Minimum 5% area of the roof shall be subjected to water tightness test. Such test necessarily be conducted on vulnerable areas like drain channel / drain head. No dampness shall be visible on the underneath side of roof (i.e. ceiling), parapet and well junctions etc. which have been subjected for testing. The above testing shall be carried out prior to application of wearing course.</p>			
7.1.11	<p>WATER SUPPLY, DRAINAGE & SANITATION</p> <p>Material used for sanitary and plumbing fittings and fixtures shall conform to and be tested as per the requirements of relevant IS Codes specified in NTPC technical specification.</p> <p>The obstructions in sewer lines shall be checked by inserting a smooth ball, of diameter 13 mm less than the pipe bore at the high end of the sewer or drain. If absence of any obstructions, such as yarn or mortar projecting through the joints, ball shall roll down the invert of the pipe and emerge at the lower end. The straightness shall be checked by means of a mirror at one end of the line and lamp at the other. If the pipeline is straight, the full circle of the light may be observed. The mirror will also indicate obstruction in the barrel, if the pipeline is not straight.</p> <p>The service pipes shall be slowly and carefully charged with water, allowing all air to escape avoiding all shock or water hammer. The service pipe shall then be inspected under test / working condition of pressure and flow, when all draw-off taps are closed. The service pipes shall be checked for satisfactory support and protection from damage, corrosion and frost.</p>			
7.1.12	<p>ARCHITECTURAL & MISC. WORKS</p> <p>Material used for sanitary and plumbing fittings and fixtures, floor finishes and allied work shall conform and tested as per the requirements of relevant IS Codes specified in NTPC technical specification.</p> <p>Fabricated item like metal doors, windows, ventilators, louvers, rolling shutters and grills etc. shall be checked for correctness of locations and smoothness of operation and fixtures. All controls and locking devices shall give fault free performance. Door and window shutters shall operate without jamming. The clearance at head and jamb for door shutters shall not exceed 1.5 mm. For double leaf doors, the gap at the meeting stiles shall not be more than 2.5 mm.</p>			
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CLAUSE NO.	<p style="text-align: center;">Quality Assurance for Civil Works</p> 			
7.1.13	<p>Materials used in glass and glazing shall be procured from source approved by NTPC and shall conform to the requirements of the Technical Specification and IS Codes.</p> <p>False ceiling panels shall be best quality material in thickness and properties called for in the specification / schedule of items. Material Test Certificate to be submitted before bulk supply.</p> <p>All bought items covered in the scope of contract shall be procured from sources approved by NTPC and shall conform to the requirements of the technical specifications and referred standards /codes.</p> <p>ROAD WORK</p> <p>Quality Assurance and testing requirements for roadwork shall be as per the MORTH-Specification (Section 900), IRC specifications or CPWD specifications as specified in the technical specifications and BOQ of the contract.</p> <p>The testing and sampling shall include the checks on earth work for embankment and subgrade, sub bases and bases and bituminous constructions. The sampling and testing of concrete pavements shall be as per the respective items of earthwork, subgrade / sub-base, concrete, etc.</p>			
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ANNEXURE-I

QA&QC ORGANISATION SETUP



NOTE:

1. The above organization setup is minimum however their deployment shall be as per the agreed deployment schedule. The contractor shall prepare a manpower deployment schedule in line with the finalized work plan and the same shall be submitted to the engineer-in charge for acceptance/ approval.
2. The contractor shall mobilize the QA& QC manpower in line with the finalized manpower deployment schedule and shall ensure their availability well in advance (15 days approx.) of the beginning of the concerned activity/ work.
3. The contractor shall further mobilize required number of skilled & supporting staff and additional resources, if any to meet the work schedule.
4. * For concrete work 2 Nos (one for foundation work & one for superstructure)
5. ** For lines and levels - 1 No.
6. *** For Finishes and cladding work - 1 No

LIST OF SPECIALIST INSTITUTES / ORGANIZATIONS FOR TESTING AND EVALUATION OF BUILDING MATERIALS				
SI No.	Name of the Institute	Contact Person	Test Facilities	Special Studies / Investigation
1	Indian Institute of Technology Bombay, Powai, Mumbai - 400076	Head, Deptt of Civil Engg, Phone : 022 25722545	Mix design and material properties on selective basis	In situ non destructive testing (UPV) of concrete structures, design of mass concrete, temperature studies, distress assessment
2	Indian Institute of Technology Madras, Chennai- 600 036	Head, Deptt of Civil Engg. Phone: 044 22574266/5255	Selective specialised studies such as design of fly ash concrete and special concrete, non destructive testing (UPV) of structures	
3	Indian Institute of Technology Guwahati -781039	Head, Deptt of Civil Engineering, Phone : 0361 2582401, 258 2442, 258 2440	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, steel reinforcement, petrography, alkali aggregate reactivity, mix design	In situ non destructive testing (UPV) of concrete structures (selective basis), design of mass concrete, studies on properties of fly ash concrete
4	Indian Institute of Technology Kanpur (UP) - 208016	Head, Deptt of Civil Engineering, Phone: 0512 2597346	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, mix design	Non destructive testing (UPV) on concrete structures, structural health assessment
5	Indian Institute of Technology Kharagpur (WB) -721302	Head, Deptt of Civil Engineering, Phone: 03222 283421	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, mix design, petrography	
6	Indian Institute of Technology Delhi, Hauz Khas, New Delhi - 1100 016	Head, Deptt of Civil Engineering, Phone:01126591191	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, mix design	In situ non destructive testing (UPV) of concrete structures (selective basis)
7	Indian Institute of Technology, Roorkee - 247667	Head, Deptt of Civil Engineering, Phone: 01332 285439, 273560	Testing and evaluation of cement(physical and chemical), aggregates (mechanical), fly ash (physical and chemical), admixtures, water, steel reinforcement, mix design, petrography, alkali aggregate reactivity	Various tests on other building materials such as silica fume, mass concrete, steel, bricks, tiles, doors, ferrocement covers, pipes, bridge bearings, PVC water tanks, etc
8	Indian Institute of Science Bangalore 560012	Head, Deptt of Civil Engineering, IISC Bangalore	Design of roller compacted concrete, radiation shield concrete, high volume fly ash concrete, fire behavior of concrete, micro cracking of concrete, non destructive testing (research & development) activities, behavior of concrete under shrinkage and creep, assessment of fire damaged concrete	IISC basically involved in r&d activities related to civil engineering and may only be contacted in case of specific studies / consultancy.
9	Institute of Technology, Banaras Hindu University (BHU) Varanasi (UP) -221005	Head, Deptt of Civil Engineering, Phone: 0542-2307016	Testing and evaluation of cement physical properties), aggregates (mechanical properties), admixtures, water, mix design, petrography	

LIST OF SPECIALIST INSTITUTES / ORGANIZATIONS FOR TESTING AND EVALUATION OF BUILDING MATERIALS				
SI No.	Name of the Institute	Contact Person	Test Facilities	Special Studies / Investigation
10	Central Building Research Institute (CBRI), Roorkee - 247667	Head, Structural engineering division, Phone: 01332 283382	Testing and evaluation of cement (physical and chemical), aggregates (mechanical), fly ash (physical and chemical), admixtures, water, mix design, alkali aggregate reactivity	Fire rating of doors, non destructive testing of structures, various tests on other building materials such as bricks, steel, tiles, etc
11	Central Soil and Materials Research Station (CSMRS), Near IIT Delhi, Olof Palme Marg, New Delhi - 110016	Joint Director Phone: 011 26962608	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, petrography, alkali aggregate reactivity, mix design	Various tests on other building materials such as steel, geotextiles, geomembrane, soil, instrumentation, monitoring, etc
12	National Council for Cement and Building Materials (NCB), 34 KM Stone, Delhi Mathura Road Ballabgarh(Har)	Head, Center for Construction Development & Research Phone : 0129 2246173	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, petrography, alkali aggregate reactivity, temperature cycle test, XRD, steel reinforcement, mix design	In situ non destructive testing (UPV) of concrete structures and special studies, testing of bricks, paving blocks, steel bars, silica fume, etc
13	National Council for Cement and Building Materials (NCB), NCB Bhawan, Old Bombay Road Hyderabad 500008	General Manager, Phone 040 23000344, 040-23000343	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, petrography, alkali aggregate reactivity, steel reinforcement, mix design	In situ Non destructive testing (UPV) of concrete structures (selective basis)
14	National Test House, Taramani Chennai 600 113	S.O.(Civil) Phone:04422432374, Fax:04422433158	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, steel reinforcement, water, mix design	Various tests on other building materials such as paving blocks, GI pipes, wires, steel plate, flush doors, salt spray test , etc
15	National Test House, Block CP Sector V, Salt Lake city Kolkata-700 091	S.O. (Civil), Phone:033 2367 3870	Testing and evaluation of cement(physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, steel reinforcement, mix design	Various tests on other building materials such as paving blocks, GI pipes, wires, steel plate, flush doors, etc
16	National Test House (NTH), Kamla Nehru Nagar, Ghaziabad (UP)	S.O. (Civil), NTH Ghaziabad	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, stel reinforcement	Timber, clay products, water proofing compound, flush doors, laminated sheets, plywood, etc
17	Structural Engineering Research Centre (SERC), Taramani, Chennai 600 113	Head, Department of Material Testing, Phone: 044 22549152, 22541735	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, steel reinforcement water, mix design	In situ Non destructive testing (UPV) of concrete structures (selective basis) and special studies such as cement admixture compatibility, design of special concrete, evaluation of structures

LIST OF SPECIALIST INSTITUTES / ORGANIZATIONS FOR TESTING AND EVALUATION OF BUILDING MATERIALS				
SI No.	Name of the Institute	Contact Person	Test Facilities	Special Studies / Investigation
18	Vishveswaraiya National Institute of Technology(VNIT), Nagpur (MH) - 440010	Director, VNIT Nagpur, Phone:0712 2223710, 2222828	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, mix design, petrography	In situ non destructive testing (UPV) of concrete structures and soil tests
19	Anna University, Department of Structural Engineering, Chennai - 600 025	Head, Deptt of Civil Engineering	Testing and evaluation of cement (physical and chemical) , aggregates (mechanical properties) , fly ash (physical and chemical) , admixtures, water, mix design	
20	Shriram Institute for Industrial Research, 19 University Road, Delhi 110007	Dr (Mrs) Laxmi Rawat, Asstt Director & Chief Phone:011 27667267	Testing and evaluation of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water, mix design	Various tests on other building materials such as steel, geotextiles, geomembrane, soil, bricks, tiles, etc
21	Spectro Analytical Lab, E-41, Okhla Indl Area, Ph II, New Delhi 110021	Phone: 011 26383048-49 Fax: 40503150, 40503151	Testing of cement (physical and chemical), aggregates (mechanical properties), fly ash (physical and chemical), admixtures, water	Chemical and physical tests on steel reinforcement
22	Motilal Nehru National Institute of Technology (MNIT), Allahabad - 211004	Director, MNIT Allahabad, Phone: 0532 2271305, Fax: 0532 2545341	Testing and evaluation of cement (physical and chemical) , aggregates (mechanical properties), fly ash (physical and chemical), admixtures, steel reinforcement water, mix design	In situ non destructive testing (UPV) of concrete structures.
23	Govt Engineering College, Jalpaiguri (WB) - 735102	Head Deptt of Civil Engg, Fax: 03561256143	Testing and evaluation of cement (physical) , aggregates (mechanical properties), water, mix design	
24	College of Engineering Pune - 411005	Head Deptt of Civil Engg, Phone No : 02025507067, Fax : 02025507299	Testing and evaluation of cement (Physical & Chemical properties), fly ash (Physical & Chemical properties), aggregates (Mechanical properties except alkali aggregate reactivity & Petrography), water, admixtures and mix design	
25	Maulana Azad National Institute of Technology, Bhopal (MP)	Head Deptt of Civil Engg, Phone No : 07554051390	Testing and evaluation of cement (physical) , aggregates (mechanical properties),water, mix design	In situ non destructive testing (UPV) of concrete structures and soil tests.
26	National Institute of Technology, Rourkela (Odisha)	Head Deptt of Civil Engg, Phone No : 06612462300	Testing and evaluation of cement (physical) , aggregates (mechanical properties), mix design,	In situ non destructive testing (UPV) of concrete structures and soil tests. Test on steel reinforcement, bricks and bitumen

ANNEXURE - III

Format of Request Letter for Evaluation of Materials

Ref: _____

Date: _____

To,

Sub.: Evaluation of materials and concrete mix design

Dear Sir,

We have awarded the work of on M/s vide our LOA No.dated.....for execution of Civil Works. Based on provisions of contract, M/s are expected to get the following tests/ evaluation done through your laboratory and accordingly the tests have been described below.

M/s have been advised to deposit the requisite evaluation/ testing charges and to deliver the test samples of quantities, specified below.

1. Evaluation of Cement:

- a) To carry out different physical tests on cement samples i.e. Blaine's fineness, initial and final setting time, soundness and compressive strength at 3, 7 and 28 days as per IS: 4031 and drying shrinkage and specific gravity in case of PPC.
- b) To carry out chemical analysis of the cement samples as per IS: 4032, including the total alkali content of the cement (Na₂Oequivalent).
- c) To advise the suitability of cement based on the test results of a) and b) above.

2. Evaluation of Aggregates:

- a) To carry out different tests on coarse aggregate sample i.e. specific gravity, water absorption, sieve analysis, deleterious material; soundness, crushing value, impact value, abrasion value, elongation index and flakiness index, as per IS: 2386.
- b) To carry out different tests on fine aggregate sample i.e. specific gravity, water absorption, sieve analysis soundness, deleterious material, silt content, clay content and organic impurities as per IS: 2386 and mica content.
- c) To prepare evaluation report based on test results of a) and b) above and to advise regarding suitability of fine and coarse aggregates to be used with the cement of 1) above.

3. Evaluation of Aggregates for Potential Alkali-Aggregate Reactivity:

- a) To carry out petrographic analysis and accelerated Mortar bar Test on aggregate samples (1N NaOH at 80 deg. Centigrade for 14 days as per ASTM 1260, or the method established/ developed by CSMRS for 22days test).
- b) If rock type is limestone, X-Ray diffraction test (XRD) shall be carried out to determine clay mineral in the rock for preliminary conclusions and to carry out repeated temperature cycle test to determine residual expansion of aggregate for concrete to be used in dynamic foundations like TG, Fans, mills, crushers etc. Additionally, Alkali carbonate reactivity test shall be carried out as per ASTM C 1105 wherein the parameters shall be reported in conjunction with the petrographic analysis.

c) To prepare a report based on test results of a) and b) above and to advise regarding suitability of aggregates to be used with the cement of 1) above and further testing required if any.

4. Evaluation of Flyash Sample:

- a) To carry out various physical and chemical tests on fly ash sample i.e. Blaine's fineness, lime reactivity, specific gravity, loss on ignition and other chemical tests as per IS: 3812, conforming to grade-I.
- b) To advise the suitability of fly ash sample based on the test results of a) above.

5. Evaluation of water: To carry out various physical and chemical tests as per IS:456 and IS:3025.

6. Evaluation of admixtures: To carry out various physical and chemical tests as per IS:9103.

Note: Test certificate shall be obtained from the supplier to compare the values given in Table 2 of IS:9103 i.e. uniformity requirements.

7. Concrete Mix Design: Based on the provisions of technical specification, the Following may be specified by site CCD/FQA **

- a) For RCC Work
 - i) Grade of concrete
 - ii) Slump required, mm:
 - iii) Cement- Type and grade
 - iv) Max Size of Aggregates, mm
 - v) Exposure conditions
 - vi) Maximum water-cement ratio
 - vii) Minimum cement content
 - viii) Plasticizer/ admixture to be used or not (If yes, specify the brand/ type/batch no. of plasticizer)
 - ix) Fly ash to be used or not (If yes, indicate % of fly ash to be used)
- b) For PCC work: Same as i) to ix) of a) above
- c) For piling work(if required): Same as i) to ix) of a) above

8. Details of material sampled: In order to facilitate the above mentioned tests, specified quantities of samples have been collected and sealed jointly (by NTPC-FQA and contractors' representative) is being sent for testing. The impression of seal has also been punched below.

a) Quantity of material required for each mix-design:

Sl. No.	Material Description	Quantity Required
i)	Cement	2bags (sealed in double polythene bags)
ii)	Coarse Aggregates	100Kg of each fraction as explained below : e.g.; If Maximum size of aggregates (MSA) is 20mm, then 100 Kg each of 20-10mm and 10mm down are required. If MSA is 40mm then 100Kg each of 40-20mm, 20-10mm and 10mm down are required.
iii)	Fine Aggregates	200Kg
iv)	Chemical Admixtures	2 Litres
v)	Water	100 Litres
vi)	Fly ash (If decided to be used)	100Kg

b) Quantity of material required for Alkali-Aggregate reactivity

Sl. No.	Material Description	Quantity Required
i)	Coarse aggregate	
a)	80-40mm	60Kg
b)	40-20mm	60Kg
c)	20-10mm	60Kg
d)	<10mm	60Kg
ii)	Fine aggregates	60Kg
iii)	Cement	2 samples (1 bag each), contemplated for use in construction.

c) Impression/ Punch Mark of seal:

You are requested to kindly forward us the test reports along with the recommendations regarding the suitability of materials to us at the earliest.

Thanking you,

Yours faithfully,
Name:
Contact Number:
Email ID:
(FQA Representative of NTPC)

Note:

- Based on provisions of technical specification, the testing charges for all the above mentioned tests shall be borne by the contractor.
 - The content of the letter is for guidance only, and if required may be suitably modified to suit the specific requirements of the package in consultation with QA-Civil.
- ** This line may be deleted in the letter sent to the institute.


ANNEXURE - IV

TYPICAL QA/QC LAB EQUIPMENT

Project:

Package:

S.No	Equipment	Nos.
1	Vicat Apparatus with deskpot	2
2	Le Chatelier flask	2
3	Le Chatelier Mould	2
4	Cube Moulds for cement testing	12
5	Vibration Machine	1
6	Length comparator	2
7	Shrinkage Bar mould	2
8	Sieve shaker	1
9	Sieves for sand, coarse & fine aggregate	1 set for each
10	Sieves for coarse aggregate for Road	1 set
11	Proctor testing equipment	2 sets + 18 cores
12	Slump testing equipment	6 sets
13	Oven	2
14	Physical balance	1
15	Rapid moisture meter	2
16	Thermometer	4
17	Burret	2
18	Measuring cylinders	9
19	Measuring flasks	3
20	Compression testing machine	2 sets of 2000 kN capacity each
21	Cube moulds	30
22	Electronic balance	2 (12 kg capacity), 2 (200 mg capacity)
23	pH balance	As per requirement
24	Radiographic facilities	As per requirement, Party should deploy BARC approved agency for carrying out RT
25	Mechanical weighing machine	1 (100 kg capacity)
26	Ultrasonic testing machine	As per requirement
27	D.P. Test kit	10
28	Vernier 300 mm, 600 mm	2
29	Micrometer (0.25 mm) out side (25.00)	2
30	Radiography film viewer	2
31	Inside Micrometer 25-750 dia	2
32	Digital elcometer for paint thickness	2
33	Baking oven for electrode	3
34	Portable ovens	2
35	Rebar detector to locate the reinforcement before core cutting operation	1
36	Concrete coring machine (55mm, 60mm upto 150 mm dia core bit)	1
37	Rebound hammer	1
38	Ultrasonic pulse velocity tester	May be arranged from specialist laboratory.

CLAUSE NO.	Quality Assurance for Civil Works				
	<p>Note :</p> <ol style="list-style-type: none"> 1. The equipments listed above are indicative and required to be mobilised as minimum requirement. additional equipment if any ,required for successful completion of work shall be provided /arranged by the contractor. 2. All test reports/ inspection reports have to be computerized and maintained on LAN with an access to the owner 3. Computers - 2 Nos shall be deployed with Windows operating system and connected to the NTPC server 4. Based on the schedule (L2/L3 Network), Quality control & Quality Assurance work plan shall be finalized by the contractor and the same shall be submitted to the engineer-in-charge for acceptance/approval. The Finalized work plan shall be maintained on the computer to be accessed by the owner for database and day to day monitoring. 				
NTECL POWER PROJECT (3X500 MW) ULTRAFILTRATION PLANT PACKAGE	Bid Doc. No.: CS-0260-132G-2	TECHNICAL SPECIFICATIONS SECTION – VI PART - B	SUB SECTION – III E -20	Page 2 of 2	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
PROJECT: NTECL - VALLUR TPP (3X500 MW)		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL				NTPC DOC NO	CS-0260-132G-2
PACKAGE: ULTRAFILTRATION PLANT						REV. NO.	0
MAIN SUPPLIER:		SUB SYSTEM: CIVIL WORKS				DATE	01.02.2016
CONTRACT NO.:							
1.	CEMENT	III	-	CCI	-	N	
				GUJARAT AMBUJA	-	N	
				JK LAXMI	-	N	
				JAYPEE	-	N	
				GRASIM	-	N	
				BIRLA	-	N	
				LAFARGE	-	N	
				ACC	-	N	
				SHREE	-	N	
				INDIA CEMENT	-	N	
				PENNA CEMENT	-	N	
				MADRAS CEMENT	-	N	
				PRISM	-	N	
				ULTRATECH	-	N	
				ORIENT	-	N	
				MANCHERIAL	-	N	
				JSW	-	N	
				ANDHRA CEMENT	-	N	
				PARASHAKTI	-	N	
				SAGAR	-	N	
				MAIHAR	-	N	
				BHARTHI CEMENT	-	N	
				CHETTINAD CEMENT	-	N	
				KONARK	-	N	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
PROJECT: NTECL - VALLUR TPP (3X500 MW)		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL			NTPC DOC NO	CS-0260-132G-2	
PACKAGE: ULTRAFILTRATION PLANT					REV. NO.	0	
MAIN SUPPLIER:		SUB SYSTEM: CIVIL WORKS			DATE	01.02.2016	
CONTRACT NO.:							
				MANIKGARH	-	N	
2.	CONSTRUCTION CHEMICALS - ADMIXTURES, PLASTISIZERS, RETARDERS WATER PROOFING COMPOUNDS GROUTS	III	-	SIKA INDIA LTD	-	N	
				CICO TECHONOLOGIES LTD	-	N	
				FOSROC CHEMICALS (I) PVT LTD	-	N	
				BASF	-	N	
3.	FALSE CEILING - GLASS REINFORCED GYPSUM SYSTEM, MINERAL FIBRE BOARD SYSTEM, PREPAINTED COIL COATED STEEL SYSTEM	III	-	SAINT GOBAIN	NEW DELHI	N	
				HUNTER DOUGLOUS	MUMBAI	N	
				TIGER STEEL	PUNE/MUMBAI	N	
				INTERARCH	NOIDA	N	
				LLOYD INSULATION	-	N	
				MG INDUSTRIES	FARIDABAD	N	
				ARM STRONG	NEW DELHI	N	
4.	PAINT AND PAINTING SYSTEM	III	-	BERGER	-	N	
				SHALIMAR PAINTS	-	N	
				JENSON AND NICHOLSON	-	N	
				KANSAI NEROLAC	-	N	
				AKZO NOBEL	-	N	
				ASIAN PAINTS	-	N	
5.	COLOUR COATED SHEET (FOR COIL)	I	-	UNION STEEL	KOREA	A	
				DONGBU STEEL	KOREA	A	
				BHUSHAN STEEL AND STRIPS LTD.	RAIGAD	A	
				ESSAR STEEL LTD	PUNE	A	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
				NATIONAL STEEL AND AGRO	DHAR	A	
				JSW STEEL COATED PRODUCTS LTD	KAMLESHWAR	A	Formerly JSW ISPAT Steel Ltd
				BHUSHAN STEEL LTD.	SAHIBABAD	A	
				JSW LTD	THANE	A	
				TATA BLUESCOPE STEEL LTD	JAMSHEDPUR	A*	*AL-ZN COIL FOR CLADDING
				BHUSHAN POWER AND STEEL LTD	SAMBALPUR (ODISHA)	A	
6.	PROFILERS FOR DECKING SHEETS	I		UNIMET PROFILES LIMITED	DHARUHERA	A	
				MULTICOLOUR STEEL INDIA LIMITED	GURGAON	A	
				ISOLLOYD	SOLAN	A	
				NATIONAL STEEL AND AGRO	DHAR	A	
				ERA BUILD SYS	RUDRAPUR	A	
				TATA BLUE SCOPE	PUNE	A	HINJEWARI WORKS
				TATA BLUE SCOPE	BHIWADI	A	
				ALFA STEEL BUILDING SOLUTIONS	HOSUR	A	
				METALKRAFT FORMING INDUSTRIES PVT LTD	MEDAK	A	
				PENNAR INDUSTRIES	ISNAPUR, HYDERABAD	A	
				BHUSHAN POWER AND STEEL LTD	SAMBALPUR (ODISHA)	A	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
PROJECT: NTECL - VALLUR TPP (3X500 MW)		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL			NTPC DOC NO	CS-0260-132G-2	
PACKAGE: ULTRAFILTRATION PLANT					REV. NO.	0	
MAIN SUPPLIER:		SUB SYSTEM: CIVIL WORKS			DATE	01.02.2016	
CONTRACT NO.:							
7.	PROFILERS FOR CLADDING SHEETS	I		MULTICOLOUR STEEL INDIA LIMITED	GURGAON	A	
				UNIMET PROFILES LIMITED	DHARUHERA-HARYANA	A	
				ERA BUILD SYS	RUDRAPUR	A	
				TATA BLUE SCOPE	PUNE	A	HINJEWARI WORKS
				TATA BLUE SCOPE	BHIWADI	A	
				ALFA STEEL BUILDING SOLUTIONS	HOSUR	A	
				ISOLLOYD	SOLAN	A	
				PENNAR INDUSTRIES	TARAPUR	A	
				METALKRAFT FORMING INDUSTRIES PVT LTD	MEDAK	A	
				NATIONAL STEEL AND AGRO	DHAR	A	
				BHUSHAN POWER AND STEEL LTD	SAMBALPUR (ODISHA)	A	
8.	ELECTROFORGED GRATING	II		INDIANA GRATING	PUNE	A	
				PREMIER POWER PRODUCTS (CALCUTTA) PVT LTD	HOWRAH	A	
				GREATWELD	PUNE	A	
				BHOLA RAM STEELS	PATNA	A	
				KANADE ANAND UDYOG	THANE	A	
				ANKIT ELECTROGRATING	RAIPUR	A	
				VINFAB ENGINEERS	THANE	A	
				PINAX STEEL INDUSTRIES	PATNA	A	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
10.	PVC WATER STOP	III	-	DURON POLYVINYLS PVT. LTD	GURGAON	N	
				KANTA RUBBER	HYDERABAD	N	
				MARUTI RUBBER	NOIDA	N	
				JYOTI POLYVINYL	VADODARA	N	
				DEEP-JYOTI RUBBER PVT LTD	NOIDA	N	
11.	BITUMEN ASPHALT	III	-	ALL GOVERNMENT REFINARIES	-	N	
12.	PLASTIC/ PVC PIPES	III	-	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	N	
13.	BITUMEN IMPREGNATED FIBER BOARD JOINT FILLER , BITUMEN SEALING COMPOUND	III	-	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	N	
14.	CERAMIC / VITRIFIED TILES	III	-	KAJARIA	-	N	
				SOMANY	-	N	
				SPARTEK INDIA	-	N	
				NITCO	-	N	
				ORIENT BELL	-	N	
				MARBITO	-	N	
				RESTILE	-	N	
				JOHNSON	-	N	

ANNEXURE - V


SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
PROJECT: NTECL - VALLUR TPP (3X500 MW)		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL				NTPC DOC NO	CS-0260-132G-2
PACKAGE: ULTRAFILTRATION PLANT						REV. NO.	0
MAIN SUPPLIER:		SUB SYSTEM: CIVIL WORKS				DATE	01.02.2016
CONTRACT NO.:							
15.	ACID / ALKALI RESISTANCE TILES, AR BRICKS, AR CEMENT (POTASSIUM SILICATE BASED CEMENT MORTAR, PHENOLIC BASED RESIN CEMENT) AR BITUMASTIC	III	-	GOODEARTH MINERALS	MORBI	N	
				PELICAN	BHIWADI	N	
				CAMBRIAN	ALWAR	N	
				KERATECH	VADODARA	N	
				CHAMPION CERAMICS	CHAMPA	N	
				MAHAKOSHAL POTTRIES	KATNI	N	
				PERFECT ACID WARE	JABALPUR	N	
				BABA BAIDNATH REFRACTORIES	PURULIA	N	
				SUNSHINE CERAMICS	CHAMPA	N	
16.	FIRE PROOF DOORS	III	-	NAVAIR INTERNATIONAL LTD.	NEW DELHI	N	
				SHAKTI HORMANN	HYDERABAD	N	
				SUPER STEEL	DELHI	N	FOR SINGLE LEAF ONLY
				SIGNUM FIRE PROTECTION	NAGPUR	N	
				RADIANT SAFE DOORS	AHMEDABAD	N	
17.	PARTICLE BOARDS, PLYWOOD, MDF	III	-	NOVAPAN	-	N	
				ECOBOARD	-	N	
				BHUTAN BOARD	-	N	
				KITPLY	-	N	
				CENTURY	-	N	
				GREEN PLY	-	N	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
				DUROPLY	-	N	
				MERINO	-	N	
18.	ALUMINUM SECTIONS	III	-	HINDALCO	-	N	
				ALOM EXTRUSIONS LTD	-	N	
				BALCO (VEDANTA)	-	N	
				NALCO	-	N	
				JINDAL	-	N	
19.	HIGH SOLID CONTENT LIQUID APPLIED URETHANE BASED ELASTOMERIC MEMBRANE FOR WATER PROOFING	III	-	STP	-	N	
				IWL INDIA LTD	-	N	
				CIPY POLYURETHANES	SHIRWAL	N	
				LLOYDS	-	N	
				CICO TECHONOLOGIES LTD	-	N	
				MK PETRO	-	N	
20.	SANITARY ITEMS	III	-	PARRYWARE	-	N	
				HINDWARE	-	N	
				SEABIRD	-	N	
				ORIENT	-	N	
				HINDUSTAN	-	N	
				CERA	-	N	
21.	CP BRASS TAP AND OTHER SANITARY FITTINGS	III	-	GEM	-	N	
				PARKO	-	N	
				JAQUAR	-	N	
				MARC	-	N	

ANNEXURE - V

SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
23.	RCC PIPES	III	-	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	N	
24.	POLYCARBONATE SHEETS	III	-	GE PLASTIC (SABIC)	-	N	
			-	BAYER (MAKROLON)	-	N	
25.	MINERAL WOOL FOR THERMAL INSULATION	III		ROCKWOOL INDIA LTD.	HYDERABAD	A	
				ROCKWOOL INDUSTRIES	BHILAI	A	
				LAPINUS	MALANPUR (MP)	A	
				MINWOOL	RAJANANDGAON	A	
				LLOYD INSULATION	BHILAI	A	
				GOENKA ROCKWOOL (I) PVT LTD	RAIPUR	A	
				SHREERAM EQUITECH PVT LTD	DURG	A	
	U.P. TWIGA	BULENDSHAHAR	A				
26.	CI PIPES	III	-	BIS APPROVED SOURCES HAVING VALID BIS LICENCE		N	

	PROJECT: NTECL - VALLUR TPP (3X500 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL			NTPC DOC NO	CS-0260-132G-2	
	PACKAGE: ULTRAFILTRATION PLANT				REV. NO.	0	
	MAIN SUPPLIER:	SUB SYSTEM: CIVIL WORKS			DATE	01.02.2016	
	CONTRACT NO.:						
SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
<p>LEGENDS:</p> <p>1. SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC) A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any. DR – For these items “Details required” for NTPC review. To be identified with letter “DR” in the list. 'N' NOTED – For these items vendors are approved by Main Supplier and accepted by NTPC without specific vendor approval from NTPC. To be identified with ‘NOTED.’</p> <p>2. QP/INSPN CATEGORY: CAT-I : For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. CAT-II : For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved quality plan. CAT-III : For these items Main Supplier approves the Quality Plans. UNITS/ WORKS : Place of manufacturing Place of Main Supplier of multi units/works.</p> <p>NOTE 1: For the items placed in CAT-III for Civil Works, the review and final acceptance shall be done by NTPC-EIC/ FQA on the basis of MTC / certificate of conformance in line with Indicative FQP / Technical Specifications.</p> <p>NOTE 2:</p> <p>i) This list has been compiled based on the names of suppliers / sub vendors proposed by the Bidders / Main Contractors to NTPC for various Corporate Civil packages awarded in the past based on respective Technical Specifications / Bill of Quantities / Tender Documents. This list is not exhaustive. Listed sub-suppliers may or may not have supplied the material to NTPC in the past.</p> <p>ii) The purpose of this list is not to limit the sub vendors but to provide general guidance to the prospective Bidders / Main Contractors. However this list is indicative in nature and may undergo revision for future packages based on the performance feedback received from NTPC sites / other agencies about the supplier / sub vendors / supplied material. Moreover listed suppliers may or may not be able to supply the material as per current Tech Specifications / Bill of Quantities / Tender Documents for the present package. Bidder is required to enquire before finalizing the suppliers / sub vendors for the present contract to meet provisions of the current Tech Specs / BOQ / Tender Documents. Moreover some of these listed sub-suppliers might have stopped manufacturing the identified items. It is also possible that some of the listed manufacturers/suppliers do not exist now. Bidder to make necessary enquiry before submitting bids. Bidders / Contractors are free to propose names of suppliers / sub vendors for various items as per their procurement policy to NTPC for considering supplies for the present Contract.</p>							

LOGO	SUPPLIERS NAME AND ADDRESS:	INDICATIVE FIELD QUALITY PLAN				ANNEXURE- VIA				
		ITEM : CIVIL WORK SUB-SYSTEM : GEOTECH INVI, FOUNDATIONS, EXCAVATION & FILL, SITE LEVELLING, CONCRETE, ROAD, BUILDING ETC.	QP NO. : REV. NO. : DATE : PAGE :	1 0	PROJECT: PACKAGE: CONTRACT NO. MAIN CONTRACTOR	Acceptance Norms		Format of Record		Remarks
Sl. No	Activity and operation	Characteristics / instruments	Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms		Format of Record	Remarks
1	2	3	4	5	6	7	8	9	D*	10
1 GENERAL REQUIREMENTS										
A	Setting up of Field QA&QC laboratory	As agreed / required	A	Physical	Once prior to start of work	Tech Specs and Const. Drawings	SR	√		Functioning of laboratory equipment in proper working condition to be verified on monthly basis
B	Avialability of requisite laboratory set up and equipment in good working condition well before commencement of concerned activity	As agreed / required	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings	SR	√		
C	Submission of QA & QC manpower deployment schedule based on agreed L-2 network .	-	A	Physical	Once prior to start of work	Tech Specs and Const. Drawings		√		
D	Availability of QA& QC manpower based on deployment schedule .	-	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings	SR	√		
E	Sampling for testing of building materials, concrete mix design etc.	As agreed / required	A	Physical	As specified in FQP for various materials	Tech Specs and Const. Drawings	SR/TR	√		Test report along with the recommendations from specialist agency to be submitted to NTPC.
F	Submission of schedule of tests to be done monthly / quaterly	-	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings	SR	√		
G	Stacking and storage of construction materials and components at site	As per IS:4082	B	Physical	Random	Tech Specs and Const. Drawings and IS: 4082	SR	√		
H	All bought out items to be procured from the approved vendor and on approval of Quality plans by NTPC as per inspection Category	-	B	Verification of TC and/or Testing	100%	NTPC Tech. Spec. /BOQ	SR/LB	√		The TC submitted should bear proper identification or correlation with the batch of material supplied and same shall be brought out in the challan/ consignment note .
I	Submission of list of Bought out items and their vendors for each of the bought out item identified for approval within the period agreed in LoA.		A	Physical	One time	NTPC Tech. Spec. /BOQ	SR/LB			To be submitted to CQA for approval with a copy to site .
2 EXCAVATION AND FILLING IN FOUNDATION WORKS										
Excavations-										
2.1	Nature, type of soil/rock before and during excavations	As agreed / required	B	Visual	Random in eah shift	Tech Specs and Const. Drawings	SR			
2.2	Initial ground level before start of excavations	As agreed / required	B	Measurement	100%	Tech Specs and Const. Drawings	SR	√		
2.3	Final shape and Dimensions of excavations.	As agreed / required	B	Measurement	100%	Tech Specs and Const. Drawings	SR			
2.4	Final excavation lelvls	As agreed / required	B	Measuement	100%	Tech Specs and Const. Drawings	SR	√		
2.5	Side slope of final excavation	As agreed / required	B	Measurement	Random in eah shift	Tech Specs and Const. Drawings	SR			
2.6	Excavation in Hard Rock- If required									
i	Receipt, Storage, accountability of Explosive	As agreed / required	B	Physical	Random in each week	Indian Explosive Act 1940/all statutory norms, Tech Specs and Const. Drawings	SR	√		NTPC approved specialist blasting agency such as CMRI, NIRM shall be deployed at site for trial blasts, design blasts, blast vibration monitoring etc. Seismographs shall be deployed at site for monitoring of blast operation vibrations.
ii	Execution of Blasting Operation	As agreed / required	B	Physical	Random in eah shift	IS:4081, Tech Specs and Const. Drawings	SR	√		
iii	Submission of Blasting report to EIC	As agreed / required	C	Physical	Each blast	Tech Specs and Const. Drawings		√		
2.7	Excavation in Hard Rock (Blasting Prohibited)	As agreed / required	B	Physical	100%	As per approved drawing/ scheme, Tech Specs and Const. Drawings	SR	√		
Fill/ Backfill -										

LOGO	SUPPLIERS NAME AND ADDRESS:	INDICATIVE FIELD QUALITY PLAN					ANNEXURE- VIA				
		ITEM : CIVIL WORK SUB-SYSTEM : GEOTECH INVI, FOUNDATIONS, EXCAVATION & FILL, SITE LEVELLING, CONCRETE, ROAD, BUILDING ETC.	QP NO. : REV. NO. : DATE : PAGE :	1 0	PROJECT: PACKAGE: CONTRACT NO. MAIN CONTRACTOR						
Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record		Remarks
1	2	3		4	5	6	7	8	9	D*	10
2.8 Suitability of borrow fill material											
i		Grain size analysis	Set of Sieves, Hydrometer etc.	B	Physical	Once per each type of source or change of source	IS:2720 (Pt.IV), Tech Specs and Const. Drawings	SR/TR	√		
ii		Liquid & plastic limit	Mechanical liquid limit device, grooving tools, Evaporating Disc, Spatula, Palette knives, Balance oven containers, etc.	B	Physical	Once per each type of source or change of source	IS:2720 (Pt.IV), Tech Specs and Const. Drawings	SR/TR	√		
iii		Shrinkage limit	-do-	B	Physical	Once per each type of source or change of source	IS:2720 (Pt.IV), Tech Specs and Const. Drawings	SR/TR	√		
iv		Free Swell Index	Measuring cylinders, etc.	B	Physical	Once per each type of source or change of source	IS:2720 (Pt.XI), Tech Specs and Const. Drawings	SR/TR	√		
v		Chemical Analysis									
a		Organic Matter	Oven chemical balance, volumetric flasks, burettes, pipettes, conical flasks, set of sieves, measuring cylinders etc.	B	Physical	Once per each type of source or change of source	IS:2720 Pt.XXII, Tech Specs and Const. Drawings	SR/TR	√		
b		Calcium carbonate	Reagents and indicators, Burette, flask s, funnels etc.	B	Physical	Once per each type of source or change of source	Part XXIII of IS-2720, Tech Specs and Const. Drawings	SR/TR	√		
c		pH value	As agreed / required	B	Physical	Once per each type of source or change of source	Part XXVI of IS-2720, Tech Specs and Const. Drawings	SR/TR	√		
d		Total soluble sulphate	As agreed / required	B	Physical	Once per each type of source or change of source	Part XXVII of IS-2720, Tech Specs and Const. Drawings	SR/TR	√		
2.9 Standard proctor Test											
		Optimum moisture content and max. dry density before fill	As per IS: 2720, Proctor needle apparatus, etc.	B	Physical	One in every 2000 cum for each type and source of fill materials	IS 2720 (Pt.VII), Tech Specs and Const. Drawings	SR/TR	√		
2.10 Moisture content											
		Moisture content of fill before compaction	As per IS: 2720, balance, oven etc.	B	Physical	One in every 2000 cum for each type and source of fill materials	IS 2720 (Pt.II), Tech Specs and Const. Drawings	SR/TR	√		
2.11 Degree Of Compaction Of Fill / Backfill											
i		Dry density by core cutter method ---OR--- Dry density in place by sand displacement method	As per IS: 2720/compaction test (core cutter), balance etc.	A	Physical	i) For foundation fill/backfill one for every 10 foundations for each compacted layer. ii) For area filling, one every 1000 SQM area for each compacted layer.	IS 2720 (Pt. XXIX), Tech Specs and Const. Drawings IS 2720 (Pt. XXVIII), Tech Specs and Const. Drawings	SR/TR	√		
ii		Relative density (Density Index)	As per IS: 2720, balance oven etc.	A	Physical	---do--- (i) & (ii) above	IS 2720 (Pt. XIV), Tech Specs and Const. Drawings	SR/TR	√		
3.0 MATERIALS											
Expert opinion regarding suitability of construction materials shall be taken from Specialist Institute (Identified during pre award)											
3.1 CEMENT											

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		Retesting of cement	as per IS:4031	A	Testing	At Random	As per relevant IS Codes		Test Report	√	Each consignment of cement shall be duly correlated with manufactureres TC,in case the cement is supplied by the contractor one sample from each lot shall be tested for setting time and compressive strength . Acceptance norms shall be as per relevant IS . If cement is stored more than 60 days in godown of contractor same shall be retested for comp. Strength & setting time.
3.2	Coarse Aggregate	Moisture content	as per IS:2386	B	Physical	Once for each stack of 100 Cu.M. or part there of	IS : 456 IS : 383/Tech Spec		SR/LB	√	during monsoon when this has to be done every day before start of concreting
ii		Specific gravity, water absorption	IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS:383/Tech Spec	IS:456	SR/LB/ Test Report	√	
iii		Sieve analysis, flakiness index, elongation index,	IS:2386	B	Physical	One per 100 cum., or part thereof	IS: 2386 Part-I, Spec	IS:383/Tech	SR/LB	√	
iv		Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale)	IS:2386	A	Physical	Once per source/ on every change of source	IS: 2386 Part-II, Spec	IS:383/Tech	SR/LB/ Test Report	√	
v		Soundness	IS:2386	A	Physical	-do-	IS: 2386 Part-V, IS:383		SR/LB/ Test Report	√	
vi		Alkali aggregate reactivity		A	Physical	-do-	IS: 2386 (Part-VII), IS:383 /Tech Spec/ASTM C-1260 / ASTM 1293		SR/LB/ Test Report	√	The aggregate type (deleterious/innocuous result should be supported by petrographic examination
vii		Petrographic examination	IS:2386 Pt VIII	A	Physical	-do-	IS: 2386 Part-VIII, IS:383 /Tech Spec		SR/LB/ Test Report	√	
viii		Crushing value abrasion value and impact value	IS:2386	A	Physical	-do-	IS:383, IS-2386 Part IV/Tech Spec		SR/LB/ Test Report	√	
3.3	Fine Aggregate	Moisture content, water absorption	balance , oven etc	B	Physical	To be done every day before start of work	IS: 2386 Part-III	IS:383	SR/LB/TR	√	
ii		Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale)	IS:2386	B	Physical	Once per source& for on every change of source	IS: 2386 Part-II, IS:383		SR/LB/TR	√	
iii		All other tests similar to coarse aggregates as mentioned above.					IS-2386, IS-383		SR/LB/TR	√	except test for flakiness index,elongation index, abrasion value, impact value
3.4	Water	Complete tests as per IS:456	Buret, conical flask, pipette etc	B	Testing	One per 3 month for each source.	IS:3025 part 22 and 23 (for test procedure), IS:456(for acceptance criteria)		SR/LB/TR	√	
3.5	CONCRETE	4 Trial mixes to ascertain the workability and cube strength	After receiving the recommended mix design from specialist agency.	A	Physical	One for each mix proportion	NTPC tech specification		SR/LB	√	
ii		Crushing strength (works Tests cubes)	IS:516	A	Physical	One set of 6 cubes per 50 CuM or part thereof for each grade of concrete per shift whichever is earlier.	IS:516, IS:456, NTPC Tech. Spec.		SR/LB/ Test Report	√	Min. of 6 cubes for each mix, 3 specimen shall be tested at 7 days remaining 3 shall be for 28 days comp. Strength.

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1	2	3	4	5	6	7	8	9	D*	10
iii		Workability - slump test	IS:1199	B	Physical	At the time of concrete pouring at site every two hrs	IS:456/NTPC Tech. Spec.	SR/LB/TR	√	
iv		Water content		B	Physical	Once per shift	As per approved design mix.	SR/LB	√	At batching plant
3.5.1	Admixtures for Concrete	Type of admixture	As per IS:9103	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	Designed mix and IS:9103	Test Report	√	Admixture of apod. Brand and tested quality shall be used (each lot of admixture will included with brochure in which the type of admixture and its properties shall be clearly indicated)
		Suitability	As per IS:9103	B	Physical	For each lot received at site	Designed mix and IS:9103	SR/LB/TR	√	Relative density, pH and slump retention on each batch / lot of admixture and to compare these properties with MTC
3.6	Concrete conveying, placing & compaction									
i		mixing of concrete shall be done in a approved mixer such as to produce a homogenous mix				To be calibrated at the time of starting and subsequently once in three months, and shall conform to IS:4925	Review of calibration chart/ Certificate, IS 4926		√	
ii		Arrangement for transportation & placement of concrete.	As required	C	Visual	100%	Before clearance for concreting	Inspection Report	√	
iii		Calibration of Batching Plant	batcher should comply with requirement of IS 4926/IS:4925	A	Physical	To be calibrated at the time of starting and subsequently once in three months, and shall conform to IS:4925	Review of calibration chart/ Certificate	Calibration Certificate	√	Provision of online printer is mandatory
iv		Handling and Transportation of concrete	As required	B	Physical	100%	As per construction/erection methodology (to be approved one week prior to start of work)	SR		
v		Placement of concrete	visual	B	Physical	100%	As per construction/erection methodology and tech.specs / No segregation	SR	√	
vi		Temperature Control	Thermometer	B	Physical	100%	Temperature as per technical specification	SR	√	
vii		Placement	Visual	B	Physical	100%	As per approved construction methodology	SR	√	
viii		Compacting	As required	B	Physical	At Random	IS:456	SR	√	
ix		Curing	As required	B	Physical	At Random	Period of curing as per IS 456 (use gunny bags / curing compound)	SR	√	
3.7	TEST/CHECK ON RCC STRUCTURE IN HARDENED CONDITIONS									
i		Visual inspection of concrete surface of all dynamic foundations just after removal of shuttering	As required	A	Visual	100%	As per Technical Specification	SR	√	
ii		Dimensional check on finished structures & Dimensional tolerances	As required	B	Measurement	Approved Drawing	As per IS:456/ tech. Specification.	SR/LB	√	
iii		Water Tightness Test of liquid retaining structure/ tanks	As required	A	Test	100%	IS:3370/ Tech. Specification	SR/LB	√	
3.8	REINFORCEMENT STEEL									

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1	2	3	4	5	6	7	8	9	10	
i		Physical and Chemical Properties for each lot as per relevant IS codes	As required/ agreed	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	IS : 1786, IS:432, IS:1566, Tech Specs and Const. Drawings	MTC	√	Applicable if steel is procured by Contractor
ii		Freedom from cracks surface flaws, Lamination.	As agreed / required	B	Visual	Random in each shift	IS: 1852, IS:432, IS:1786, Tech Specs and Const. Drawings	SR		To be checked at site. Steel collected from source should be free from excessive rust. To be stored as per Technical Specs.
3.9 PLACEMENT OF REINFORCEMENT STEEL										
i		Bar bending schedule with necessary lap, Spacers & Chairs	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502	SR	√	
ii		Bending of bars, cutting tolerance	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502	SR	√	
iii		Acceptance - Cover, spacing of bars, spacers and chairs after the reinforcement cage is put inside the formwork	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings	SR	√	
3.10 STAGING AND FORMS										
i		Materials and accessories	As agreed / required	B	Visual	Once before start of work	As per relevant IS, Tech Specs and Const. Drawings	SR		
ii		Soundness of staging, shuttering and scaffolding including application of mould oil / release agent	As agreed / required	B	Visual	Once before start of work	As per manufacturer's spec.and as per 3696,4014, 4990, Tech Specs and Const. Drawings	SR		
iii		Acceptance of formwork before start of concreting		B	Physical / visual	Before start of each concreting	As per provisions and tolerances, Tech Specs and Const. Drawings	SR	√	
3.11 INSPECTION OF CONCRETE SURFACE JUST AFTER REMOVAL OF FORM WORK										
i	Visual inspection jointly with NTPC	Concrete surface, position and alignment of embedded parts and inserts	--	B	Visual	Once for TG, BFP & MILL foundations	As per provisions and tolerances of equipment supplier, Tech Specs and Const. Drawings		√	Inspection protocol shall be signed Jointly by Contractor and NTPC CCD & Erection
ii	Submission of grouting / repair methodology if concrete surface / position and alignment of embedded parts / inserts are found defective		-	B	Review and approval	once for each type of defect	As per provisions and tolerances, Tech Specs and Const. Drawings		√	
3.12 EMBEDDED PART(INCLUDING LAYING OF RAILS & ANCHOR FASTENERS)										
i		Position / alignment / levels of embedded parts / bolt hole / pipe sleeves / rails / PVC pipes / etc	As agreed / required	B	Physical/ measurement	100%	As per drawing, Tech Specs and Const. Drawings	SR/ Protocol	√	Exposed surface of the embedded parts other than holding down bolts are to be painted with as per technical specifications
ii		Welding / tying of embeddment to reinforcement	As agreed / required	B	Physical/ measurement	Random in each shift	As per drawing, Tech Specs and Const. Drawings	SR		
3.13 PRE-CAST CONCRETE										
i		Crushing strength	compression strength testing machine	A	Physical	one sample of six cubes per 50m m3 or part thereof	IS:516 & IS: 456	SR/LB	√	A minimum of three specimen shall be tested for 7 and 28 days compressive strength
ii		Workmanship and dimentions	Visual	B	Physical	100%	As per IS:456/NTPC Tech. specification.	Register		
iii		Load Test	As required	B	Physical	1% up to 1000 nos. and 0.5% for more than 1000 nos. for each type	IS:456/ As decided by NTPC Site Engr. Incharge.	Inspection Report	√	
3.14 JOINTS IN CONCRETE										

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1	2	3	4	5	6	7	8	9	D*	10
i		Joint material - bitumen impregnated fibre board, PVC water stops, Sealing compound, Expanded polystyrene board, Hydrophillic strip, Acrylic polymer etc.	As per manufacturer Standards	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings, IS 1838, IS 1834, IS12200	MTC	√	
ii		Acceptance of installation	As agreed / required	B	Acceptance	Each installation randomly	Tech Specs and Const. Drawings			
3.15 DAMP PROOF COURSE										
i		Material - Hot bitumen and water proofing materials etc	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery at site	Tech Specs and Const. Drawings, IS 702	SR	√	
ii		Acceptance of damp proof course	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings	SR		
3.16 GROUTING										
i		Material	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR	√	
		Type of mix - fluid mix, plastic mix, stiff mix etc.	As agreed / required	B	Physical	Prior to start of work	Tech Specs and Const. Drawings	SR	√	
ii		Mixing, placement, application and grout pressure	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings	SR		
iii		Compressive strength	As agreed / required	A	Physical	Random in each shift	Tech Specs and Const. Drawings	SR	√	
iv		Acceptance of the grouts	As agreed / required	B	Physical	Each grout section	Tech Specs and Const. Drawings	SR		
4.00 BRICK MASONARY										
4.1 Test on Bricks										
		Dimensions , shape, compressive strength, water absorption, warpage, efflorescence.	As agreed / required	A	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings	Inspection Report	√	Efflorescence shall be checked at each source.
4.2 Test on Mortar										
i		Compressive strength	As agreed / required	B	Test	At random	IS 2250-1981, Tech Specs and Const. Drawings	LB		
ii	Sand	Grading	As agreed / required	B	Test		IS:2116	SR/LB		
4.3 Masonry construction										
		Workmanship, verticality and alignment	As agreed / required	B	Visual/ Physical	100%	IS 2212, IS 1905 , Tech Specs and Const. Drawings	SR/LB		
5.00 FINISHING AND ALLIED WORKS										
5.1 PLASTERING- MATERIAL										
i	Sand	Deleterious Material	As agreed / required	B	Physical	Once per source	IS : 2386 (Part-I &II) & IS :2116, Tech Specs and Const. Drawings	SR		
ii		Grading	As agreed / required	B	Physical	50 Cum./or part thereof	Tech Specs and Const. Drawings	SR		
iii	Galvanised wire mesh	Galvanized hexagonal wire netting for lath plastering	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR		
5.2 PLASTERING - WORKMANSHIP										
i		Curing	As agreed / required	C	Physical	100%	Tech specifications, construction drawings and agreed methodology	SR		
ii		Thickness and finishing of plaster, grooves etc	As agreed / required	B	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings	SR/LB		
iii		Truness of plastering system	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and Const. Drawings	SR		

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5.3 STONE GRIT PLASTER/ GRANULAR TEXTURED COAT FINISH										
i		Material	As agreed / required	B	Approved source and review of MTC	For each lot received at site	Tech Specs and Const. Drawings	SR	√	
ii		Thickness, finishing and grooves etc	As agreed / required	B	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings	SR	√	
6.00 SHEETING AND OTHER WORKS										
6.1 PAINTING SYSTEM - CONCRETE WORKS AND PLASTERED MASONARY SURFACES										
i	Materials and accessories- Oil Bound, Acrylic Emulsion, Chemical Resistant, Oil Resistant Paint etc.	Shade, type from brand and manufacturer as approved by NTPC EIC	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii	Surface preparation	As required	As agreed / required	C	Physical /visual	Random in each shift	Tech Specs and Const. Drawings	SR		
iii	Acceptance of painted surfaces	As required	As agreed / required	B	Physical	Each surface at random	Tech Specs and Const. Drawings	SR		
6.1.1 PAINTING SYSTEM - STEEL WORKS (OTHER THAN STRUCTURAL STEEL WORKS)										
i		Painting Materials and accessories	-	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	Mfr.'s T.C. shall be correlated with the consignment received.
ii		Submission of painting methodology	-	B	For Review of painting system	Before start of painting work	Tech Specs and Const. Drawings			
iii		Surface preparation	As agreed / required	B	Physical /visual	Each Erection Mark	Tech Specs and Const. Drawings, Relevant code/ standards	SR	√	
iv		Primer Thickness	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
v		DFT of paint	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
vi		Acceptance of painted surfaces	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR		
6.2	Modular areated panel	As required	As agreed / required	A	Review of test report	Each batch of delivery	Tech Specs and Const. Drawings	SR/LR	√	
6.3 Permanently colour coated sheets, metal decking										
i		Storage	As agreed / required	B	Visual	Random in each shift	Tech Specs and Const. Drawings	SR		Prevention of distortion / blemishing / water staining
ii		Installation, lap alignment & workmanship.	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and Const. Drawings	SR		No gas cutting of sheets acceptable . FQP for structural steel shall also be applicable
iii		Finishing and acceptance	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and Const. Drawings	SR/LB		
6.4 INSULATION WORKS										
i	Material	Insulation material, galvanised wire net, aluminium foil, fasteners	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings	SR / LB	√	All tests as per specification
ii		Acceptance of each type of installation	As agreed / required	B	Visual/ Physical	Each installation	Tech Specs and Const. Drawings	SR/LB		
7.00 DOORS , WINDOWS VENTILATORS & GRILL										
7.1 Steel doors										
i		Materials (MS sheet, fasteners, hinges, jambs, lock strike plate etc	As agreed / required	A	Visual/ Physical / test report	For each lot received at site	Tech Specs and Const. Drawings	SR / LB	√	Review of test report
ii		Flush Door shutters, teak beading	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	IS 2202, Tech Specs and Const. Drawings	SR	√	Review of test report
iii		Hollow metal doors (material and dimensions)	As agreed / required	A	Visual/ Physical/Test report	For each lot received at site	Tech Specs and Const. Drawings		√	Review of test report
iv		Acceptance	As agreed / required	B	Visual/ Physical	Random	Tech Specs and Const. Drawings	SR/LB		
7.2	Anodised aluminium works									

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		Materials- Aluminium sections, alkali resistant paint	As agreed / required	A	Visual/ Physical / test report	For each lot received at site	IS: 1948, IS: 1949, IS:733, IS1285, IS:1868, IS:11857/ Tech Specs and Const. Drawings	SR / LB	√	Review of test report For aluminium door/windows, check for anodisation as per Tech. Spec
		Particle Door	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	IS:12823 (phenol formaldehyde sythetic resin, BWP type), Tech Specs and Const. Drawings	SR	√	Review of test report
		Acceptance	As agreed / required	B	Visual/ Physical	Random	Tech Specs and Const. Drawings	SR		
7.3	Fire proof doors									
		Source of supply	As agreed / required	A	Review of purchase order (unpriced copy) / drawings of suppliers / certificate of CBRI	For each source	Tech Specs and Const. Drawings	SR	√	Procured from Approved parties as per relevant IS/Tech, The door drawing proposed for supply should have been tested and approved by CBRI Roorkee for the similar dimensions for minimum 2 hours fire rating.
		Receipt inspection	As agreed / required	A	Visual/ Physical/ Review of MTC	For each lot received at site	Tech Specs and Const. Drawings	SR	√	
		Finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings	SR		
7.4	Rolling shutters									
		Surface finish and thickness of plate of approved make and DFT	As agreed / required	A	Physical / visual / review of MTC	Random for each lot of delivery	Tech Specs and Const. Drawings	SR	√	
		Finishing and acceptance	As agreed / required	B	Physical and acceptance	Random	Tech Specs and Const. Drawings	SR		
7.5	Steel windows / Grills/ Louvre									
		Material fabrication and fixtures	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery	IS: 1038 / IS:1361, IS: 7452 and Tech Specs and Const. Drawings	SR	√	
		Finishing and acceptance	As agreed / required	B	Visual / physical	Random	IS: 1038 / IS:1361, IS: 7452 and Tech Specs and Const. Drawings	SR	√	
7.6	Glass and glazing									
		Material Clear float glass, tinted glass, curtain glass, hermetically sealed glass	As agreed / required	B	EIC Approved source and review of MTC/ test reports	For each lot received at site	IS: 14900, IS:1081, IS: 3548, IS:5437 Tech Specs and Const. Drawings	SR	√	
		Installation finishing and acceptance	As agreed / required	B	Visual/ Physical	Random	Tech Specs and Const. Drawings	SR		Leak proof installation with neoprene gasket
7.7	Curved dome on roof/ Poly Carbonate Sheet									
		Source of supply Impact strength, K value, light transmission value with class -I fire rating	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings	SR	√	
		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings	SR		
7.8	Reflective toughened glass									
		Material	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings	SR	√	
		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings	SR		
7.9	False Ceiling									

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i		Materials (gypsum glass, glass fibre membrane, fibre board acoustical tiles etc)	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings	SR	√	Compare MTC with technical specification and requirement
ii		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings	SR		
7.10	WATER PROOFING									
		Methodology for the application of water proofing system	As required	B	Review	for each type of treatment	Tech Specs and Const. Drawings	SR	√	
7.10.1	General Requirement- Water Proofing									
i	Polyurethane based coating, polyester scrim cloth, extruded HD dimpled polyurethane	Material	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each lot received at site	Tech Specs /Const. Drawings	SR	√	MTC shall contain all the parameters specified in the technical specifications
ii		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings			
7.10.2	Roof / Basement Treatment									
i	Graded under bed	Levels / slopes	As required	C	Physical	100%	Tech Specs and Const. Drawings			
ii	Elastomeric coatings	Material- Primer coat, finishing coat	As required	B	EIC Approved source and review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR	√	
iii	Wearing course	Materials - PCC, chicken wire mesh, elastomeric sealant	As required	B	Review of MTC	Each lot of delivery	Tech Specs and Const. Drawings	SR	√	
iv		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings			
7.11	Fencing and Gates									
i	PVC coated chain link fencing, Welded wire mesh (IS 1566), Reinforced barbed tape galvanised (IS 2629) etc.	Materials	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
ii	Structural steel, painting system, caster wheel, ball and bearing, fixtures and fasteners	Materials	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iii		Alignments, erection painting, DFT etc.	As agreed / required	B	Physical / measurements	Each installation	Tech Specs and Const. Drawings	SR		
iv		Acceptance of the installation and working	As agreed / required	B	Physical / measurements	Each installation	Tech Specs and Const. Drawings	SR		
7.12	FLOOR FINISHES AND ALIED WORKS									
7.12.1	Cement Concrete Flooring									
i		Glass/ PVC strips in joints	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings	SR		
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
7.12.2	Tiles									
i	Ceramic, vitrified, glass mosaic, acid alkali resistant, heavy duty cement concrete tiles	Materials	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR	√	MTC shall contain all the parameters specified in the technical specifications
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
7.12.3	Interlocking Blocks									
i		Materials	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR	√	MTC shall contain all the parameters specified in the technical specifications
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		

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7.12.4 Kota Stone, Granite and Marble										
i		Quality, texture, thickness, colour for each lot of delivery from approved source	As agreed / required	B	Physical	Each batch of delivery	Tech Specs and Const. Drawings	SR	√	
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
7.12.5 Metallic / non-metallic hardener										
i		Material	As agreed / required	B	Physical	Each batch of delivery	Tech Specs and Const. Drawings	SR	√	
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
7.12.6 Acid / alkali and oil resistant high built seamless epoxy based resin and treatment										
i	Material	Bricks, vitreous tiles, mortar, sealing, paints, coatings, sheets, fillers etc	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR	√	Experienced workers under supervisors recommended/ appointed by manufacturer to be deployed
ii		Surface preparation	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings, IS			
iii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
7.12.7 Rubber Flooring										
i		Material	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR	√	MTC shall contain all the parameters specified in the technical specifications
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
7.13 Doors/Windows Sections										
i	Material - Rolled Steel, Z Sections, T-iron frames sections, Plates etc.	Review of MTC/ make / Physical checks, tests (if MTC is not available)	As agreed / required	A	EIC Approved source and review of MTC/ test reports	For each batch of delivery	Tech Specs and Const. Drawings	SR	√	
ii		Acceptance of Steel Glazed doors and T-iron frames sections after fixing	As agreed / required	B	Physical and acceptance	Random for each installation	Tech Specs and Const. Drawings	SR		
8.0 WATER SUPPLY / SANITARY INSTALLATIONS										
8.1 Water supply fittings and fixtures										
i	Materials	GI/ MS pipes and fittings	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings	SR	√	
ii	Disinfection	Before use	As agreed / required	B	Physical	Each installation	Tech Specs and Const. Drawings	SR		
iii	Hydraulic test	Before use / leakage	As agreed / required	A	Physical	Each installation	Tech specs and const drawings	SR	√	
iv		Acceptance and working	As agreed / required	B	Acceptance	Random	Tech Specs and Const. Drawings	SR		
8.2 Sand cast iron / cast iron pipes										
i	Material	SCI / CI pipes and fittings / joints	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings	SR	√	
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR		
8.3 Sanitary fittings and fixtures										
i	Material	Sanitary items and fixtures i.e. water closets, urinals, wash basins, sinks, mirrors, shelves, towel rail, soap containers, geyser, water cooler, etc, water supply / sanitation pipes, manhole cover and frames etc	As agreed / required	B	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings	SR	√	
ii		Acceptance of installations of all sanitary items and fixtures	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings	SR		

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8.4 RCC Pipes										
i	Material	RCC pipes	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings /IS 458	SR	√	
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR		
8.5 Water Storage Tanks										
i	Material	Over head / loft type	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings	SR	√	
ii		Acceptance and leakage	As agreed / required	B	Acceptance	Random	Tech Specs and Const. Drawings	SR		
9.0 SPECIAL ITEMS										
9.1 Earthing Mat (Grounding System)										
i	Material	Earthing mat	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	As per relevant IS and Tech. Specs / Manufacturer's IS 3043	SR/MTC	√	
ii		Weld sizes & length	Visual/Tape	B	Visual/ Measurement	100%	Tech Specs and Const. Drawings			NTPC approved electrodes shall be used
iii		D P test	DP test Kit	A	Physical	10% at random of the offered lot	Tech Specs and Const. Drawings	TR	√	
iv		Earth test	Earthing test kit	A	Physical	100%	Tech Specs and Const. Drawings,	SR	√	
9.2 Bitumen layer for tank foundation										
i	Material	Grade of bitumen	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	As per relevant IS and Tech. Specs /MTC	SR/MTC	√	
ii	Acceptance and workmanship	Application / workmanship	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR		
9.3 Composite Aluminium Panels and structural glazing										
i	Material	Type of aluminium panels / structural glazing / fasteners and fixtures / silicon sealant	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Technical specifications / drawings	SR/MTC	√	MTC shall cover all the properties / parameters as per technical specifications
ii	Acceptance and workmanship	Installation / workmanship	As agreed / required	B	Physical	Random	Technical specifications / drawings	SR		
9.4 Pressure Release Valves										
i	Material		As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each lot of delivery as per Specifications	Technical specifications / drawings	SR/MTC	√	
ii	Acceptance and workmanship	Acceptance / Installation / workmanship	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR	√	
10.0 ANTI WEED TREATMENT										
i		Anti-weed treatment materials	As agreed / required	A	EIC Approved source and review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR	√	
ii		Execution of treatment	As agreed / required	B	Physical	Random check for each treatment	Tech Specs and Const. Drawings	SR		
11.0 ROAD WORKS										
11.1	Construction of Sub-Grade and earthen/hard soulders									

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i		Standard proctor Test	As per IS: 2720	B	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt.VII)	SR/TR	√	In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
ii		Moisture content of fill before compaction	As per IS: 2720	B	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt.II)	SR/TR		In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
iii		Dry density by core cutter method ---- OR---- Dry density in place by sand displacement method	As per IS: 2720	A	Physical	One in every 500 SQM area for each compacted layer.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt. XXIX)/ IS 2720 (Pt. XXVIII),	SR/TR	√	Both for embankment and cut formation quantum of check - One in every 1000 SQM area for each compacted layer.
iv		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
11.2 Granular Sub Base (GSB)										
i		Gradation	As required / agreed	B	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	
ii		Atterberg Limit	As per IS: 2720	B	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	
iii		Moisture content prior to compaction	As per IS: 2720	B	Physical	One test per 250 SQM of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	
iv		Density of compacted layer	As per IS: 2720	A	Physical	One test per 500 SQM of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR / TR	√	
v		Deleterious constituents	As required / agreed	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	
vi		CBR	As per IS: 2720	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR / TR	√	
11.3 Water Bound Macadam (Non-Bituminous) / WMM for base course and sub-base course										
i		Aggregate Impact value	Aggregate Impact value Test Apparatus	B	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	
ii		Grading	Set of IS Sieves	B	Physical	One test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR		
iii		Flakiness index and elongation index	Flakiness test gauge	B	Physical	One test per 200cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR		
iv		Atterberg Limits of binding material	Atterberg limits determination	B	Physical	One test per 25 cum of binding material	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	not applicable for WMM
v		Atterberg Limits of portion of aggregate passing 425 micron sieve	Atterberg limits determination	B	Physical	One test per 100cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	
vi		Camber, surface, slope	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR		Template, straight edge
vii		Density of compacted layer	As required / agreed	A	Physical	One per 500 SQM	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification,	SR	√	not applicable for WBM
11.4 Bituminous Macadam for base and binder course										
i		Quality of binder	Penetrometre with St. needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 73	SR	√	

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ii		Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact Value Test apparatus	B	Physical	Once per source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness test gauge	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
v		Water sensitivity of mix	As required / agreed	B	Physical	Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
vi		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
vii		Water absorption of aggregate	As required / agreed	B	Physical	Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	
ix		Percentage of fractured faces	As required / agreed	B	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
x		Binder content and aggregate grading	Bitumen extractor	A	Physical	Periodic, subject to a min of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	
xi		Control of Temperature of binder and aggregate for mixing and of the mix at the time of laying and rolling	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
xii		Rate of spread of mixed materials	As required / agreed	B	Physical	Regular control through checks of layer thickness	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		
xiii		Density of compacted Layer	As required / agreed	A	Physical	One test per 250 sqm of area	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	
11.5 Bituminous Surfacing - Open graded premix carpet and Seal coat										
i		Quality of binder	Penetrometre with St. needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73, Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	
ii		Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact Value Test apparatus	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness test gauge	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		

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iv		Stripping value of aggregate (Immersion tray test) As required / agreed	B	Physical	Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
v		Water absorption test	B	Physical	Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
vi		Water sensitivity of mix As required / agreed	B	Physical	Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
vii		Grading of aggregates Set of Sieves	B	Physical	One test per 25 cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
viii		Soundness (Magnesium and Sodium Sulphate) As required as per IS:2386	A	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
ix		Polished stone value As required as per BS:812(Part 114)	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
x		Temperature of binder at application Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
xi		Binder content Bitumen extractor	A	Physical	One test per 500 cum & not less than two tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
xii		Rate of spread of materials As required / agreed	B	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
xiii		Percentage of fractured faces Bitumen extractor	B	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
11.6 Tack Coat/ Prime coat/ fog coat										
i		Quality of binder Penetrometre with Standard needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73, Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
ii		Temperature of binder at application Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
iii		Rate of spread of binder As required / agreed	B	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
11.7	RCC Pavements	Concrete - Material, Mix design, Trial Mixes, Production, Transportation, Placement, Compaction, Curing, Test on green concrete, Test on hardened concrete etc. As required / agreed	-	-	Refer FQP for concrete Works	Refer FQP for concrete Works, , Tech Specs and Const. Drawings, IRC & MORTH	-	-		FQP for Concrete Works shall also be application for all concrete works
11.8 Alignment, Level, Surface regularity and rectification										
i		Horizontal alignment, Surface levels and Surface regularity As required / agreed	B	Physical	As per section 900 of MORTH specification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR			
ii		Rectification As required / agreed	B	Physical	Each rectification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√		
12.0	PILING WORK (Applicable only If envisaged in Tech. specs)									


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12.1	Execution									
i		100 mm Dia Borehole	As required	A	Physical	100%	NTPC Tech. Specs	SR/LB	√	If carried out by the contractor
ii		Pile layout	Total station	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√	
iii		Recording ground level	As required	B	Measurement	Random	IS:2911, as per appd. Drawings and technical specification	SR/LB	√	
iv		Cleaning/Flushing of pile bore	As required	B	Visual	Random	As per appd. Drawings and technical specification	SR/LB	√	
v		Size of bore and During boring of pile record commencement of SPT/ core recovery to ensure socketing length equivalent in terms of the Diameter of the pile below the socketing horizon.	As required	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√	
vi		Trial mix to ascertain the workability and cube strength	After receiving the recommended mix design from specialist agency,	B	Physical	One for each mix proportion	NTPC tech specification	SR/LB	√	Necessary correction for moisture content and water absorption according to mix design recommendation may be carried out during the trial mix
vii		Cement content	As required	B	Physical	Once per shift	As per approved design mix.	SR/LB	√	At batching plant
viii		Pouring of concrete to project above cutoff level.	As required	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√	
ix		Pile termination level	SPT & core recovery	A	Soil data	As per NTPC specifications	As per appd. Drawings and technical specification	SR	√	
12.2	Testing									
i		Bentonite	IS:2720	A	Physical/ testing	Once per source	As per IS:2720 / tech. Specs.	SR/LB	√	Review of test report
ii		Density check on sample of mud collected from pile bore bottom	Sample collection	A	Physical	As per Tech. Spec.	As per NTPC Tech Spec.	SR/LB	√	Tests to be done before placing concrete. Samples to be collected from pile bore bottom.
iii		Slump test of concrete	IS:1199	B	Physical	Every 2 hrs at pouring point of concrete	IS:2911, As per appd. Drawings and technical specification	SR/LB	√	
iv		Cube sampling for works cube test	IS:456	B	Physical	One set of 6 cubes per 50 CuM or part thereof for each grade of concrete per shift whichever is earlier.	IS:2911, As per appd. Drawings and technical specification	SR/LB	√	
v		Initial pile load test, Vertical (Compression), Lateral (horizontal) and pullout (tension).	IS:2911 / as required	A	Testing	100% for 3 nos. for each type or as specified in BOQ / Tech. Spec.	IS:2911, As per appd. Drawings and technical specification	SR/LB	√	In case of compression test method the loading shall be cyclic.
vi		Routine pile tests, compression and horizontal	Calibrated dial gauges etc. as required.	A	Testing	100% for 0.5% of the total number of piles provided for each type of test/Tech. Spec.	IS:2911, As per appd. Drawings and technical specification	SR/LB	√	Routine Test shall be conducted by direct loading method.
vii		Integrity Tests	PEM	A	Testing	100%	IS:2911, As per appd. Drawings and technical specification and suppliers manual	Test Report	√	CHP
13.0	FOUNDATION SYSTEM									
	SHALLOW FOUNDATIONS									
i		Foundation excavation - Location, Layout, size, depth etc	As required / agreed	B	Physical	Each location	As per technical specifications and construction drawings	SR		lines and levels to be checked
ii		Foundation casting - Layout, Shape, dimensions, Reinforcement, concreting, curing etc	As required / agreed	B	Physical	Each foundation	As per technical specifications and construction drawings	SR		lines and levels to be checked. Concrete Grade to be checked as per Mix Design

LOGO	SUPPLIERS NAME AND ADDRESS:	INDICATIVE FIELD QUALITY PLAN					ANNEXURE- VIA			
		ITEM : CIVIL WORK SUB-SYSTEM : GEOTECH INVI, FOUNDATIONS, EXCAVATION & FILL, SITE LEVELLING, CONCRETE, ROAD, BUILDING ETC.	QP NO. : REV. NO. : DATE : PAGE :	1 0	PROJECT: PACKAGE: CONTRACT NO. MAIN CONTRACTOR					
Sl. No	Activity and operation	Characteristics / instruments	Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3	4	5	6	7	8	9	10	
		LEGEND: D * Records, indentified with "Tick" (✓) shall be essentially included by supplier in QA documentation. Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR, TR, MTC, LB					DOC. NO.: CS - Project Code - XXX-XX-QVC-G-001 REV: 0			
Manufacturer/ Sub-supplier	Main-supplier	Categorization Witnessing & Accepting (As per NTPC QA&I System) Category 'A' FQA Engineer in association with Executing Engineer, Category 'B' Executing Engineer, Category 'C' Executing Engineer ;SR = Site Register , TR= Test Report,MfrTC = Manufacturer's Test Certificate					For NTPC USE			
	Signature	This document shall be read in conjunction with NTPC Tech. Specifications, BOQ, Drawings					REVIEWED BY APPROVED BY APPROVAL SEAL			


INDICATIVE FIELD QUALITY PLAN FOR CIVIL WORKS


LOGO	SUPPLIERS NAME AND ADDRESS:	INDICATIVE FIELD QUALITY PLAN					ANNEXURE - VIB			
		ITEM : STRUCTURAL STEEL WORK		QP NO. :		PROJECT:	PACKAGE:			
		SUB-SYSTEM : FABRICATION & ERECTION		REV. NO. :	0	CONTRACT NO.				
				DATE :		MAIN CONTRACTOR				
Sl. No	Activity and operation	Characteristics / instruments		Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks
1	2	3		4	5	6	7	8	9	D* 10
i		size and visual examination	As required/ agreed	B	Visual/ Measurement	100%	As per technical specifications and construction drawings, IS 822, AWS D 1.1	SR		As per requirement of NTPC Engineer
ii		Macro-etch Examination on production test coupons	As required/ agreed	B	Physical	Main fillet weld with min one joint per built up beam, columns and crane girders	As per technical specifications and construction drawings, IS 822, AWS D 1.1	SR	√	
iii		Dye Penetration Test	As required/ agreed	B	Physical	25% weld length of tension member of crane girder and 5% of Weld length with min. 300mm at each loaction except crane girder to all other fillet welds	As per technical specifications and construction drawings, IS 822, AWS D 1.1	SR		
2.2	BUTT WELDS									
i		Visual examination	As required/ agreed	B	Visual	Random in each shift	As per technical specifications and construction drawings, IS 822, AWS D 1.1	SR		As per requirement of NTPC Engineer
ii		DPT	As required/ agreed	B	Physical	100% on all butt welds after back gouging on root run and 10% on final weld.	As per technical specifications and construction drawings, IS 822, AWS D 1.1	IR		All butt welds to be back gouged before DPT
iii		Mechanical testing on production test coupons	As required/ agreed	B	Physical	Min. one joint per built up beams, coloums and crane girder.	As per technical specifications and construction drawings, IS 822, AWS D 1.1	IR	√	Test on production test coupons
iv		Radiography Test	As required/ agreed	A	Physical	100% radiography test on butt welds of tension flange (bottom flange) of crane girder. All other butt welds shall be subjected to 10% weld length of each welder.	As per technical specifications and construction drawings, IS 822, AWS D 1.1	IR	√	Wherever RT is not feasible UT to be carried out. In case of failure of any welds in SPOT/RT or UT the % of retesting shall be doubled at that particular loaction. Acceptance criteria of NDT on welds shall be as per AWS D1.1.
3.00	FOUNDATION CHECKS									
i		Dimensions and levels- Shape, lines (including diagonal checks)	Theodolite, Tape etc	B	Physical/ Measurement	Each Foundation	Tech Specs and Const. Drawings	SR	√	
ii		Foundation Bolts and Embedments- Verticality, Levels, pitch distance	Theodolite, Tape, Piano wires etc	B	Physical/ Measurement	Each Foundation	Tech Specs and Const. Drawings	SR	√	
4.00	PAINTING SYSTEM									
i		Paining Materials and accessories	-	A	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	Mfr.'s T.C. shall be correlated with the consignment received.
ii		Submission of painting methodology	-	B	For Review of painting system	Before start of painting work	Tech Specs and Const. Drawings			
iii		Surface prepration	As agreed / required	B	Physical /visual	Each Erection Mark	Tech Specs and Const. Drawings, Relevant code/ standards	SR	√	
iv		Primer Thickness	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
v		DFT of paint	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	

LOGO	SUPPLIERS NAME AND ADDRESS:	INDICATIVE FIELD QUALITY PLAN					ANNEXURE - VIB				
		ITEM : STRUCTURAL STEEL WORK		QP NO. :		PROJECT:	PACKAGE:				
		SUB-SYSTEM : FABRICATION & ERECTION		REV. NO. :	0	CONTRACT NO.					
				DATE :		MAIN CONTRACTOR					
Sl. No	Activity and operation	Characteristics / instruments		Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3		4	5	6	7	8	9	D* 10	
vi		Acceptance of painted surfaces	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR			
5.00	PRE-ASSEMBLY CHECKS										
i		Punch Erection marks and match marks on members	-	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings			Markings for - Assembly designation, Part number, Weight, Any other important identifications.	
ii		Pre-assembly as per match mark	-	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings				
iii		Camber, sweep and total length after trial assembly of structure.	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings	SR	√		
iv		Control assembly check at shop	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Every first and tenth set of identical structure	Tech Specs and Const. Drawings				
v		Completion of primer & intermediate coat of paint		B	Visual / Physical	Random	Tech Specs and Const. Drawings	SR			
6.00	ERECTION CHECKS										
i		Alignment, slopes, level, tolerances of erected member	Theodolite, Tape, plumb, piano wires etc	B	Measurement	Each structural member	Tech Specs and Const. Drawings	SR	√		
ii		Tightening of bolts/ Torque including foundation bolts with lock nuts	Wrench/ Torque wrench if specified	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings	SR	√		
iii		Completion of all erection fillet & butt welds		B	Visual	Each structural member	Tech Specs and Const. Drawings	SR	√		
iv		Acceptance of erected structure	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Each erected structure	Tech Specs and Const. Drawings, IS 7215 and IS 12843	SR	√		
7.00	PERMANENT BOLTS AND NUTS AND WASHERS										
i		Material- Permanent mild steel Bolts, mild steel Nuts, High strength structural Bolts, Washers- Dimensions, properties, Class, storage along with MTC	Screw gauge, Vernier, Tape etc.	A	Physical and MTC Review	Once for each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√		
ii		Contact surfaces before bolting	-	B	Physical	Random before assembly for bolting	Tech Specs and Const. Drawings, IS 4000	SR			
iii		Inspection of the assembled bolts	-	B	Physical	Randomly in each shift for assembled bolts	Tech Specs and Const. Drawings, IS 4000	SR			
iv		Tensioning	As agreed / required	B	Physical	Randomly during snug tight test and after full tensioning	Tech Specs and Const. Drawings, IS 4000	SR	√		
v		Acceptance of installed bolts	-	B	Physical	Each bolt	Tech Specs and Const. Drawings	SR			
8.00	ELECTROFORGED GRATINGS										
i		Material from approved source	As agreed / required	A	Physical and MTC Review	Once for each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	Also refer the approved MQP	
ii		Acceptance of Erection, alignment and each Installation	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR			
9.00	GALVANISED STEEL HAND RAILS										
i		Material		A	Physical	Once per lot	Grade IS:2062, Technical specifications, Galvanised as per IS 4736	SR/LB	√	Galvanising shall be carried out as per the technical specifications.	
ii		DPT	As required	B	Physical	Random	AWS D1.1 / Technical specifications	SR/LB	√		

LOGO	SUPPLIERS NAME AND ADDRESS:	INDICATIVE FIELD QUALITY PLAN				ANNEXURE - VIB				
		ITEM : STRUCTURAL STEEL WORK		QP NO. :		PROJECT:				
		SUB-SYSTEM : FABRICATION & ERECTION		REV. NO. :	0	PACKAGE:				
				DATE :		CONTRACT NO.				
Sl. No	Activity and operation	Characteristics / instruments	Class# of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	Remarks	
1	2	3	4	5	6	7	8	9	D*	10
LEGEND: D* Records, identified with "Tick" (✓) shall be essentially included by supplier in QA Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR, TR, MTC, LB							 DOC. NO.: CS - Project Code - XXX-XX-QVC-G-002 REV: 0			
Manufacturer/ Sub-supplier	Main-supplier	Categorization Witnessing & Accepting (As per owner QA&I System) Category 'A' FQA Engineer in association with Executing Engineer, Category 'B' Executing Engineer, Category 'C' Executing Engineer ;SR = Site Register , TR= Test Report,MfrTC = Manufacturer's Test Certificate				For NTPC use				
Signature		This document shall be read in conjunction with owner Tech. Specifications, BOQ, Drawings						REVIEWED BY	APPROVED BY	APPROVAL SEAL

INDICATIVE FQP FOR STRUCTURAL STEEL WORKS

	PROJECT: NTECL POWER PROJECT (3X500 MW)	LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL (PROPOSED LIST)				NTPC DOC NO	
	PACKAGE: ULTRAFILTRATION PLANT					REV. NO.	0
	MAIN SUPPLIER:	SUB SYSTEM: CIVIL WORKS				DATE	
	CONTRACT NO.:						
SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
1.	CEMENT	III	-				
2.	CONSTRUCTION CHEMICALS - ADMIXTURES, PLASTISIZERS, RETARDERS WATER PROOFING COMPOUNDS GROUTS	III	-				
3.	FALSE CEILING - GLASS REINFORCED GYPSUM SYSTEM, MINERAL FIBRE BOARD SYSTEM, PREPAINTED COIL COATED STEEL SYSTEM	III	-				
4.	PAINT AND PAINTING SYSTEM	III	-				
5.	COLOUR COATED SHEET (FOR COIL)	I	-				
6.	PROFILERS FOR DECKING SHEETS	I	-				
7.	PROFILERS FOR CLADDING SHEETS	I	-				
8.	ELECTROFORGED GRATING	II	-				
9.	PVC WATER STOP	III	-				
10.	CERAMIC / VITRIFIED TILES	III	-				
11.	ACID / ALKALI RESISTANCE TILES, AR BRICKS, AR CEMENT (POTASSIUM SILICATE BASED CEMENT MORTAR, PHENOLIC BASED RESIN CEMENT) AR BITUMASTIC	III	-				
12.	FIRE PROOF DOORS	III	-				
13.	PARTICLE BOARDS, PLYWOOD, MDF	III	-				
14.	ALUMINUM SECTIONS	III	-				

	PROJECT: NTECL POWER PROJECT (3X500 MW)		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL (PROPOSED LIST)			NTPC DOC NO	
	PACKAGE: ULTRAFILTRATION PLANT					REV. NO.	0
	MAIN SUPPLIER:		SUB SYSTEM: CIVIL WORKS			DATE	
	CONTRACT NO.:						
SR. NO.	ITEM	QAP / INSP. CAT	QAP NO.	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
15.	HIGH SOLID CONTENT LIQUID APPLIED URETHANE BASED ELASTOMERIC MEMBRANE FOR WATER PROOFING	III	-				
16.	SANITARY ITEMS	III					
17.	CP BRASS TAP AND OTHER SANITARY FITTINGS	III	-				
18.	POLYCARBONATE SHEETS	III	-				
19.	MINERAL WOOL FOR THERMAL INSULATION	III					
<p>LEGENDS:</p> <p>1. SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC) A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any. DR – For these items “Details required” for NTPC review. To be identified with letter “DR” in the list. 'N' NOTED – For these items vendors are approved by Main Supplier and accepted by NTPC without specific vendor approval from NTPC. To be identified with ‘NOTED.’</p> <p>2. QP/INSPN CATEGORY: CAT-I : For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. CAT-II : For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved quality plan. CAT-III : For these items Main Supplier approves the Quality Plans. UNITS/ WORKS : Place of manufacturing Place of Main Supplier of multi units/works.</p> <p>NOTE 1: For the items placed in CAT-III for Civil Works, the review and final acceptance shall be done by NTPC-EIC/ FQA on the basis of MTC / certificate of conformance in line with Indicative FQP / Technical Specifications.</p>							

PART - D

ERECTION CONDITION OF CONTRACT

CLAUSE NO.	ERECTION CONDITIONS OF CONTRACT		
<p>1.00.00</p> <p>1.01.00</p> <p>1.02.00</p>	<p>GENERAL</p> <p>The following provisions shall supplement the conditions already contained in the other parts of these specifications and documents and shall govern that portion of the work of this contract which is to be performed at site. The erection requirements and procedures not specified in these documents shall be in accordance with the recommendations of the equipment manufacturer, or as mutually agreed to between the Employer and the Contractor prior to commencement of erection work.</p> <p>The Contractor upon signing of the Contract shall, in addition to a Project Co-ordinator, nominate another responsible officer as his representative at Site suitably designated for the purpose of overall responsibility and co-ordination of the Works to be performed at Site. Such a person shall function from the Site office of the Contractor during the pendency of Contract.</p>		
<p>2.00.00</p> <p>2.01.00</p> <p>2.02.00</p>	<p>REGULATION OF LOCAL AUTHORITIES AND STATUTES</p> <p>In addition to the local laws and regulations, the Contractor shall also comply with the Minimum Wages Act and the Payment of Wages Act (both of the Government of India) and the rules made there under in respect of its labour and the labour of its sub-contractors currently employed on or connected with the contract.</p> <p>All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully payable under the provisions of the Indian Boiler Regulations and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the Employer, shall be to the account of the Employer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or his Sub-Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor.</p>		
<p>3.00.00</p> <p>3.01.00</p> <p>3.02.00</p>	<p>WELDING OF PRESSURE PARTS AND HIGH PRESSURE PIPING</p> <p>The welding of all pressure parts and high pressure piping shall be in accordance with the following requirements :</p> <p>Qualification of Weld Procedures</p> <p>Only qualified welding procedures as per ASME Section IX shall be used by contractor at site. Procedure qualification records along with WPS shall be submitted to NTPC for review. Welding procedure shall indicate all essential and non-essential parameters as per ASME Section IX. Makes of welding consumables shall be subject to employer's approval.</p> <p>Welder's Qualification</p> <p>Only welders who are qualified in accordance with the latest applicable requirements of the Indian Boiler Regulations, shall be permitted to perform any welding work on the pressure parts and its attachment welding. In addition to such statutory</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 1 OF 49</p>

CLAUSE NO.	ERECTION CONDITIONS OF CONTRACT		
<p>3.03.00</p> <p>3.04.00</p> <p>4.00.00</p> <p>4.01.00</p> <p>4.02.00</p>	<p>qualification requirements, the welders shall also undergo a satisfactory pre-production qualification test to be conducted by the Contractor at site as per ASME Sec IX in presence of employer's representative(s), prior to performing work under these specifications. The services of an independent testing laboratory shall be retained by the Contractor to perform welder qualification tests for welders.</p> <p>All the welders carrying out welding at site shall carry an identification badge, which shall indicate the category and the grade of welding for which they have been tested and authorised to carry out welding. All such badges shall be countersigned by the Employer.</p> <p>Records</p> <p>Welders performance shall be monitored regularly and record of their performance shall be maintained by contractor in a manner acceptable to the employer. Contractor shall maintain such records including record of procedure qualification & welder qualification and hand-over to the employer at the end of work.</p> <p>MARKING</p> <p>On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be stamped on separate marking plate which shall be tack welded on pipe near the weld.</p> <p>HEAT TREATMENT</p> <p>Pre-heating, post-heating and post-weld stress relief operations of all welds, shall be performed in accordance with the requirements of applicable code. Local post weld stress relieving heat - treatments shall be adopted only in cases where it is normally impracticable to subject the entire assembly as such for stress relieving operations. Heating may be by means of electric induction coils or electric resistance coils. Oxy-acetylene flame heating or exothermic chemical heating methods will not be permitted. Complete recording of the temperatures through out the stress relieving cycle of the material and the weld subjected to heat treatment shall be made by means of a potentiometric recorder. Recorders other than those of potentiometric type shall not be used for such temperature recording during stress relieving operations.</p> <p>The contractor & employer's representative, at start and at the end of HT Cycle shall sign the time and temperature charts for heat-treatment.</p> <p>After setting up the weld joint for heat treatment operation, the Employer's signature shall be obtained on the strips chart of the recorder prior to starting of heat treatment cycle. The right hand corner of the strip chart at the starting point of the heat treatment cycle shall contain details like the weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 2 OF 49</p>

CLAUSE NO.	ERECTION CONDITIONS OF CONTRACT				
<p>5.00.00</p> <p>6.00.00</p> <p>6.01.00</p> <p>6.02.00</p> <p>6.03.00</p> <p>7.00.00</p>	<p>temperatures, date of heat treatment, reference to item number of the Field welding Schedule (as specified at clause no 7.00.00- of this chapter) etc.</p> <p>WELD EDGE PREPARATION</p> <p>Preparation at site of weld joint shall be in accordance with details acceptable to the Employer. Wherever possible, machining or automatic flame cutting shall be used for edge preparation. Hand flame cutting will be permitted only where edge preparation otherwise is impractical. All slag shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of the Employer. Flame cutting of alloy steel pipe shall be avoided. Wherever such cutting is done, a 200mm length at the cut face shall be removed by machining. Pneumatic hand tools such as edge preparation, tube cutting machine can be used.</p> <p>CLEANING AND SERVICING</p> <p>The inside of all tubes, pipes, valves and fittings shall be free from dirt, and loose scales before being erected. All the pipelines shall be thoroughly blown and/or flushed. Each steam and water tubes shall be blown with compressed air and shall be subjected to 'ball test' before erection to ensure that no obstructions exist. A system for recording of all such operations shall be developed and maintained in a manner to ensure that no obstructions are left inside the tubes and no tubes are left uncleaned and untested.</p> <p>All valves and valve actuators, and dampers and damper actuators, if any, shall be thoroughly cleaned and serviced prior to pre-commissioning tests and/or Initial Operations of the plant. A system for recording of such servicing operation shall be developed and maintained in a manner acceptable to the Employer and to ensure that no valves or dampers including their actuators are left unserviced.</p> <p>All interior surfaces of the turbine shall be thoroughly cleaned prior to boxing - up to remove all traces of oil preservations.</p> <p>FIELD WELDING SCHEDULE</p> <p>The Contractor shall submit to the Employer, a certified and complete field welding schedule for all the field welding activities to be carried out in respect of the pressure parts involved in the equipment furnished and erected by him, at least 90 days prior to the scheduled start of erection work at site. Such schedule will be strictly followed by the Contractor during the process of erection. The above field-welding schedule to be issued by the Contractor shall contain the following:</p> <p>(a.) Drawing No (s)</p> <p>(b.) Location of the weld</p> <p>(c.) Size of the weld (outside diameter and thickness)</p> <p>(d.) Type of joints</p> <p>(e.) Material specifications</p>	<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 3 OF 49</p>

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	<p>(f.) Size of fillet on backing ring, when the type of joint is with backing ring</p> <p>(g.) Electrode/ filler metal specifications</p> <p>(h.) Number of welds per unit</p> <p>(i.) Quantity of filler metal per weld</p> <p>(j.) Indication of required Non-destructive Examination (NDE) for each weld</p> <p>(k.) Pre-heat temperatures for welding</p> <p>(l.) Process of welding</p> <p>(m.) Post-welding heat treatment temperature ranges, duration, under as specified at clause no 4.00.00- of this chapter entitled "Heat Treatment".</p> <p>(n.) Qualification details of weld procedures to be adopted as specified under as specified at clause no 3.01.00- of this chapter entitled 'Qualification of Weld Procedures'.</p>		
8.00.00	<p>SITE RUN MISCELLANEOUS PIPING</p> <p>Sketches or diagrams of the proposed routings of all piping, not already indicated and routed on the shop drawings which were reviewed by the Employer, shall be submitted to the Employer for review, Employer's acceptance of such site routings shall be obtained before the piping is erected. All these site run piping shall be installed in such a manner as to present an orderly and neat installation. They shall be located as to avoid obstruction of access and passages. Valves, instruments or any other special items shall be located convenient for operation by the operating personnel. Pipe runs shall be plumb or level except where pitch for drainage is required. Pipe runs that are not parallel to the building structure, walls or column rows shall be avoided so that deflection of pipes between hangers does not exceed 6 mm. No miscellaneous pipe shall be routed and installed above or adjacent to electrical equipment.</p>		
9.00.00	<p>THERMAL EXPANSIONS</p> <p>All piping installation shall be such that no excessive or destructive expansion forces exist either in the cold condition or under condition of maximum temperature. All bends, expansion joints and any other special fittings, necessary to provide proper expansion, shall be incorporated. During installation of expansion joints and anchors, care must be taken to make sure that full design movement is available at all times for maximum to minimum temperature and vice-versa.</p>		
10.00.00	<p>PIPING SUPPORTS</p>		
10.01.00	<p>Hangers, supports and anchors shall be installed as required to obtain a safe, reliable and complete pipe installation. All supports shall be properly levelled and anchored when installed. The anchors shall be so placed that thermal expansion will</p>		
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10.02.00	<p>be absorbed by bends without subjecting the valves or equipment to excessive strains.</p> <p>The hanger assemblies shall not be used for the attachment of rigging to hoist the pipe into place. Other means shall be used to securely hold the pipe in place till the pipe support is completely assembled and attached to the pipe and building structures and spring support is set to accommodate the pipe way. All temporary rigging shall be removed in such a way that the pipe support is not subjected to any sudden load. All piping, having variable spring type supports, shall be held securely in place by temporary means during the hydraulic test of pipe system. Constant support type spring hangers used during hydraulic test shall be pinned or blocked solid during the test. After complete installation and insulation of the piping and filling of the piping with its normal operating medium, the pipe support springs shall be adjusted to the cold positions. If necessary, the spring support shall be re-adjusted to the hot positions after the line has been placed for service at its normal maximum operating temperature conditions. Electric arc welding only shall be used to weld all pipe supports to structural steel members that form part of the building supporting structure. The structural beams shall not be heated more than necessary during welding of supports and such welds shall run parallel to the axis of the span. All lugs or any other attachments welded to the piping shall be of the same material as the pipe.</p>		
11.00.00	PRESSURE TESTING		
11.01.00	On completion of erection of pressure parts, a hydraulic test in accordance with the requirements of the Indian Boiler Regulations shall be performed by the Contractor.		
11.02.00	All the valves, high pressure pipes and inter-connected pipes connecting the pressure parts shall be tested along with pressure parts. All blank flanges or any removable plugs required for openings not closed by the valves, and piping provided, shall be furnished by the Contractor. The pressurization equipment including water piping from the supply, needed for the above test shall also be furnished by the Contractor. Any defects noticed during the testing are to be rectified and the unit re-tested. If any welding is done on the pressure parts after the Hydraulic test, the Hydraulic test for that portion of pressure parts shall be repeated.		
11.03.00	Thy hydraulic test shall be considered successful only on certification to that effect by the concerned inspecting Authority as per the provisions of the Indian Boiler Regulations and the Employer.		
12.00.00	THERMOWELLS AND FLOW NOZZLES		
12.01.00	All the thermowells and flow nozzles in the equipment furnished under the technical specifications shall be installed as a part of this work.		
12.02.00	All thermowell connections incorporated in the steam service shall be plugged during the pressure testing and the blow out of steam piping systems. Upon completion of the blow out operation, all thermowells shall be installed and seam welded. Similarly, all flow nozzles in the steam lines shall also be installed only on completion of steam		
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<p>13.00.00</p>	<p>blowing operations unless otherwise agreed to by the Employer, depending upon the sequence of cleaning and purging operations to be adopted by the Contractor at the field.</p> <p>INSULATION, LAGGING AND CLADDING</p> <p>The provision of insulation, lagging and cladding of the various equipments and portion of the equipment covered under the Contract, shall be furnished by the Contractor as specified elsewhere or agree to separately in writing. Welds required for holding insulation on pressure parts shall be carried out by IBR qualified welder.</p> <p>13.01.00 In case of equipment other than steam turbine, Lugs made out of MS rods of 5 mm dia conforming to IS280 or equivalent shall be welded on the surface at intervals of 250 mm pitch zigzag to support insulation. Mineral wool mats with wire netting on both sides shall be applied against the surface with lugs piercing through. The edges of mattress shall be laced together with galvanised MS 0.71 mm dia (22 SWG) IS 280 or equivalent (soft) lacing wire. Galvanized binding wire of 1.63 mm dia (16 SWG) IS 280 or equivalent (soft) will be used criss-cross between lugs to hold it. The lugs will then be bent over the netting.</p> <p>13.02.00 Unless otherwise specified, all equipment insulation shall be covered with aluminium cladding/ jacketing. The thickness of aluminium sheet shall not be less than 0.63 mm. Galvanic corrosion shall be prevented by carefully avoiding permanent contact of aluminium cladding with copper, copper alloys, tin, lead nickel or nickel alloys including monel metal. Where cladding is attached to carbon steel or low alloy steels, the steel shall first be prime painted with zinc chromate and then painted with aluminium paint. The use of lead base paints for this purpose shall be avoided.</p> <p>13.03.00 Prior to application of cladding, all surface imperfections such as ducts, cracks and voids shall be filled with insulation cement so as to form a smooth base for the final shall be machine rolled and formed. All overlaps at longitudinal joints shall face downwards. The fixing of cladding shall be by means of screws and they shall be adequate in number and be so place is such location as to produce tight joints eliminating 'bellying'. The screws, as far as possible, shall be uniformly placed and on centres not exceeding 150 mm except where insulated outside diameters are smaller than 230 mm in which case spacing shall be on centres not exceeding 100mm. Self tapping type screws, of 12 mm size of stainless steel/aluminium alloy as per the requirements shall be used. All joints wherever possible shall be lapped a minimum of 50 mm. The overlaps of longitudinal joints shall be a 10 mm turnback edge. Butt joints such as those at piping tees, shall be made using a rolled seam. Suitable provisions for expansion movement shall be provided in joints. Hinged or sliding doors for convenience shall be provided in the cladding at all access openings, non-projecting connections, important codes stampings etc.</p> <p>13.04.00</p>		
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<p>13.04.01</p> <p>13.04.02</p> <p>13.04.03</p> <p>13.04.04</p>	<p>Piping</p> <p>The insulation on piping shall be applied using wire loops on 150mm centres. These wire loops shall be thoroughly embedded into the outer insulation surface and all cracks, voids and depressions shall be filled with insulating cement suitable for the piping temperature so as to form a smooth base for application of cladding. The wires used for piping insulation shall be of 16 SWG. The surface shall be smooth and uniform before applying the outer covering. All piping insulation ends shall be terminated at a sufficient distance from flanges to facilitate removal of bolts.</p> <p>Flanges</p> <p>Insulation on flanges shall be by means of blocks of insulating material securely bound to the flange by wire loops. Such blocks of insulation shall be long enough to overlap the adjacent pipe insulation by an amount equal to the thickness of adjacent pipe insulation. Smooth finish shall be obtained by the application of insulating cement. Alternatively, sectional pipe insulation of proper diameter may be used. Insulation on flanges shall not be done until the pipe and equipment have been in service during the initial operation and till all the flange bolts have been re-tightened.</p> <p>Bends and Elbows</p> <p>Insulation on bends and elbows shall be cut into sections sufficiently short to form a reasonable smooth external surface. After the application of insulation material in place, it shall be smoothly coated with insulating cement. Elbows may be insulated as above or alternatively by means of specially moulded insulation enclosures.</p> <p>Cladding</p> <p>Cladding shall be of aluminium sheet of thickness as per details given in detail Technical Specification or will be provided during detail engineering shall be machine rolled and formed to accurately fit insulation curvatures. Cladding shall be secured using self-tapping screws. Screws shall be adequate number and so located as to produce tight joints. The spacing of screws shall be as far as possible uniform and on centres not exceeding 150 mm. For outside diameters less than 230 mm, spacing of screws shall be on centres not exceeding 100 mm. adequate number of screws shall be provided for fixing the cladding and be so placed in such locations, as to produce a smooth cladding finish without 'bellying'. Insulated elbows having insulated diameters less than 330 mm shall be provided with preformed smooth aluminium elbow jackets. Wherever possible, all joints should be lapped a minimum of 50 mm with joints facing downwards and so placed that they are obscured from normal points of vision. All the joints in the cladding shall be made with suitable provisions for expansions. All butt joints such as those at piping tees shall be made using rolled seams. In addition, to prevent galvanic corrosion, suitable action, as stipulated as specified at clause no 13.02.00- of this chapter, shall be taken.</p>		
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13.04.05	<p>Valves and Fittings</p> <p>All valves and fittings installed in the pipelines shall also be applied with insulation and furnished with suitably shaped boxes so as to facilitate easy dismantling of the fittings. The insulation thickness for valves, valve fittings etc., shall be same as that used on the line on which they are installed. All voids shall be properly filled up with insulating material and as per the directions of the Employer.</p>		
13.05.00	<p>Protection of Equipment during Insulation Applications</p> <p>All equipment and structures shall be suitably protected from damage while applying insulation after completion of insulation. All equipment and structures shall be thoroughly cleaned and remove insulating materials which might have fallen on them.</p>		
14.00.00	<p>CODE REQUIREMENTS</p> <p>The erection requirements and procedures to be followed during the installation of the equipment shall be in accordance with the relevant Indian Electricity Rules & Codes, Indian Boiler Regulations, ASME codes and accepted good practices, the Employer's Drawings and other applicable Indian recognised codes and laws and regulations of the Government of India.</p>		
15.00.00	<p>ELECTRICAL SAFETY REGULATIONS</p>		
15.01.00	<p>In no circumstances will the Contractor interfere with fuses and electrical equipment belonging to the other Contractor or Employer.</p>		
15.02.00	<p>Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Employer, he shall:</p> <ul style="list-style-type: none"> (a.) Satisfy the Employer that the appliance is in good working condition; (b.) Inform the Employer of the maximum current rating, voltage and phases of the appliances; (c.) Obtain permission of the Employer detailing the socket to which the appliances may be connected. <p>The Employer will not grant permission to connect until he is satisfied that</p> <ul style="list-style-type: none"> a) The appliance is in good condition and is fitted with a suitable plug. b) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores. 		
15.03.00	<p>No electric cable in use by the other Contractor/ Employer will be disturbed without permission. No weight of any description will be imposed on any such cable and ladder or similar equipment will rest against or be attached to it.</p>		
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15.04.00	No repair work shall be carried out on any live equipment. The equipment must be declared safe by the Employer and a permit to work issued before any work is carried out.		
15.05.00	The Contractor shall employ the necessary number of qualified, full time electricians to maintain his temporary electrical installation.		
16.00.00	<p>REMOVAL OF MATERIAL</p> <p>No material brought to the Site shall be removed from the Site by the Contractor and/or his Sub-Contractors without the prior written approval of the Employer.</p>		
17.00.00	<p>INSPECTION, TESTING AND INSPECTION CERTIFICATES</p> <p>The provisions of the clause entitled Inspection, Testing and Inspection Certificates given in Part - C of the Technical Specification, shall also be applicable to the erection portion of the Works. The Employer shall have the right to re-inspect any equipment though previously inspected and approved by him at the Contractor's works, before and after the same are erected at Site. If by the above inspection, the Employer rejects any equipment, the Contractor shall make good for such rejections either by replacement or modification/ repairs as may be necessary to the satisfaction of the Employer. Such replacements will also include the replacements or re-execution of such of those works of other Contractors and/or agencies, which might have got damaged or affected by the replacements or re-work done to the Contractor's work.</p>		
18.00.00	ACCESS TO SITE AND WORKS ON SITE		
18.01.00	Suitable access to site and permission to work at the Site shall be accorded to the Contractor by the Employer in reasonable time.		
18.02.00	In the execution of the Works, no person other than the Contractor or his duly appointed representative, Sub-Contractor and workmen, shall be allowed to do work on the Site, except by the special permission, in writing by the Employer or his representative.		
19.00.00	<p>CONTRACTOR'S SITE OFFICE ESTABLISHMENT</p> <p>The Contractor shall establish a Office at the Site and keep posted an authorised representative for the purpose of the Contract. Any written order or instruction of the Employer or his duly authorised representative, shall be communicated to the said authorised resident representative of the Contractor and the same shall be deemed to have been communicated to the Contractor at his legal address.</p>		
20.00.00	CO-OPERATION WITH OTHER CONTRACTORS		
20.01.00	The Contractor shall co-operate with all other Contractors or tradesmen of the Employer, who may be performing other works on behalf of the Employer and the workmen who may be employed by the Employer and doing work in the vicinity of the works under the Contract. The Contractor shall also arrange to perform his work		
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	<p>as to minimise, to the maximum extent possible, interference with the work of other Contracts and their workmen. Any injury or damage that may be sustained by the employees of the other Contractors and the Employer, due to the Contractor's work shall promptly be made good at his own expense. The Employer shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractors or between the Contractor and the workmen of the Employer in regard to their work. If the work of the Contractor is delayed because of the any acts of omission of another Contractor, the Contractor shall have no claim against the Employer on that account other than an extension of time for completing his works.</p> <p>Employer shall have full access to visit the contractor's site at any time for inspection and surveillance checks.</p> <p>20.02.00 The Employer shall be notified promptly by the Contractor of any defects in the other Contractor's works that could affect the Contractor's Works. The Employer shall determine the corrective measures if any, required to rectify this situation after inspection of the works and such decisions by the Employer shall be binding on the Contractor.</p> <p>21.00.00 DISCIPLINE OF WORKMEN</p> <p>The Contractor shall adhere to the disciplinary procedure set by the Employer in respect of his employees and workmen at Site. The Employer shall be at liberty to object to the presence of any representative or employee of the Contractor at the Site, if in the opinion of the Employer such employee has mis-conducted himself or is incompetent, negligent or otherwise undesirable then the Contractor shall remove such a person objected to and provide in his place a competent replacement.</p> <p>22.00.00 CONTRACTOR'S FIELD OPERATION</p> <p>22.01.00 The Contractor shall keep the Employer informed in advance regarding his field activity plans and schedules for carrying out each part of the works. Any review of such plan or schedule or method of work by the Employer shall not relieve the Contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by the Employer or any of his representatives and no claim of the Contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.</p> <p>22.02.00 The Contractor shall have the complete responsibility for the conditions of the Work-Site including the safety of all persons employed by him or his Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of the Contract and shall not be limited to normal working hours. The construction review by the Employer is not intended to include review of Contractor's safety measures in, on or near the Work-Site, and their adequacy or otherwise.</p>		
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<p>23.00.00</p> <p>23.01.00</p> <p>23.02.00</p> <p>23.03.00</p>	<p>PHOTOGRAPHS AND PROGRESS REPORT</p> <p>The Contractor shall furnish three (3) prints each to the Employer of progress photographs of the work done at Site. Photographs shall be taken as and when indicated by the Employer or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the Contractor and the title of the photograph.</p> <p>The above photographs shall accompany the monthly progress report detailing out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.</p> <p>The Contractor shall submit the progress of work in video cassettes (2 copies) quarterly highlighting the progress and constraints at site.</p>		
<p>24.00.00</p> <p>24.01.00</p> <p>24.02.00</p>	<p>MAN-POWER REPORT</p> <p>The Contractor shall submit to the Employer, on the first day of every month, a man hour schedule for the month, detailing the man hours scheduled for the month, skill-wise and area-wise.</p> <p>The Contractor shall also submit to the Employer on the first day of every month, a man power report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill-wise and the areas of employment of such labour.</p>		
<p>25.00.00</p> <p>26.00.00</p> <p>26.01.00</p>	<p>PROTECTION OF WORK</p> <p>The Contractor shall have total responsibility for protecting his works till it is finally taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be resolved as per the provisions of the as specified at clause no 20.00.00- of this chapter entitled "Co-operation with other Contractors." The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.</p> <p>EMPLOYMENT OF LABOUR</p> <p>In addition to all local laws and regulations pertaining to the employment of labour to be complied with by the Contractor pursuant to GCC, the Contractor will be expected</p>		
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	to employ on the work only his regular skilled employees with experience of the particular work. No female labour shall be employed after darkness. No person below the age of eighteen years shall be employed.		
26.02.00	All travelling expenses including provisions of all necessary transport to and from Site, lodging allowances and other payments to the Contractor's employees shall be the sole responsibility of the Contractor.		
26.03.00	The hours of work on the Site shall be decided by the Employer and the Contractor shall adhere to it. Working hours will normally be eight (8) hours per day - Monday through Saturday.		
26.04.00	Contractor's employees shall wear identification badges while on work at Site.		
26.05.00	In case the Employer becomes liable to pay any wages or dues to the labour or any Government agency under any of the provisions of the Minimum Wages Act, Workmen Compensation Act, Contract Labour Regulation Abolition Act or any other law due to act of omission of the Contractor, the Employer may make such payments and shall recover the same from the Contractor's Bills.		
27.00.00	FACILITIES TO BE PROVIDED BY THE EMPLOYER		
27.01.00	Space		
	The Contractor shall advise the Employer within thirty (30) days from the date of acceptance of the Notification of Award about his exact requirement of space for his office, storage area, pre-assembly and fabrication areas, labour and staff colony area, toilets, etc. The above requirement shall be reviewed by the Employer and space as decided by Employer will be allotted to the Contractor for construction of his temporary structures/ facilities like office, storage sheds, pre-assembly and fabrication areas, labour and staff colony, toilets, etc. for Contractor's as well as his Sub-Contractor's use.		
27.02.00	Electricity		
	The Contractor shall submit to the Employer within thirty (30) days from the date of acceptance of the Notification of Award, his electrical power requirements, if any, to allow the planning of the same by the Employer. The Contractor shall be provided with free supply of electricity for the purposes of the Contract, only at two locations in the Employer's Site and at 415V voltage level. The Contractor shall make his own further distribution arrangement. All temporary wiring must comply with local regulations and will be subject to Employer's inspection and approval before connection to supply. The free supply of power will not be provided for the use in the labour and staff colony. Power supply for labour and staff colony shall be provided at one point and the Contractor shall be charged at rates prevalent at the site.		
27.03.00	Water		
	Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/colony.		
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27.04.00	<p>Communication</p> <p>The Employer will extend the telephone facilities, if available at Site, for purposes of Contract. The Contractor shall be charged at actuals for such facilities.</p>		
27.05.00	<p>Cranes</p> <p>Turbine hall EOT cranes may be used by the Contractor on chargeable basis for erection of the units / equipments under this package. For the equipments which cannot be handled by these Turbine hall EOT cranes, the Contractor shall make his own arrangements.</p>		
28.00.00	<p>FACILITIES TO BE PROVIDED BY THE CONTRACTOR</p>		
28.01.00	<p>Contractor's site office Establishment</p> <p>The Contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the contract, pursuant to GCC.</p>		
28.02.00	<p>Tools, tackles and scaffoldings</p> <p>The Contractor shall provide all the construction equipments, tools, tackles and scaffoldings required for pre-assembly, installation, testing, commissioning and conducting Guarantee tests of the equipments covered under the Contract. He shall submit a list of all such materials to the Employer before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without the written permission of the Employer. The Contractor shall arrange Dozer, Hydra, Cranes, Trailer, etc. for the purpose of fabrication, erection and commissioning.</p>		
28.03.00	<p>Testing Equipment and Facilities:</p> <p>The contractor shall provide the necessary testing, equipment and facilities.</p>		
28.04.00	<p>Site laboratory for civil works:</p> <p>Contractor shall provide and maintain a site laboratory for the testing of construction material under the direction and general supervision of employer.</p>		
28.05.00	<p>First-aid</p> <p>28.05.01 The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor's personnel shall be trained in administering first-aid.</p> <p>28.05.02 The Employer will provide the Contractor, in case of any emergency, the services of an ambulance for transportation to the nearest hospital.</p>		
28.06.00	<p>Cleanliness</p>		
28.06.01	<p>The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at</p>		
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28.06.02	<p>least once in a day. All such rubbish and scrap material shall be stacked or disposed in a place to be identified by the Employer. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.</p> <p>Similarly the labour colony, the offices and the residential areas of the Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the Employer. Proper sanitary arrangements shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.</p>		
29.00.00	<p>LINES AND GRADES</p> <p>All the Works shall be performed to the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and layout the Works. Basic horizontal and vertical control points will be established and marked by the Employer at Site at suitable points. These points shall be used as datum for the works under the Contract. The Contractor shall inform the Employer well in advance of the times and places at which he wishes to do work in the area allotted to him so that suitable datum points may be established and checked by the Employer to enable the Contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled by the Employer at Contractor's expense.</p>		
30.00.00	<p>FIRE PROTECTION</p>		
30.01.00	<p>The work procedures that are to be used during the erection shall be those which minimise fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least once each day. Fuels, oils and volatile or flammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Untreated canvas, paper, plastic or other flammable flexible materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the Site, the same shall be removed and replaced with acceptable material before moving into the construction or storage area.</p>		
30.02.00	<p>Similarly corrugated paper fabricated cartons etc. will not be permitted in the construction area either for storage or for handling of materials. All such materials used shall be of water proof and flame resistant type. All the other materials such as working drawings, plans etc. which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.</p>		
30.03.00	<p>All the Contractor's supervisory personnel and sufficient number of workers shall be trained for fire-fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the Site during the entire period of the Contract.</p>		
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30.04.00	The Contractor shall provide enough fire protection equipment of the types and number for the warehouses, office, temporary structures, labour colony area etc. Access to such fire protection equipment, shall be easy and kept open at all time.		
31.00.00	<p>SECURITY</p> <p>The Contractor shall have total responsibility for all equipment and materials in his custody stores, loose, semi-assembled and/or erected by him at Site. The Contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the Employer Site only with the written permission of the Employer in the prescribed manner.</p>		
32.00.00	<p>CONTRACTOR'S AREA LIMITS</p> <p>The Employer will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and the Contractor shall not trespass the areas not so marked out for him. The Contractor shall be responsible to ensure that none of his personnel move out of the areas marked out for his operations. In case of such a need for the Contractor's personnel to work out of the areas marked out for him the same shall be done only with the written permission of the Employer.</p>		
33.00.00	<p>CONTRACTOR'S CO-OPERATION WITH THE EMPLOYER</p> <p>In case where the performance of the erection work by the Contractor affects the operation of the system facilities of the Employer, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the Employer and the same shall be acceptable at all times to the Contractor. The Employer may impose such restrictions on the facilities provided to the Contractor such as electricity, etc. as he may think fit in the interest of the Employer and the Contractor shall strictly adhere to such restrictions and co-operate with the Employer. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and installed by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in documents and specifications.</p>		
34.00.00	<p>PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES</p>		
34.01.00	<p>GENERAL</p>		
34.01.01	The Contractor upon completion of installation of equipments and systems, shall conduct pre-commissioning and commissioning activities, to make the equipment/systems ready for safe, reliable and efficient operation on sustained basis. All pre-commissioning/commissioning activities considered essential for such		
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	<p>readiness of the equipment/systems including those mutually agreed and included in the Contractor's quality assurance programme as well as those indicated in clauses elsewhere in the technical specifications shall be performed by the contractor.</p>		
34.01.02	<p>The pre-commissioning and commissioning activities including Guarantee tests, checks and trial operations of the equipment/systems furnished and installed by the contractor shall be the responsibility of the Contractor as detailed in relevant clauses in Technical Specification. The Contractor shall provide, in addition, test instruments, calibrating devices etc. and labour required for successful performance of these operations. If it is anticipated that the above test may prolong for a long time, the Contractor's workmen required for the above test shall always be present at site during such operations.</p>		
34.01.03	<p>The following activities shall be carried out by the contractor, 18 month prior to schedule date of commissioning of the equipment/systems installed by him.</p> <p>(a.) The contractor shall furnish the organization chart of his operation and commissioning engineers for the acceptance of employer. Adequate number of operation and commissioning engineers shall be deployed by the contractor to effectively meet the requirement of round the clock operation in shifts also, till the plant is taken over by the employer.</p> <p>(b.) The contractor shall submit the bio-data containing the details of experience of his operation and commissioning engineers for the acceptance of employer.</p> <p>(c.) The contractor shall furnish the deployment schedule of his operation and commissioning engineers for the acceptance of the employer.</p> <p>(d.) Apart from above, contractor shall ensure deployment of sufficient skilled/semi-skilled/unskilled manpower during pre-commissioning and commissioning activities.</p>		
34.01.04	<p>It shall be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and initial operation of the equipment/systems which are installed by him.</p>		
34.01.05	<p>The Contractor shall also be responsible for flushing and initial filling of all oils and lubricants required for the equipment furnished and installed by him so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in these specifications and documents.</p>		
34.02.00	COMMISSIONING DOCUMENTATION		
34.02.01	<p>The contractor shall submit the commissioning documentation, comprising of Standard checklists, pre-commissioning procedures, testing schedules, commissioning schedules and commissioning networks for various equipment/systems covered under the contract, for the approval of employer.</p>		
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34.02.02	Standard checklist, as the name suggests, shall be a fairly general documents, containing the list of all checks required to be carried out for similar and repetitive type of equipment to ensure consistent and thorough checking. An indicative list of such equipment is enclosed as Annexure I.		
34.02.03	The testing schedule is a document, designed for safe and systematic commissioning of individual equipment/sub-system (for example Boiler Feed Pump, condensate pump, compressor etc) Commissioning schedule is a document envisaged for commissioning of a system (for example feed system, Condensate system, Compressed Air system, Fire water system, Unit commissioning etc). The testing/Commissioning schedule shall have a standard format in order to maintain consistency of presentation, content and reporting. A brief write up on the contents of the Testing Schedule/Commissioning Schedule is enclosed as Annexure-II.		
34.02.04	The contractor shall submit the list of commissioning documentation to be submitted by him, alongwith their submission schedule for various equipment/systems covered under the contract, with in 6(six) month from the date of award of contract, for the acceptance of employer.		
34.02.05	The Contractor shall submit the commissioning documentation, for various equipment/covered under the contract, for the approval of employer, at least 18 months before the scheduled date of commissioning of the equipment/systems.		
34.03.00	COMMISSIONING ACTIVITIES		
34.03.01	Upon completion of pre-commissioning activities/tests, the contractor shall initiate commissioning of facilities. During commissioning the Contractor shall carry out system checking and reliability trials on various parts of the facilities.		
34.03.02	Contractor shall carry out the checks/tests at site to prove to the Employer that each equipment of the supply complies with requirements stipulated and is installed in accordance with requirements specified.		
34.03.03	Before the plant is put into initial operation the Contractor shall be required to conduct test to demonstrate to the Employer that each item of the plant is capable of correctly performing the functions for which it was specified and its performance, parameters etc. are as per the specified/approved values. These tests may be conducted concurrently with those required under commissioning sequence.		
34.03.04	The Contractor shall also demonstrate the performance of all C&I equipment, the tests on main equipment of prior to that as the case may be.		
34.03.05	Other tests shall be conducted, if required by the Employer, to establish that the plant equipment are in accordance with requirements of the specifications.		
34.03.06	The Contractor shall conduct all the commissioning tests and undertake commissioning activities pertaining to all other auxiliaries and equipments including all electrical and C&I equipment/systems not specifically brought out above but are within the scope of work and facilities being supplied and installed by the Contractor		
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<p>34.04.00</p>	<p>and follow the guidelines indicated above or elsewhere in these technical specifications(Section-VI)</p> <p>Initial Operation</p> <p>Upon completion of system checking/Tests as above and as a part of commissioning of facilities, complete plant/facilities shall be put on initial operation as stipulated in General Technical Requirements.</p>		
<p>35.00.00</p>	<p>MATERIALS HANDLING AND STORAGE</p>		
<p>35.01.00</p>	<p>All the equipments furnished under the Contract and arriving at Site shall be promptly received, unloaded and transported and stored in the storage spaces by the Contractor.</p>		
<p>35.02.00</p>	<p>Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damage in transit, handling and / or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.</p>		
<p>35.03.00</p>	<p>The Contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the Employer.</p>		
<p>35.04.00</p>	<p>All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the Employer. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at Site.</p>		
<p>35.05.00</p>	<p>All electrical panels, controls gear, motors and such other devices shall be properly dried by heating before they are installed and energised. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.</p>		
<p>35.06.00</p>	<p>All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months from the date of receipt till the date of commissioning and a record of such measured insulation values maintained by the Contractor. Such records shall be open for inspection by the Employer.</p>		
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35.07.00	The Contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before the equipment are installed.		
35.08.00	The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.		
35.09.00	All the materials stored in the open or dusty location must be covered with suitable weatherproof and flameproof covering material wherever applicable.		
35.10.00	If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Employer will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.		
35.11.00	The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally, all the electrical equipments such as motors, control gear, generators, exciters and consumables like electrodes, lubricants etc. shall be stored in the closed storage space . The Employer, in addition, may direct the Contractor to move certain other materials, which in his opinion will require indoor storage, to indoor storage areas which the Contractor shall strictly comply with.		
36.00.00	CONSTRUCTION MANAGEMENT		
36.01.00	The field activities of the Contractors working at Site, will be coordinated by the Employer and the Employer decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors and tradesmen of the Employer regarding scheduling and co- ordination of work. Such decision by the Employer shall not be a cause for extra compensation or extension of time for the Contractor.		
36.02.00	The Employer shall hold weekly meetings of all the Contractors working at Site, at a time and place to be designated by the Employer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Employer and shall strictly adhere to those decisions in performing his Works. In addition to the above weekly meeting, the Employer may call for other meeting either with individual Contractors or with selected number of Contractors and in such a case the Contractor if called, will also attend such meetings.		
36.03.00	Time is the essence of the Contract and the Contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at any time, the Contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the Employer, satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.		
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36.04.00	The Employer shall however not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor except for the co-ordination work between various Contractors as set out earlier.		
37.00.00	<p>FIELD OFFICE RECORDS</p> <p>The Contractor shall maintain at his Site Office up-to- date copies of all drawings, specifications and other Contract Documents and any other supplementary data complete with all the latest revisions thereto. The Contractor shall also maintain in addition the continuous record of all changes to the above Contract Documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the Contract shall incorporate all such changes on the drawings and other Engineering data to indicate as installed conditions of the equipment furnished and erected under the Contract. Such drawings and Engineering data shall be submitted to the Employer in required number of copies.</p>		
38.00.00	<p>CONTRACTOR'S MATERIALS BROUGHT ON TO SITE</p>		
38.01.00	The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the Works under intimation to the Employer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Employer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.		
38.02.00	The Employer shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under, in respect of or by reasons of the Contract. After giving a fifteen (15) days notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose off any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.		
38.03.00	After the completion of the Works, the Contractor shall remove from the Site under the direction of the Employer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Employer. If the Contractor fails to remove such materials, within fifteen (15) days of issue of a notice by the Employer to do so then the Employer shall have the liberty to dispose off such materials as detailed under as specified at clause no 38.02.00- of this chapter and credit the proceeds thereto to the account of the Contractor.		
39.00.00	<p>PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY</p>		
39.01.00	The Contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of the Employer and the employees of other Contractors and		
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39.02.00	<p>Sub- Contractors and all public and private property including structures, building, other plants and equipments and utilities either above or below the ground.</p> <p>The Contractor will ensure provision of necessary safety equipment such as barriers, sign - boards, warning lights and alarms, etc. to provide adequate protection to persons and property. The Contractor shall be responsible to give reasonable notice to the Employer and the Employers of public or private property and utilities when such property and utilities are likely to get damaged or injured during the performance of his Works and shall make all necessary arrangements with such Employers, related to removal and/or replacement or protection of such property and utilities.</p>		
40.00.00	<p>PAINTING</p> <p>Unless otherwise mentioned in other sub-sections. all exposed metal parts of the equipment including pipings, structure railings, etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least two coats of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting and the same being inspected and approved by the Employer for painting. Afterwards, the above parts shall be finished painted with three coats of allowed resin machinery enamel paints. The minimum thickness of paint film shall not be less than 100 microns. The quality of the finish paint shall be as per the standards of Bureau of Indian Standards (BIS) or equivalent and to be of the colour as approved by the Employer.</p>		
41.00.00	<p>INSURANCE</p>		
41.01.00	<p>In addition to the conditions covered under the Clause entitled "Insurance" in Section General Conditions of Contract (GCC), the following provisions will also apply to the portion of works to be done beyond the Contractor's own or his Sub-Contractor's manufacturing Works.</p>		
41.02.00	<p>Workmen's Compensation Insurance</p> <p>This insurance shall protect the Contractor against all claims applicable under the Workmen's Compensation Act, 1948 (Government of India). This policy shall also cover the Contractor against claims for injury, disability disease or death of his or his Sub-Contractor's employees, which for any reason are not covered under the Workmen's Compensation Act, 1948. The liabilities shall not be less than the following:</p> <p>Workmen's Compensation - As per Statutory Provisions</p> <p>Employee's Liability - As per Statutory Provisions</p>		
41.03.00	<p>Comprehensive Automobile Insurance</p> <p>This insurance shall be in such a form to protect the Contractor against all claims for injuries, disability, disease and death to members of public including the Employer's</p>		
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	<p>men and damage to the property of other arising from the use of motor vehicles during on or off the Site operations, irrespective of the Ownership of such vehicles. The liability covered shall be as herein indicated :</p> <p>Fatal Injury : Rs.100,000 each person</p> <p style="padding-left: 150px;">: Rs.200,000 each occurrence</p> <p>Property Damage : Rs.100,000 each occurrence</p> <p>41.04.00 Comprehensive General Liability Insurance</p> <p>41.04.01 The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractors or from riots, strikes and civil commotion. This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled "Defence of Suits" in Section General Conditions of Contract (GCC).</p> <p>41.04.02 The hazards to be covered will pertain to all the Works and areas where the Contractor, his Sub-Contractors, his agents and his employees have to perform work pursuant to the Contract.</p> <p>41.05.00 The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Contractor to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the Contract.</p> <p>42.00.00 UNFAVOURABLE WORKING CONDITIONS</p> <p>The Contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects during inclement weather conditions, like monsoon, storms, etc. and during other unfavourable construction conditions. No field activities shall be performed by the Contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such Works and with the concurrence of the Employer. Such unfavourable construction conditions will in no way relieve the Contractor of his responsibility to perform the Works as per the schedule.</p> <p>43.00.00 PROTECTION OF MONUMENTS AND REFERENCE POINTS</p> <p>The Contractor shall ensure that any finds such as relic, antiquity, coins, fossils, etc. which he may come across during the course of performance of his Works either during excavation or elsewhere, are properly protected and handed over to the Employer. Similarly the Contractor shall ensure that the bench marks, reference points, etc., which are marked either with the help of Employer or by the Employer shall not be disturbed in any way during the performance of his Works. If, any work is to be preformed which disturb such reference, the same shall be done only after</p>		
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	<p>these are transferred to other suitable locations under the direction of the Employer. The Contractor shall provide all necessary materials and assistance for such relocation of reference points etc.</p>		
44.00.00	WORK & SAFETY REGULATIONS		
44.01.00	General		
	<p>The contractor shall comply with all the requirements of "<i>The Building and Other Construction Workers (Regulation of Employment & Conditions of Service) Act,</i>" 1996 and its Central Rule 1998 / State Rules and any other statutory requirements as applicable.</p>		
44.02.00	<p>The Contractor shall follow NTPC Safety Rules as issued from time to time with respect to safety in construction & erection.</p>		
44.03.00	<p>The contractor shall have the approved Safety; <i>Health and Environment (SHE)</i> Policy in respect of Safety and health of Building Workers and it shall be circulated widely and displayed at conspicuous place in Hindi and local language understood by the majority of the workers. A copy of the safety policy should be submitted to Engineer in charge.</p>		
44.04.00	<p>The contractor shall prepare the safety plan comprising of methods to implement the Safety Policy/ Rules, Risk assessment and ensuring Safety at work areas. Safety audits, inspections and its compliance, Supervision and responsibility to ensure Safety at various levels, Safety training to employees, review of Safety and accident analysis, ensure Health and Safety Procedures to prevent accidents and submit to Engineer In charge for approval as per the format of Safety plan as annexed at Table –A.</p>		
44.05.00	<p>The Contractors shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to the Employer or to others, working at the Site.</p>		
44.06.00	<p>All equipments used in construction and erection by the contractor shall meet BIS / International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the contractor in accordance with manufacturer's operation manual. The contractor should also follow Guidelines / Rules of the Employer in this regard.</p>		
44.07.00	<p>The Contractors shall provide suitable latest Personal Protective Equipments of prescribed standard to all their employees and workmen according to the need. The Engineer In charge shall have the right to examine these safety equipments to determine their suitability, reliability, acceptability and adaptability. The contractor should also ensure these before their use at worksite.</p>		
44.08.00	<p>The Contractor shall provide safe working conditions to all workmen and employees at his workplace including safe means of access, railings, stairs, and ladders, scaffolding, work platforms, toe boards etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection of</p>		
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44.09.00	<p>scaffolds, access, work platforms etc. shall be good and the contractor shall use standard quality of material.</p> <p>The Contractor shall follow and comply with all the Safety Rules, standards, code of practices of NTPC and relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any protest or contest or reservation. In case of any' unconformity between statutory requirement and the Safety Rules of the Employer referred above, the latter shall be binding on the Contractor unless the statutory provisions are more stringent. As and when required he can refer / obtain copy of NTPC safety documents as stated above.</p>		
44.10.00	<p>The contractor shall have his own arrangements with nearby hospitals for shifting and treatment of sick and injured. The <i>medical examination of the workers</i> employed in hazardous areas shall be conducted as per Rule 223 of The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998. Their health records shall be maintained accordingly and to be submitted to Engineer In-charge when asked for. If any worker found suffering from occupational health hazard, the worker should be shifted to suitable place of working and properly treated under intimation to Engineer In-charge. The medical fitness certificate to be submitted to Engineer In-charge.</p>		
44.11.00	<p><i>First Aid boxes</i> equipped with requisite articles as specified in the Rule 231 of The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998 shall be provided at construction sites for the use of workers. Training has to be provided on first aid to workmen & office bearers working at site.</p>		
44.12.00	<p>Emergency Action Plan</p> <p>The contractor shall prepare an emergency action plan approved by his competent authority to handle any emergency occurred during construction work. Regular mock drills shall be organized to practice this emergency plan. The Emergency Action Plan should be widely circulated to all the employees and suitable infrastructure shall be provided to handle the emergencies</p>		
44.13.00	<p>Scaffolding</p> <p>The contractor shall take all precautions to prevent any accidental collapse of scaffolding or fall of persons from scaffolding. The contractor should ensure that scaffolding are designed by a competent person and it erection and repairs should be done under the expert supervision- The scaffolding shall meet the required strength and other requirements for the purpose for which the scaffold is erected. The material used for scaffold should conform to the BIS / International standards.</p>		
44.14.00	<p>Opening</p> <p>The contractor shall ensure that there is no opening in any working platform/any floor of the building, which may cause fall of workers or material. When ever an opening on a platform/any floor of the building is unavoidable, the opening should be</p>		
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44.15.00	<p>suitably fenced and necessary measures for protection against falling objects or building workers from such platform are taken by providing suitable safety nets, safety belts or other similar means.</p> <p>Explosives</p> <p>The contractor shall take all precautions while handling, using, storing or transporting of all explosives. Before usage of any explosive necessary warning / danger signals be erected at conspicuous places to warn the workers and general public. The contractor should strictly ensure that all measures and precautions required to be complied for use, handling, storing or transportation of explosives under the rules framed under the Explosives Act, 1884.</p>		
44.16.00	<p>Fencing of Machinery</p> <p>The contractor shall provide suitable fencing or guard to all dangerous and moving parts of machinery.</p> <p>The contractor shall not allow any of the employees to clean, lubricate, repair, adjust or examine during machinery in motion, which may cause injury to the person.</p>		
44.17.00	<p>Carrying of Excessive Weight by a Worker</p> <p>The worker shall not be allowed to lift by hand or carry over his head, back or shoulder more than the maximum limit set by the prescribed rules for the construction Workers.</p>		
44.18.00	<p>Dangerous and Harmful Gases / Equipment</p> <p>The contractor shall ensure that the workers are not exposed to any harmful gases during any construction activity including excavation, tunneling, confined spaces etc.</p> <p>The contractor should not allow any worker to go into the confined space unless it is certified by Engineer in-charge to be safe and fit for the entry to such work place. Proper record and work permits should be followed to carry out such works.</p>		
44.19.00	<p>Overhead Protection</p> <p>The contractor shall ensure that any area exposed to risk of falling materials, articles or objects is roped off or cordoned off or otherwise suitably guarded from inadvertent entry of any person. Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards</p>		
44.20.00	<p>Working at Heights</p> <p>All working platforms, ways and other places of construction work shall be free from accumulations of debris or any other material causing obstructions and tripping.</p>		
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44.21.00	<p>Wherever workers are exposed to the hazard of falling into water, the contractor shall provide adequate equipment for saving the employees from drowning and rescuing from such hazards. The contractor shall provide boat or launch equipped with sufficient number of life buoys, life jackets etc. manned with trained personnel at the site of such work.</p> <p>Every opening at elevation from ground level through which a building worker, vehicle, material equipment etc. may fall at a construction work shall be covered and/or guarded suitably by the contractor to prevent such falls.</p> <p>Wherever the workers are exposed to the hazards of falling from height, the contractor shall provide full harness safety belts fitted with fall arresting systems to all the employees working at higher elevations and life line of 8 mm diameter wire rope with turn buckles for anchoring the safety belts while working or moving at higher elevations. Safety nets shall also be provided for saving them from fall from heights and such equipment should be in accordance with BIS standards.</p> <p>Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.</p> <p>The contractor shall provide standard prefabricated ladders on the columns where the workers are required to use them as an access for higher elevations till permanent staircase is provided. The workers shall be provided with safety belts fitted with suitable fall arresting system (Fall arresters) for climbing/getting down through ladders to prevent fall from height</p> <p>Handling of Hazardous Chemicals</p> <p>The Contractor will notify well in advance to the Engineer 1/c of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. NTPC shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contract shall strictly adhere to and comply with such instructions. The Engineer In-charge shall have the right at his sole discretion to inspect any such container or such construction plant / equipment for which material in the container is required to be used and if in his opinion, its use is not safe; he may forbid its use. No claim due to such prohibition shall be entertained by NTPC and NTPC shall not entertain any claim of the Contractor towards additional safety provisions / conditions to be provided for / constructed.</p> <p>Further, any such decision of the Engineer 1/c shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by NTPC, the Contractor shall use alternative methods with the approval of the NTPC without any cost implication to the NTPC or extension of work schedule.</p> <p>Where it is necessary to provide and / or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such</p>		
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44.22.00	<p>provision and / or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948, and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Engineer In-charge In case any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities; the Contractor shall be responsible for obtaining the same.</p> <p>The Contractor shall be fully responsible for the safe storage of his and his Sub-contractor's radio-active sources in accordance with BARC/DAE (Bhabha Atomic Research Centre/ Department of Atomic Energy, Govt. of India) Rules and other applicable provisions- AU precautionary measures stipulated by BARC/DAE in connection with use, the contractor would take storage and handling of such material.</p> <p>The contractor shall provide suitable personal protective equipments to the workers who are handling the hazardous and corrosive substances including alkalis and acids.</p> <p>As a precautionary measure the contractor should keep the bottles filled with distilled water in cupboard / Boxes near work place for emergency eye wash by worker exposed to such hazardous chemicals.</p> <p>Eye Protection</p> <p>The contractor shall provide suitable personal protective equipment to his workmen depending upon the nature of hazards and ensure their usage by the workers engaged in operations like welding, cutting, chipping, grinding or similar operations which may cause injuries to his eyes.</p>				
44.23.00	<p>Excavation</p> <p>The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding material or article from any bank or side of such excavation which is more than one and a half meter above his footing by providing adequate piling, shoring, bracing etc. against such bank or sides.</p> <p>Adequate and suitable -warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.</p>				
44.24.00	<p>Electrical Hazards</p> <p>The contractor should ensure that all electrical installations at the construction work comply with the requirements of latest electricity acts / rules.</p> <p>The contractor shall take all adequate measures to prevent any worker from coming into physical contact with any electrical equipment or apparatus, machines or live electrical circuits which may cause electrical hazards during the construction work. The contractor shall provide the sufficient ELCBs / RCCBs for all the portable</p>				
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	<p>equipments, electrical switchboards, distribution panels etc. to prevent electrical shocks.</p> <p>The contractor should ensure use of single / double insulated hand tools or low voltage i.e., 110 volts hand tools.</p> <p>The contractor should also ensure that all temporary electrical installations at the construction works are provided with earth leakage circuit breakers.</p> <p>No electric cable in use by the Contractor /Employer will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.</p> <p>The Contractor shall employ necessary number of qualified, full time Electricians/electrical supervisors to maintain his temporary electrical installations.</p> <p>44.25.00 Vehicular Traffic</p> <p>The contractor should employ vehicle drivers who hold a valid driving license under the Motor Vehicles Act, 1988.</p> <p>44.26.00 Lifting Appliances, Tools & Tackles, Lifting Gear And Pressure Plant & Equipment etc.</p> <p>The contractor shall ensure all the lifting appliances, tools & tackles including cranes etc., lifting gear including fixed or movable and any plant or gear, hoists, Pressure Plant and equipment etc. are in good condition and shall be examined by competent person and only certified shall be used at sites. Periodical Examination and the tests for all lifting / hoisting equipment & tackles shall be carried out. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by the Engineer I/c or by the person authorized by him.</p> <p>44.27.00 Excessive Noise, Vibration</p> <p>The contractor shall take adequate measures to protect the workers against the harmful effect of excessive noise or vibration. The noise should not exceed the limits prescribed under the concerned rules. Noise Pollution (Regulation and Control) Rules, 2000.</p> <p>44.28.00 Electrical Installations</p> <p>The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Employer or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Engineer I/c to handle such fuses, wiring or electrical equipment.</p> <p>Before the Contractor connects any electrical appliances to any plug or socket belonging to the other contractor or the NTPC, he shall</p> <p>1.1 Satisfy the Engineer I/C that the appliance is in good working condition;</p>		
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44.29.00	<p>1.2 Inform the Engineer I/C of the maximum current rating, voltage and phases of the appliances;</p> <p>1.3 Obtain permission of the Engineer I/C detailing the sockets to which the appliances may be connected.</p> <p>The Engineer I/C will not grant permission to connect until he is satisfied that;</p> <p>The appliance is in good condition and is fitted with suitable plug; having earth connection with the body.</p> <p>Wherever armored / metallic sheathed multi core cable is used, the same armored / sheathed should be connected to earth.</p> <p>1.4 No repair work shall be carried out on any live equipment. The Engineer I/c must declare the equipment safe and a permit to work shall be issued by the NTPC / contractor as the case may be to carry out any repair / maintenance work. While working on electric lines / equipments whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the contractor to electricians / workmen / Officers.</p> <p>1.5 The contractor shall employ necessary number of qualified, full time Electricians / Electrical Supervisors to maintain his temporary electrical installation.</p> <p>The installations are provided with suitable ELCBs and RCCBs wherever required.</p> <p>Safety Organization</p> <p>i) The contractor employing more than 250 workmen whether temporary, casual, probationary, regular or permanent shall employ at least one full time safety officer exclusively to supervise safety aspects of the equipments and workmen, who will coordinate with the NTPC Safety Officer. Further requirement of safety officers, if any, shall be guided by Rule 209 of The Building and Other Construction Worker (Regulation of Employment and Conditions of Service) Central Rule 1998. In case the work is being carried out through subcontractor, the employees / workmen of the sub contractor shall also be considered as the contractor's employees/workmen for the above purpose.</p> <p>ii) In case of contractor deploying less than 250 workmen he should designate one of his Engineer / supervisor or the contractor himself (if he is directly supervising the work) as safety officer in addition to his existing responsibilities. The Engineer/ supervisor should get at least 2days safety training from any reputed organization or from NTPC before resuming the work. If already trained in past the declaration along with training. Certificate to be furnished to NTPC safety officer.</p> <p>iii.) The name and address of such Safety Officer of the Contractor will be promptly informed in writing to the EIC with a copy to the Project Safety</p>	NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE	TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2	ERECTION CONDITIONS OF CONTRACT (ECC)	PAGE 29 OF 49

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	<p>Officer before he starts work or immediately after any change of the incumbent is made during currency of the Contract.</p>		
44.30.00	<p>Reporting of Accident and Investigation</p> <p>In case any accident occurs during the construction / erection or other associated activities undertaken by the Contractor thereby causing any near miss, minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Engineer in-charge, NTPC Safety Officer with a copy to NTPC Head of Project in the prescribed form and also to all the authorities envisaged under the applicable laws</p>		
44.31.00	<p>Right to stop Work</p> <p>i) The Engineer I/C shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a -way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipments. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury / accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary appeal against the order of stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.</p> <p>ii) The Contractor shall not be entitled for any damages / compensation for stoppage of work, {Sub-Clause XVIII (I)} due to safety reasons and the period of such stoppage of work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages.</p>		
44.32.00	<p>Fire Protection</p> <p>The contractor shall provide sufficient fire extinguishers at place /s of work. The fire extinguishers shall be properly maintained as per relevant BIS Standards. The employees shall be trained to operate the fire extinguishers / equipment</p>		
44.33.00	<p>Penalties</p> <p>i) If the Contractor fails in providing safe working environment as per the Safety Rules of NTPC or continues the work even after being instructed to stop the work by the Engineer I/C as provided in Clause XVIII (1) above, the Contractor shall be penalized at the rate of Rs. 25,000/- per day or part thereof till the instructions are complied with and so certified by the Engineer I/C- However, in case of accident, the provisions contained in Sub-Clause XX (II) below shall also apply in addition to the penalties mentioned in this sub-clause.</p> <p>ii) If the Contractor does not take all safety precautions and / or fails to comply with the Safety Rules as prescribed by the Employer or under the applicable</p>		
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	<p>law for the safety of the plant and equipment and for the safety of personnel and the contractor does not prevent hazardous conditions which cause injury to this own employees or employees of other contractors, or NTPC's employees or any other person who are at the Site or adjacent thereto, the Contractor shall be responsible for payment of penalty to NTPC as per the following schedule; -</p> <p>a) Fatal injury or accident causing death Penalty @10% of contract value or Rs. 5,00,000/- per person, which ever is less.</p> <p>b) Major injuries or accident causing 25% or more permanent disablement to workmen or employees. Penalty @2.5 % of contract value or Rs.1,00,000/- per person which-ever is less</p> <p>iii) Permanent disablement shall have the same meaning as indicated in The Workmen's Compensation Act' 1923. The penalty mentioned above shall be in addition to the compensation payable to the workmen / employees under the relevant provisions of the Workmen's Compensation Act' 1923 and rules framed there under or any other applicable laws as applicable from time to time.</p> <p>iv) If any contractor worker found working without using the safety equipment like safety helmet, safety shoes, safety belts, etc. or without anchoring the safety belts while working at height the Engineer in-charge / Safety Officer of NTPC shall have the right to penalize the contractor for Rs. 200/- per person per day and such worker shall be sent out of the workplace immediately and shall not be allowed to work on that day. Engineer in-charge / Safety Officer of NTPC will also issue a notice in this regard to the contractor</p> <p>v) If two or more fatal accidents occur at same NTPC site under the control of contractor during the period of contract and he has</p> <p>(1) not complied with keeping adequate PPEs in stock</p> <p>(2) defaulted in providing PPR's to his -workmen</p> <p>(3) not followed statutory requirements /NTPC safety rules</p> <p>(4) been issued warning notice/s by NTPC head of the project on non observance of safety norms</p> <p>(5) not provided safety training to all his workmen, the contractor can be debarred from getting tender documents in NTPC for two years from the date of last accident.</p> <p>vi) The safety performance will also be one of the overriding criteria for evaluation of overall performance of the contractors by NTPC. The contractor shall submit the accident data including fatal / non-fatal accidents for the last</p>		
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44.34.00	<p>3 years where he has undertaken the construction activities Projects-wise along with the tender documents. This will also be considered for evolution of tender documents. If the information given by the contractor found incorrect, his contract will be liable to be terminated.</p> <p>Award</p> <p>If the Contractor's performance on safety front is found satisfactory i.e. without any fatal/reportable accident in the year of consideration; he may be considered for suitable award "ACCIDENT FREE SAFETY MERITORIOUS AWARD" as per scheme of the employer.</p> <p>Table - A</p> <p>Safety Plan</p> <ol style="list-style-type: none"> 1. Safety policy of the contractor to be enclosed 2. When was the safety policy last reviewed 3. Details of implementation procedure/methods to implement Safety Policy/Safety Rules 4. Name, qualification, experience of Safety Officer 5. Review of Accident, Analysis Method, Methods to ensure Safety and Health 6. Unit executive responsible to ensure Safety at various levels in work area 7. List of employees trained in safety employed before execution of the job. Give the details of training. 8. Safety training Targets, Schedules, Methods adopting to provide safety training to all employees 9. Details of checklist for different jobs/ work and responsible person to ensure compliance (copy o checklist to be enclosed.) 10. Regular Safety Inspection Methods and Periodicity and list of members to be enclosed 11. Risk Assessment, Safety Audit by Professional Agencies, Periodicity 12. Implementation of Recommendations o Audit / Inspections. Procedures for implementation and follow up. 13. Provision for treatment of injured persons at work site 14. Review of overall safety by top Management and Periodicity 		
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	<p>15. System for Implementation of Statutory legislations</p> <p>16. Issue of PPEs to employees, Periodicity / stock on hand etc.</p> <p style="text-align: right;">Signature Head of the Organization With date & stamp</p>		
45.00.00	FOREIGN PERSONNEL		
45.01.00	<p>The Contractor shall submit to the Employer data on all personnel he proposes to bring into India from abroad for the performance of the Works under the Contract, at least sixty (60) days prior to their departure to India. Such data will include for each person the name, his present address, his assignment and responsibility in connection with the works, and a short resume of his qualification, experience etc. in relation to the work to be performed by him.</p>		
45.02.00	<p>Any person unsuitable and unacceptable to the Employer shall not be brought to India. Any person brought to India, if found unsuitable or unacceptable by the Employer, the Contractor shall within a reasonable time make alternate arrangements for providing a suitable replacement and repatriation of such unsuitable personnel.</p>		
45.03.00	<p>No person brought to India for the purposes of the works shall be repatriated without the consent of the Employer in writing, based on a written request from the Contractor for such repatriation giving reasons for such an action to the Employer. The Employer may give permission for such repatriation provided he is satisfied that the progress of work will not suffer due to such repatriation.</p>		
45.04.00	<p>The cost of passports, visas and all other travel expenses to and from India, incurred by the Contractor shall be to his account. The Employer will not provide any residential accommodation and/or furniture for any of the Contractor's personnel including foreign personnel and Contractor shall make his own arrangements for such facilities in the area allotted at Site, to him by the Employer for that purpose.</p>		
45.05.00	<p>The Contractor and his expatriate personnel shall respect all Indian Acts, Laws, rules and regulations and shall not in any way interfere with Indian political and religious affairs and shall conform to any other rules and regulations which the Government of India and the Employer may establish from time to time, on them. The Contractor's expatriate personnel shall work and live in close co-operation and coordination with their co-workers and the community and shall not engage themselves in any other employment neither part-time or full-time nor shall they take part in any local politics.</p>		
45.06.00	<p>The Employer shall assist the Contractor, to the extent possible, in obtaining necessary permits to travel to India and back, by issue of necessary certificates and other information needed by the Government agencies.</p>		
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46.00.00	FOUNDATION DRESSING & GROUTING FOR EQUIPMENT/ EQUIPMENT BASES		
46.01.00	The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment/equipment bases on the foundations.		
46.02.00	All the equipment/ equipment bases, shall be grouted and finished as per these specifications unless otherwise recommended by the equipment manufacturer.		
46.03.00	The concrete foundation surfaces shall be properly prepared by chipping, grinding as required to bring the top of such foundation to the required level, to provide the necessary roughness for bondage and to assure enough bearing strength.		
46.04.00	<p>Grout</p> <p>The grout shall be high strength grout having a minimum characteristic compressive strength of 60 N/mm² at 28 days. The grout shall be chloride - free, cement based, free flowing, non-metallic grout.</p> <p>The Grout shall have good flowability even at very low water/ grout powder ratio.</p> <p>The Grout shall have characteristics of controlled expansion to be able to occupy its original volume to fill the voids and to compensate for shrinkage. Grout shall be of pre-mix variety so that only water needs to be added before use.</p> <p>The mixing of the Grout shall conform to the recommendations of the manufacturer of the Grout.</p>		
46.05.00	Placing of Grout		
46.05.01	After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout, a low dam shall be set around the base at a distance that will permit pouring and manipulation of the grout. The height of such dam shall be at least 25mm above the bottom of the base. Suitable size and number of chains shall be introduced under the base before placing the grout, so that such chains can be moved back & forth to push the grout into every part of the space under the base.		
46.05.02	The grout shall be poured either through grout holes if provided or shall be poured at one side or at two adjacent sides to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases.		
46.05.03	In addition to the above, recommendations of Grout manufacturer shall also be followed.		
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46.06.00	<p>Finishing of the Edges of the Grout</p> <p>The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout which extends beyond the edges of the structural or equipment base plates shall be cut off, flushed and removed. The edges of the grout shall then be pointed and finished with 1:2 cement mortar pressed firmly to bond with the body of the grout and smoothed with a tool to present a smooth vertical surface. The work shall be done in a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.</p>		
46.07.00	<p>Checking of Equipment After Grouting</p> <p>After the grout is set and cured, the Contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during such post grouting check- up and verifications. Such pre and post grout records of alignment details shall be maintained by the Contractor in a manner acceptable to the Employer.</p>		
47.00.00	<p>SHAFT ALIGNMENTS</p> <p>All the shafts of rotating equipment shall be properly aligned to those of the matching equipments to as perfect an accuracy as practicable. The equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment. The vibration level of rotating equipments measured at bearing housing shall not exceed forty (40) microns and shall conform to VDI 2056. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.</p>		
48.00.00	<p>DOWELLING</p> <p>All the motors and other equipment shall be suitably doweled after alignment of shafts with tapered machined dowels as per the direction of the Employer.</p>		
49.00.00	<p>CHECK OUT OF CONTROL SYSTEMS</p> <p>After completion of wiring, cabling furnished under separate specification and laid and terminated by the Employer, the Contractor shall check out the operation of all control systems for the equipment furnished and installed under these specifications and documents.</p>		
50.00.00	<p>COMMISSIONING SPARES</p>		
50.01.00	<p>It will be the responsibility of the Contractor to provide all commissioning spares including consumable spares required for initial operation till the Completion of Facilities. The Contractor shall furnish a list of all commissioning spares within 60</p>		
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50.02.00	<p>days from the date of Notification of Award and such list shall be reviewed by the Employer and mutually agreed to. However, such review and agreement will not absolve the Contractor of his responsibilities to supply all commissioning spares so that initial operation do not suffer for want of commissioning spares. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.</p> <p>These spare will be received and stored by the Contractor atleast 3 months prior to the schedule date of commencement of initial operation of the respective equipment and utilised as and when required. The unutilised spares and replaced parts, if any, at the end of successful completion of guarantee tests shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer.</p>		
51.00.00	CABLING		
51.01.00	<p>All cables shall be supported by conduits or cable tray run in air or in cable channels. These shall be installed in exposed runs parallel or perpendicular to dominant surfaces with right angle turn made of symmetrical bends or fittings. When cables are run on cable trays, they shall be clamped at a minimum intervals of 2000mm or otherwise as directed by the Employer.</p>		
51.02.00	<p>Each cable, whether power or control, shall be provided with a metallic or plastic tag of an approved type, bearing a cable reference number indicated in the cable and conduit list (prepared by the Contractor), at every 5 meter run or part thereof and at both ends of the cable adjacent to the terminations. Cable routing is to be done in such a way that cables are accessible for any maintenance and for easy identification.</p>		
51.03.00	<p>Sharp bending and kinking of cables shall be avoided. The minimum radii for PVC insulated cables 1100 V grade shall be 15 D where D is the overall diameter of the cable. Installation of other cables like high voltage, coaxial, screened, compensating, mineral insulated shall be in accordance with the cable manufacturer's recommendations. Wherever cables cross roads and water, oil, sewage or gaslines, special care should be taken for the protection of the cables in designing the cable channels.</p>		
51.04.00	<p>In each cable run some extra length shall be kept at a suitable point to enable one or two straight through joints to be made, should the cable develop fault at a later date.</p>		
51.05.00	<p>Control cable terminations shall be made in accordance with wiring diagrams, using identifying codes subject to the Employer's approval. Multicore control cable jackets shall be removed as required to train and terminate the conductors. The cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. The insulated conductors from which the jacket is removed shall be neatly twined in bundles and terminated. The bundles shall be firmly but not tightly tied utilising plastic or nylon ties or specifically treated fungus protected cord made for this purpose. Control cable conductor insulation shall be securely and evenly cut.</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 36 OF 49</p>

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51.06.00	<p>The connectors for control cables shall be covered with a transparent insulating sleeve so as to prevent accidental contact with ground or adjacent terminals and shall preferably terminate in Elmex terminals and washers. The insulating sleeve shall be fire resistant and shall be long enough to over pass the conductor insulation. All control cables shall be fanned out and connection made to terminal blocks and test equipment for proper operation before cables are corded together.</p>		
52.00.00	<p>EQUIPMENT DELIVERY AND ERECTION</p>		
52.01.00	<p>General Requirements</p> <p>(a.) This part covers Contractor's responsibilities for packing, shipping, warehousing and the installation of all equipment and materials furnished and installed under this specification.</p> <p>(b.) The Contractor shall submit for Employer's approval draft manual for Equipment Delivery and Erection (EDE Manual) covering detailed instructions, write up, technical data, drawings, check-lists, documentation formats for all activities after equipment manufacture upto installation of equipment. This manual shall cover general instructions for all equipment and specific instructions for individual equipment wherever required and shall include at least the following :</p> <ol style="list-style-type: none"> (1.) Instructions for packing, shipping, receiving handling, warehousing and storage. (2.) Instructions for location and installation of equipment furnished by this specification. (3.) Installation drawings for field mounted equipment, panels, cubicles and other equipment covered under this specification. (4.) Instruction relating installation of piping/ tubing, support and routing drawings of impulse pipes/signal tubes and tube/cable trays. (5.) Check lists and quality assurance hold points. (6.) Format for all related documentation. <p>(c.) The EDE Manual shall conform to the requirements of this specification, all applicable codes and standards, recommendations of equipment manufacturers and accepted good engineering practices and shall be subject to Employer approval during detailed engineering.</p> <p>(d.) The Contractor shall ensure that all work under this part shall be performed as per the requirements of this specification, Employer approved EDE Manual and drawing/documents approved by the Employer during detailed engg.</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 37 OF 49</p>

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52.02.00	<p>Crating</p> <p>(a.) All equipment and materials shall be suitably coated, wrapped, or covered and boxed or crated for moist humid tropical shipment and to prevent damage or deterioration during handling and storage at the site.</p> <p>(b.) Equipment shall be packed with suitable desiccants, sealed in water proof vapour-proof wrapping and packed in lumber of plywood enclosures, suitably braced, tied and skidded. Lumber enclosures shall be solid, not slatted.</p> <p>(c.) Desiccants shall be either silica gel or calcium sulphate, sufficiently ground to provide the required surface area and activated prior to placing in the packaging. Calcium sulphate desiccants shall be of a chemical nature to absorb moisture. In any case, the desiccant shall not be of a type that will absorb enough moisture to go into solution. Desiccants shall be packed in porous containers, strong enough to withstand handling encountered during normal shipment. Enough desiccant shall be used for the volumes enclosed in wrapping.</p> <p>(d.) Review by the Employer of the Contractor's proposed packaging methods shall not relieve the Contractor of responsibility for damage or deterioration to the equipment and materials specified.</p> <p>(e.) All accessory items shall be shipped with the equipment. ; Boxes and crates containing accessory items shall be marked so that they are identified with the main equipment. The contents of each box and crates shall be indicated by markings on the exterior.</p> <p>(f.) All boxes, crates, cases bundles, loose pieces, etc. shall be marked consecutively from No.1 upward throughout all shipments from a given port to completion of the order without repeating the same number.</p> <p>(g.) An itemized list of contents shall be enclosed inside each case and one other copy securely fastened to the outside of the case in a tin or light weight sheet metal envelope or pocket. The lists shall be plainly marked and placed in accessible locations to facilitate receipt and inspection. The packing list shall indicate whether shipment is partial or complete and shall incorporate the following information on each container, etc., according to its individual shipping number :</p> <p>(1.) Export case markings</p> <p>(2.) Case number</p> <p>(3.) Gross weight and net weight in Kilograms</p> <p>(4.) Dimensions in centimeters</p> <p>(5.) Complete description of material</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 38 OF 49</p>

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52.03.00	<p>(h.) Packaging or shipping units shall be designed within the limitations of unloading facilities and the equipment which will be used for transport. Complications involved with ocean shipment and the limitations of ports, railways and roads shall be considered. It shall be the Contractor's responsibility to investigate these limitations and to provide suitable packaging to permit safe handling during transit and at the job site.</p> <p>(i.) Electrical equipment, control and instrumentation shall be protected against moisture and water damage. All external gasket surfaces and flange faces, couplings, motor pump shafts, bearing and like items shall be thoroughly cleaned and coated with rust preventive compound as specified above and protected with suitable wood, metal or other substantial type covering to ensure their full protection.</p> <p>(j.) Equipment having antifriction or sleeve bearings shall be protected by weather tight enclosures.</p> <p>(k.) Coated surfaces shall be protected against impact, abrasion, discolouration and other damage. Surfaces which are damaged shall be repaired.</p> <p>(l.) All exposed threaded parts shall be greased and protected with metallic or other substantial type protectors. All female threaded openings shall be closed with forged steel plugs. All pipings, tubing, and conduit equipment and other equipment openings shall be sealed with metallic or other rough usage covers and tapped to seal the interior of the equipment piping, tubing, or conduit.</p> <p>(m.) Provisions shall be made to ensure that water does not enter any equipment during shipment or in storage at the plant site.</p> <p>(n.) Returnable containers and special shipping devices shall be returned by the manufacturer's field representative at the Contractor's expense.</p> <p>(o.) While packaging the material, care shall be taken for the limitation from the point of view of availability of railway wagon sizes in India.</p> <p>Factory Assembly</p> <p>(a.) Instrument enclosures shall be supplied and erected completely in the factory with instrument, air supply and blow down piping with necessary valves, fittings, etc. and also all electrical wiring between the instruments and the enclosure terminal blocks. Control panel and cubicles shall also be fully wired in the factory. Control panel mounted equipments are to be dismantled from the panels before shipment and individually packed for shipment. Electronic control modules of the plug-in type are to be removed from equipment racks after factory checkout are individually packed for shipment. Other equipment shall be fully assembled at the factory, except for necessary shipping splits in panels.</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 39 OF 49</p>

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52.04.00	<p>(b.) All separately packaged accessories items and parts shall be shipped with the equipment. Containers for separately packaged items shall be marked so that they are identified with the main equipment. An itemized packing slip, indicating what is in that carton only, shall be attached to the outside and inside of each container used for packing.</p> <p>A master packing slip covering all accessories items for a given piece of equipment which are shipped in separate containers, shall be attached to one container.</p> <p>Equipment Installation</p> <p>(a.) General Requirements</p> <p>(1.) The Contractor shall furnish all construction materials, tools and equipment and shall perform all work required for complete installation of all control and instrument equipment furnished under this specification.</p> <p>(2.) Contractor shall prepare detailed installation drawings for each equipment furnished under this specification for Employer's approval. Installation of all equipment/systems furnished by this specification shall be as per Employer's approval.</p> <p>(3.) Erection procedures not specified herein shall be in accordance with the recommendations of the equipment manufacturers. The procedures shall be acceptable to the Employer.</p> <p>(4.) The Contractor shall coordinate his work with other suppliers where their instruments and devices are to be installed under specifications.</p> <p>(b.) Installation Materials</p> <p>All materials required for installation, testing and commissioning of the equipment shall be furnished by the Contractor.</p> <p>(c.) Regulatory Requirements</p> <p>All installation procedures shall confirm with the accepted good engineering practice and with all applicable governmental laws, regulations and codes.</p> <p>(d.) Cleaning</p> <p>All equipment shall be cleaned of all sand, dirt and other foreign materials immediately after removal from storage and before the equipment is brought inside the power plant building or to other installation sites. All piping and tubes shall be air blown.</p> <p>(e.) Equipment Assembly</p> <p>Equipment installed under these specifications shall be assembled if shipped unassembled. The equipment shall be dismantled and reassembled as</p>		
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	<p>required to perform the installation and commissioning work described in these specifications.</p> <p>(f.) Equipment Setting</p> <p>Field mounted instruments and accessories shall be bracket or sub panel mounted on the nearest suitable firm steel work or masonry. The brackets, stands, supports and other miscellaneous hardware required for mounting instruments and accessories such as receiver gauge, air set, valve manifold, purge-meter etc. shall be furnished and installed. No field mounted instruments shall be installed such that it depends for support or rigidity on the impulse piping or on electrical connection to it.</p> <p>Indicating type field mounted instruments shall be installed in such a way that centre of indicating dial shall be about 1600-1800mm from operating floor level. Non-indicating type field instruments shall be installed such that operating handle of manifold block / isolating cock comes within 1600 mm from operating floor level.</p> <p>All free standing instrumentation cabinets and panels shall be located within the construction tolerances of +/- 3 mm of the location dimensions indicated on the Employer's plant arrangement drawings.</p> <p>(g.) Free-Standing Equipment</p> <p>Free-standing Cabinets shall be attached to the floor, concrete equipment bases or supporting steel as indicated on the manufacturer's drawings and the Employer's Plant Arrangement Drawings. The cabinets shall be shimmed for proper alignment before bolting them to the floor. Adjacent enclosures shall be shimmed to maintain mutually level appearance before they are attached to floor. Vibration dampening mounts shall be installed between supporting structures and panels when specified.</p> <p>(h.) Non-free Standing Equipment</p> <p>(1.) Non-free standing local enclosures and cabinets shall be mounted in accessible locations on columns, walls, or stands in locations as indicated on the Employer's Plant Arrangement Drawings. Bracket and stands shall be fabricated as required to install the local enclosures and cabinets in a workman like manner.</p> <p>(2.) Rough edges and welds on all fabricated supports shall be ground smooth. The supports shall be finished with two coats of primer and two coats of paint as specified in this part.</p> <p>(i.) Equipment Location</p> <p>(1.) All individual items of equipment not located in cabinets or on panels and racks are located approximately according to the floor elevation and the nearest building column designated by the Employer.</p>		
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	<p>(2.) Solenoid valves not located in enclosures or mounted on valves shall be mounted in easily accessible protected locations near the components with which they are associated.</p> <p>(3.) All brackets, stands, supports and other miscellaneous hardware required for mounting devices shall be furnished and installed.</p> <p>(4.) Thermometers shall be installed in the process lines and ducts as required and adjusted for ease in reading.</p> <p>(5.) Permanent temperature wells on the main steam, hot reheat and cold reheat piping shall not be installed until steam blowing has been completed. Temporary temperature wells shall be installed in the main and reheat steam piping during steam blow and discarded after completion.</p> <p>(6.) Any required adapting hardware such as pipe bushings, nipples, drilled caps and the like shall be provided for complete installation of control devices into process connections.</p> <p>For location of C&I related equipment/devices, the requirement specified elsewhere in the technical specification may be referred.</p> <p>(j.) Installation of Field Mounted Instruments and Devices</p> <p>The Contractor shall submit installation drawings for all field mounted equipment furnished under this specification for Employer's approval. These drawings shall meet the requirements of this specification, installation drawings, applicable codes and standards and recommendations of manufacturers of instruments/devices. All installation work under this specification shall be strictly as per installation drawings approved by the Employer during detailed engineering stage.</p> <p>In addition to above relevant Portion as specified elsewhere in technical specification may be referred.</p> <p>(k.) Piping Connections</p> <p>(1.) All equipment having piping connections shall be levelled, aligned and wedged in place but shall not be grouted or bolted prior to the initial fitting and alignment of connecting piping. All equipment shall, however, be grouted or bolted to its foundation prior to final bolting or welding of the connection piping.</p> <p>(2.) All flanged joints shall be checked and retightened after approximately 10 days of operation at normal operating temperature.</p> <p>(l.) Equipment Checkout</p> <p>(1.) All equipment shall be cleaned after installation. Equipment subject to pressure differentials shall be checked for leakage.</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 42 OF 49</p>

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53.00.00	<p>(2.) After erection, all equipment having moving parts, having electrical apparatus, or subject to pressure differentials shall be trial-operated.</p> <p>(m.) Defects</p> <p>(1.) All defects in erection shall be corrected to the satisfaction of the Employer and the Project Manager. The dismantling and reassembly of Contractor furnished equipment to remove defective parts, replace parts, or make adjustments shall be included as a part of the work under these specifications.</p> <p>(2.) The removal of control and instrument equipment in order to allow bench calibration, if required, and the re-installation of the said equipment after calibration shall also be included as a part of the work under these specifications.</p>		
	<p>(n.) Equipment Protection</p> <p>(1.) All equipment to be erected under these specifications shall be protected from damage of any kind from the time of contract award until commissioning of each unit.</p> <p>(2.) The equipment shall be protected during storage as described herein.</p> <p>(3.) Equipment shall be protected from weld spatter during construction.</p> <p>(4.) Suitable guards shall be provided for protection of personnel on all exposed rotating or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy removal and maintenance.</p> <p>(5.) Equipment having glass components such as gauges, or equipment having other easily breakable components, shall be protected during the construction period with plywood enclosures or other suitable means. Broken, stolen, or lost components shall be replaced by the Contractor.</p> <p>(6.) Machine finished surfaces, polished surfaces, or other bare metal surfaces which are not to be painted, such as machinery shafts and couplings shall be provided temporary protection during storage and constructional periods by a coating of a suitable non- drying, oily type, rust preventive compound.</p>		
	<p>WELDING - SPECIAL REQUIREMENTS</p> <p>If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed under separate specifications, the requirements shall be submitted to the Project Manager in advance of commencement of erection work.</p>		
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54.00.00	<p>DEVIATIONS DISPOSITIONING:</p> <p>Any deviation to the contract and employer approved documents shall be properly recorded in the format prescribed by NTPC. All the deviations shall be brought to the knowledge of employer's representative for suitable dispositioning.</p>		
55.00.00	<p>NON-DESTRUCTIVE TESTING (NDT):</p> <p>The contractor shall record results of NDTs carried out at site in the format acceptable to employer. All the radiographs & its report duly signed & correlated to the job shall be handed over to the employer. Sensitivity of all the test equipment shall be compatible to the job & acceptance norms agreed.</p>		
56.00.00	<p>TESTING EQUIPMENT & FACILITIES:</p> <p>Contractor shall provide the testing equipment and facilities necessary to carry out tests & inspections.</p>		
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	<p style="text-align: right;">ANNEXURE-I</p> <p style="text-align: center;">STANDARD CHECKLIST - COMMISSIONING/TESTING ESSENTIAL PRE-REQUISITE</p> <p>(a.) Mechanical</p> <p>Sl. No. DESCRIPTION</p> <p>(1.) Valves- All Types as applicable</p> <p>(2.) Tanks And Pressurre Vessels as Applicable</p> <p>(3.) Pumps as applicable</p> <p>(4.) Pipe Work System as applicable</p> <p>(5.) Strainer And Filter as applicable</p> <p>(6.) Heat Exchangers/ Cooling Towers as applicable</p> <p>(7.) Fans And Compressors as applicable</p> <p>(8.) Dampers & Gates as applicable</p> <p>(9.) Duct Work as applicable</p> <p>(10.) Cranes. Hoists And Elevators as applicable</p> <p>(11.) Power Tranmission (Gear Box, Bearings & Couplings) as applicable</p> <p>(b.) Electrical</p> <p>(1.) D.C. MOTOR</p> <p>(2.) HV SQUIRREL CAGE INDUCTION MOTOR</p> <p>(3.) 415 V SQUIRREL CAGE INDUCTION MOTOR</p> <p>(4.) MOTOR OPERATED ACTUATORS</p> <p>(5.) HT Switchgears</p> <p>(6.) LT Switchgears/MCC</p> <p>(i.) Standard Checlists for all types of relays used in Switchgears Protection System</p> <p>(ii.) PT Carriage and Cubicles</p> <p>(iii.) Cable/Bus Duct/Bus Bars</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 45 OF 49</p>

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	<p>(iv.) Contractor Module</p> <p>(v.) SWITCH FUSE MODULE</p> <p>(vi.) Master Panel of Lube Oil Panel</p> <p>(vii.) FEEDER PANEL OF LUBE OIL PANEL</p> <p>(viii.) SPACE HEATER AND CABLE MODULE</p> <p>(ix.) HT Circuit Breaker</p> <p>(x.) 415 V Circuit Breaker</p> <p>(7.) POWER CABLE</p> <p>(8.) AUXILIARY CABLE</p> <p>(9.) D.C. CABLE</p> <p>(10.) Explosion Proof Electrical Equipment</p> <p>(11.) JUNCTION BOX</p> <p>(12.) CONTROL TRANSFORMER MODULE</p> <p>(13.) SOOT BLOWER SEQUENCE PANEL</p> <p>(14.) BRUSH GEAR ASSEMBLY</p> <p>(15.) AUX. CONTROL AND RELAY PANEL DESK</p> <p>(16.) INDICATING INSTRUMENT</p> <p>(17.) RECORDING INSTRUMENT</p> <p>(18.) INTEGRATING INSTRUMENT</p> <p>(c.) Control & Instrumentation</p> <p>(1.) Conductivity Analysing Equipment including Test procedures</p> <p>(2.) pH ANALYSER INCLUDING TEST PROCEDURE</p> <p>(3.) Silica analyser</p> <p>(4.) LEVEL SWITCH (FLOAT ACTUATED)</p> <p>(5.) LEVEL SWITCH (ELECTRODE TYPE)</p> <p>(6.) Level Switch Displaced actuated)</p> <p>(7.) Transmitter (Float Operated Pneumatic Output)including testing procedure</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 46 OF 49</p>

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	<p>(8.) Level Indicator (Float/Pulley Type)</p> <p>(9.) LOCAL TEMPERATURE INDICATORS INCLUDING TEST PROCEDURE</p> <p>(10.) Resistance Thermometer Element including Test Procedure</p> <p>(11.) THERMOCOUPLE ELEMENT AND CONNECTING CABLE</p> <p>(12.) Thermocouple and Resistance Thermometer Converter/Transmitter including Test Procedures.</p> <p>(13.) Temperature Switch/Thermostat including test procedures</p> <p>(14.) COLD JUNCTION BOXES</p> <p>(15.) ZENER BARRIER</p> <p>(16.) O2 Analyser</p> <p>(17.) O2 IN HYDROGEN INCLUDING TEST PROCEDURES</p> <p>(18.) Pressure and Vacuum Gauge</p> <p>(19.) PRESSURE AND VACUUM SWITCH INCLUDING TEST PROCEDURE</p> <p>(20.) Differential Pressure Transmitter including test procedure</p> <p>(21.) Differential Pressure switch including test procedure.</p> <p>(22.) Flow Indicator (variable area)</p> <p>(23.) ORIFICE PLATE</p> <p>(24.) TURBINE FLOW TRANSMITTER</p> <p>(i.) FLOW SWITCH</p> <p>(ii.) WEIR</p> <p>(iii.) NOZZLE</p> <p>(iv.) Flow Indicator (Pneumatic input)including test procedure</p> <p>(v.) Flow integrator (Pneumatic input)including test procedure</p> <p>(vi.) Flow indicator (float operated)including test procedure</p> <p>(vii.) VENTURI (FLUID)</p> <p>(viii.) Flow switch(Magnetic Type)</p> <p>(ix.) AVERAGING INLET</p>		
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	<p>(x.) LIMIT SWITCHES</p> <p>(25.) TURBINE SUPERVISORY MEASURING SYSTEM</p> <p>(26.) Position Measurement and indication including Test Procedures</p> <p>(i.) TACHOMETER</p> <p>(ii.) VIBRATION MEASUREMENT</p> <p>(iii.) DIGITAL INDICATOR</p> <p>(iv.) MOVING COIL INDICATOR INCLUDING TEST PROCEDURE</p> <p>(v.) RECORDER INCLUDING TEST PROCEDURE</p> <p>(vi.) FLAME SCANNER</p> <p>(vii.) ELECTRICAL AUTO MANUAL CONTROL STATION</p> <p>(viii.) PUSH BUTTON MODULE</p> <p>(ix.) ALARM ANNUNCIATOR EQUIPMENT INCLUDING TEST PROCEDURE</p> <p>(x.) Test procedure for electronic Modules of DDCMIS</p> <p>(xi.) THERMO CONTROL VALVE</p> <p>(xii.) Test Procedure for adjustment of modulating Controller –PID Terms</p> <p>(xiii.) Test Procedure indicating Controller-Electrical Input and Pneumatic Output</p> <p>Note: The items which are not part of this specification may not be considered as not applicable.</p>		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 48 OF 49</p>

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	<p style="text-align: right;">Annexure-II</p> <p style="text-align: center;">BRIEF WRITE UP ON THE CONTENTS OF TESTING SCHEDULE / COMMISSIONING SCHEDULE</p> <p>Testing Schedules should be designed to ensure that the plant area, equipment or apparatus are tested and commissioned and will operate as per the employer's specifications and good engineering practices.</p> <p>Testing Schedule/Commissioning Schedule is required to be of a standard format in order to maintain consistency of presentation, content and reporting.</p> <p>Testing Schedule/Commissioning Schedule should contain the following sections to make the document a self contained one:</p> <ul style="list-style-type: none"> a) Plant Details/Design data b) Testing Objective/Proposals c) State of the Plant <ul style="list-style-type: none"> 1) Erection Status with respect to Mech. Elect and C&i 2) Availability of the services required 3) Safety requirements as per manufacturer's data (d.) Test method including completion/acceptance criteria (e.) Results (f.) Appendix <ul style="list-style-type: none"> (1.) Testing Programme (2.) Mech/Elect/C&I –Plant item completing list (3.) List of Drawing/documents required for carrying out the testing. 		
<p>NTECL POWER PROJECT (3X500 MW) (VALLUR THERMAL POWER PROJECT 3X500 MW) ULTRAFILTRATION PLANT PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-D BID DOC.NO.:CS-0260-132G-2</p>	<p>ERECTION CONDITIONS OF CONTRACT (ECC)</p>	<p>PAGE 49 OF 49</p>

TENDER DOCUMENT

TENDER SPECIFICATION No: BAP:CF:OT: 03/2017-18 Dt: 25/06/2017

NAME OF WORK:

“Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai”

PERIOD OF CONTRACT:

FIVE MONTHS

PART – II – PRICE BID

(Pages **1 - 37** including this cover page)



CIVIL PROJECTS & SERVICES
BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
BOILER AUXILIARIES PLANT
INDIRA GANDHI INDUSTRIAL COMPLEX
RANIPET – 632 406

TENDERER

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Section – A:**Instructions to Bidders:**

1. Bidders shall only quote 'Total Amount' in the format given in PART – II, Section - B of the price bid. Any other entry elsewhere in the price bid shall be treated as Null and Void.
2. The above mentioned 'Total amount' is for the entire Bill of Quantity (BOQ) given in Part – II, Section - C of the Price Bid.
3. BHEL has pre-fixed the weightages for the amount of individual items of Bill of Quantity with respect to the 'Total Amount' in Part – II, Section - C.
4. Based on the pre-fixed weightages, the amount for the individual items of the Bill of Quantity shall be arrived at. This amount shall be rounded off to the nearest rupee.
5. Based on the quantities of individual item and the amount arrived in SI No: 4 above, unit rate of individual items shall be derived. This unit rate shall be rounded off to two decimal places.
6. Bidders to note that this is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived at as per SI No.5 above.

Section - B: Format to quote Total Amount

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai

Total Amount for the entire Bill of Quantities(BOQ) given in Section - C	In Figures
	In words

Note:

Bidders shall quote Total Amount in this format given above, which shall be taken into account for evaluation and awarding and hence, shall be complete in all respect for the full scope defined in the specification and in accordance with all terms & conditions of the tender.

Bidders are requested to fill the full GST as applicable in the following tabulation for the total work value quoted above.

SI No	GST	Service Account Code (SAC)	Applicable GST %	Applicable GST Amount
1	CGST			
2	SGST			
3	IGST			
4	UTGST			
5	CESS			

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Section - C: Bill of Quantities

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
100	EARTH WORK			
	Earth work In excavation, backfilling and disposal including necessary men/women, materials, equipment, loading, transportation, unloading, dewatering etc as per specification, drawing and as directed by engineer- in-charge for the following.			
101	Earth work in excavation in all types of soil including ash which can be excavated by any means including setting out, levelling, dewatering (but excluding special type of dewatering viz. well point method), shoring & strutting (wherever required), dressing the sides & bottom, all lifts, ramming/compacting the excavated bottom, stacking, disposal of surplus excavated materials within a lead upto 500 m, spreading/levelling of disposed materials etc all complete for following depths below ground level.			
a	Depth from ground level but not exceeding 2 m	2531.00	CUM	0.0065958
b	Depth exceeding 2 m but not exceeding 4 m	300.00	CUM	0.0009773
c	Depth exceeding 4 m but not exceeding 6 m	10.00	CUM	0.0000407
102	Extra over ST No. 101 for dewatering of ground water by well point method as per IS 9759.	10.00	CUM	0.0000152
107	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 250 mm thickness using/with selected materials from compulsorily excavated soil available within a lead upto 500m and compacted as specified including re-excavation of stacked earth, watering, ramming/compaction by manual/mechanical means, dressing etc all complete.for the following.			

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
a	Each layer compacted so as to achieve at least 95% maximum dry density as per IS-2720 (Part-VII)	5.00	CUM	0.0000129
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	604.00	CUM	0.0013969
108	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 250 mm thickness using/with selected materials directly from excavation and compacted as specified including watering, ramming/compaction by manual/mechanical means, dressing etc all complete for the following.			
a	Each layer compacted so as to achieve at least 95% maximum dry density as per IS-2720 (Part-VII)	5.00	CUM	0.0000055
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	873.00	CUM	0.0008808
109	Extra over ST No.101 and 103 to 107 for carriage of excavated earth/ selected materials for every 1 km or part thereof beyond an initial lead of 500m.	4827.50	CUM	0.0014146
110	Back filling upto any depth below ground level around foundations, plinths, trenches, drains etc to proper grade and level in layers not exceeding 250 mm thickness using/with approved borrowed soil (borrowed soil to be arranged by the bidder) and compacted as specified including supplying borrowed soil, royalty (if any), watering, ramming/compaction by manual/mechanical means, dressing etc all complete for the following.			
a	Each layer compacted so as to achieve at least 95% maximum dry density as per IS-2720 (Part-VII)	1.00	CUM	0.0000197

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
b	Each layer compacted so as to achieve at least 90% maximum dry density as per IS-2720 (Part-VII)	127.00	CUM	0.0025030
111	Supplying and filling sand upto any depth under floors, around foundations, plinths, in trenches etc. in layers not exceeding 250 mm thickness and compacted so as to achieve at least 75% relative density as per IS-2720 (Part-XIV) including spreading, watering, ramming/compaction by manual / mechanical means, dressing, royalty (if any) etc. all complete.	10.00	CUM	0.0006108
A114	Earth work in stripping of top soil upto a maximum depth of 0.30m below ground level so as to exclude all debris, grass, vegetation, bushes, trees having girth upto 300mm including roots and organic materials etc for leveling and grading including dressing to specified levels & grades and compacting the graded/stripped surface by manual/ mechanical means, disposal of stripped materials within a lead upto 1km etc all complete as per specification, drawing and as directed by the engineer-in-charge.	10.00	SQM	0.0000142
200	CONCRETE WORKS			
	Providing and placing concrete work including cost of labour, materials and equipment for handling, transportation, batching, mixing, placing, vibrating and curing, (excluding cost of centering, shuttering and reinforcement) with mechanised equipments like batching plant, transit mixer, concrete pump etc. complete as per drawing, specifications and as per direction of engineer in charge for the following.			
201	Concrete of grade M7.5 (1 part cement, 4 part sand, 8 parts of 40 mm graded aggregate by volume) as lean concrete, levelling course, mud mat under and around foundations/floors at any depth below finished floor level etc.	83.00	CUM	0.0093879

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ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
202	Concrete of grade M10 (1 part cement, 3 part sand, 6 parts of 40 mm graded aggregate by volume) as as lean concrete, levelling course, mud mat under and around foundations/floors at any depth below finished floor level etc.	181.00	CUM	0.0255278
204	Concrete under floors, paving, plinth protection, pipe encasing etc complete with 20mm nominal size graded aggregate at any depth below finished floor level for the following grades.			
a	M15 Grade (Mix 1:2:4)	46.00	CUM	0.0066809
205	Providing and laying Design Mix cement concrete conforming to IS:456 & IS 10262-2009 for reinforced concrete works with coarse sand and graded hard stone aggregate of 20mm nominal size in foundations/substructure, grade slab, paving, drains, under floors etc at any level below finished floor level, any shape, position or thickness etc complete including use of plasticizer/ superplasticizer conforming to IS:9103 (latest) to achieve required slump in concrete all complete as per specification & drawing for the following.			
b	M30 Grade	606.00	CUM	0.1154264
206	Providing and laying Design Mix cement concrete conforming to IS:456 & IS 10262-2009 for reinforced concrete works with coarse sand and graded hard stone aggregate of 20mm nominal size in superstructure at any level above finished floor level, any shape, position or thickness etc complete including use of plasticizer/ superplasticizer conforming to IS:9103 (latest) to achieve required slump in concrete all complete as per specification & drawing for the following.			
b	M30 Grade	156.00	CUM	0.0307453

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
211	Providing and encasing of structural steel member with concrete using nominal aggregate size of 12.5mm down. Encased member shall be wrapped with welded wire mesh/chicken wire mesh with proper lap etc. complete as per specification for the following grades. (Payment of welded wire mesh, chicken wire mesh shall be made separately)			
b	M30 Grade	4.00	CUM	0.0011719
212	Screed concrete conforming to IS 456 with coarse sand and graded hard stone aggregate 12.5mm/6 mm nominal size on the roof at any level or thickness, drains etc complete as per following.			
a	1:2:4 (1 part cement, 2 part sand, 4 parts of aggregate by volume)	10.00	CUM	0.0015423
213	Providing and laying Design Mix cement concrete as per IS:456 & IS 10262-2009 for reinforced concrete works using graded aggregate for Concrete in precast works like roof slabs/trench covers, fins, lintels, chajas, beams, columns, wall panels, facias etc.at all levels in all kinds of work including formwork/moulds, curing, rendering the top exposed surface with cement sand mortar (1:3), handling, storing, transpoting, all leads, erection without damage, setting in position with cement sand mortar (1:3), filling the gaps between adjacent precast units with M30 grade concrete or cement sand mortar (1:3) and including making of holes for bolts for fixing, welding etc.complete with graded aggregate (20/12.5/10 mm) and as per specification and drawing for following grades.			
b	M 30 grade	20.00	CUM	0.0046268

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
214	Providing and laying Design Mix cement concrete as per IS:456, IS 3370 & IS 10262-2009 for reinforced concrete works using graded aggregate for Concrete in water retaining/conveying structures including addition of suitable plastisizer cum waterproofing cement additives confirming to IS 9103 latest to achieve a slump more than 125 mm in concrete as per manufacturers recommendation and conforming to limits of permeability as per IS 2545 and specification with 20 mm nominal size graded aggregate for following grades.			
a	M 30 grade	289.00	CUM	0.0656339
215	Dismantling concrete work for all types of structures at all levels including stacking of servicable material to a lead of 500 m and disposal of unservicable material upto a lead of 2 km, cutting of reinforcement, labour, equipment, safety precautions etc all complete as per drawings, specification and instructions of engineer in charge.			
a	Plain cement concrete of all grades	1.00	CUM	0.0000275
b	Reinforced cement concrete of all grades	1.00	CUM	0.0000424
216	Chipping of concrete in reinforced concrete work, cutting pockets, making openings at all levels and according to shapes, disposal of waste materials upto a lead of 2 km as directed by engineer including equipment, safety precautions, making good the broken surface etc all complete as per specification, drawing, instructions of engineer in charge but excluding cutting of reinforcement .	10.00	CUDM	0.0000153
217	Extra over and above St No 216 for cutting of reinforcement, all sizes and types including labour, equipment, return of cut reinforcement to store etc all complete as per specification, drawings and instructions of engineer in charge. Measurement shall be on the cross sectional area of reinforcement cut.	10.00	SQCM	0.0000015

CONTRACTOR/ TENDERER

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ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
218	Cutting Reinforced concrete with mechanised tools like Core drilling machine etc. for cutting pockets, holes, cores in slab, beam, column or foundation as per direction of engineer in charge.	100.00	CUDM	0.0005819
219	Providing and applying curing compound of approved make where ever required as per manufacturer's specification.	10.00	SQM	0.0000332
300	FORM WORKS			
	Providing, fixing and removing formwork at any elevations for all structures, as per specifications and including all labour, material, scaffoldings and centering complete including pockets etc. complete as per drawing, specifications and as per direction of engineer in charge for the following.			
301	Fairface form work with good quality water proof ply wood of required thickness and smooth surface below finished ground floor level for foundations, footings, base of columns, walls, columns, pilasters, beams, mass concrete, trenches etc.	150.00	SQM	0.0023161
301A	Fairface form work with steel formwork and shuttering of required thickness and smooth surface below finished ground floor level for foundations, footings, base of columns, walls, columns, pilasters, beams, mass concrete, trenches etc.	1405.00	SQM	0.0175048
302	Fairface form work with good quality water proof ply wood of required thickness and smooth surface above finished ground floor level for columns, beams, suspended floors, roofs, lintels, cantilevers, staircases, landings, balconies, domes, arches, circular overhead tanks etc. for all heights.	1852.00	SQM	0.0342076

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
304	Providing, fixing and removing formwork in block-outs/pockets and openings (below 0.1 sqm plan area) at all elevations including cutting, formation of all shapes and all other operations required for making the required shape and size all complete as per specification, drawing and instruction of engineer in charge.			
a	Upto 150 mm depth	224.00	Each	0.0015850
b	Pockets of depths more than 150mm and upto 300 mm depth	50.00	Each	0.0006270
c	Pockets of depths more than 300mm and upto 600 mm depth	10.00	Each	0.0002313
400	REINFORCEMENT			
405	Providing, Straightening, cutting, bending, placing in position at any level, binding in position of Corrosion Resistant(HCRM) thermo - mechanically treated reinforcement steel (High strength Deformed steel bars) conforming to grade Fe-500 of IS:1786 (Latest) including cost of binding wire, labour, Scaffolding, transportation to & from stores, submission of optimized bar bending schedule, stacking of cut pieces/scarp steel as per sizes for easy retrieval for further use etc complete all as per specifications, drawings and as directed by Engineer	123.00	MT	0.1946207

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
405A	Extra over ST No.405 for providing fusion bonded epoxy coating by mechanised & qualified process including blast cleaning to white metal as per Swedish code, heating in induction heater, electrostatically spraying the epoxy powder, complete fusion to give minimum coating thickness of 200-300 microns, gradual cooling without affecting the properties of steel, testing as per ASTM 775 and IS:13620, flexibility & holiday test, proper packing, safe transportation, touchup at site, etc. complete to ensure proper resistance of FBE against corrosive environment. The bidder has to transport the steel from BHEL site store to vendor plant and bringing back to site and special handling during straightening, cutting, bending, placing etc complete all as per specifications, drawings and as directed by Engineer.	50.00	MT	0.0174917
500	WATER PROOFING WORKS			
	Water proofing works including all labour, material, equipment, transportation, handling, curing, sampling, testing etc at any level as per specification, drawings and as directed by engineer - in - charge.			
501	Providing and laying underbed grading plaster with cement mortar 1:4 (1 cement : 4 sand) and average thickness of 25 mm including preparation of surface, batching, mixing, leveling etc. all complete.	168.00	SQM	0.0012572

CONTRACTOR/ TENDERER

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
506	Providing and applying PolyUrethane(PU) based water proofing treatment with one coat of polyurethane or any other equivalent material based primer with an application rate of minimum 6sq.m per liter and two successive liquid coatings of high solids content urethane pre-polymers or equivalent material based finish coats as per relevant IS/ASTM(ASTM C-898 or other relevant codes) standards to form an elastomeric membrane with overall dry film thickness 1.5 mm subject to minimum 500gm/sqm/coat application rate. Item includes surface preparation, polyscrim cloth/ fabric, polymerised mortar base preparation, etc. all complete as per specifications and directions of engineer in charge.	168.00	SQM	0.0043891
507	Providing and laying wearing course consisting of 25mm thick plain cement concrete of grade M15 (1:2:4) with graded aggregate of 12.5mm size cast in panels of maximum size 1.2mx1.2m and reinforced with 0.56mm dia. galvanised chicken wire mesh and sealing of joints (in grooves of 6mm X 6mm) using silicon /elastomeric compound etc all complete.	168.00	SQM	0.0021672
508	Providing and laying cement concrete chequered flooring tiles of 22 mm thickness and size 300x300 mm conforming to IS 13801 with 8 mm thick 1:4 cement mortar over the top most layer of roofing treatment in pathway and entire equipment area with fine joints including sealing of joints (silicon/elastomeric sealant) etc all complete. (Water proofing paid elsewhere)	20.00	SQM	0.0002689
509	Providing and applying two coats of bitumen grade 85/25 as per IS 702 (@ 1.7kg/sqm) with 1% antistripping compound conforming to IS 6241 in foundation, wall, column etc on concrete surfaces exposed to soil / ash including surface preparation etc. all complete.	1602.00	SQM	0.0067839

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
511	Providing and mixing water proofing compound conforming to IS:2645 in concrete or cement mortar all complete.	10.00	KG	0.0000080
512	Anti termite chemical treatment of soil with Chloropyrifos emulsifiable concentrates(1%) conforming to IS:8944 and as per IS 6313 all complete all complete.	1896.00	SQM	0.0085856
600	JOINTS AND FILLERS			
	Joists & fillers including all labour, material, equipment, transportation, handling etc at any level as per specification, drawings and as directed by engineer - in - charge.			
601	Supplying & installation of bitumen impregnated fibre board confirming to IS 1838 as joint filler at joints in concrete including nailing, coating of both faces with coal tar pitch/bitumin etc. all complete.			
c	25 mm wide joints	2.00	SQM	0.0000608
602	Providing and applying polysulphide based sealant conforming to IS:12118 in expansion joints in concrete including cleaning of joints, raking out groove, application of primer, scaffolding etc. all complete for following size grooves:			
c	25mmX25mm	20.00	RM	0.0002691
603	Supplying and filling in position hot applied bitumin sealing compund (Grade A) confirming to IS 1834 including cleaning, mixing, heating, pouring/injecting sealing compound in gaps in joints including application of primer etc. all complete.			
c	20mmX25mm	10.00	RM	0.0000159
604	Supplying and filling in position hot applied bitumin sealing compund (Grade B) confirming to IS 1834 including cleaning, mixing, heating, pouring/injecting sealing compound in gaps in joints including application of primer etc. all complete.			

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
c	20mmX25mm	10.00	RM	0.0000238
606	Providing and fixing PVC water stops in joints conforming to IS-12200 & IS 15058 all complete for the following:			
b	230 mm wide and 6 mm thick	324.00	RM	0.0037791
700	MS EMBEDMENTS			
	Embedments including all labour, material, equipment, transportation, handling etc. at any level as per specification, drawings and as directed by engineer - in - charge.			
701	Supply, fabricating and fixing of mild steel embedments, inserts, pipe sleeves, angle pieces, rungs of various diameters, plates of dimensions as required etc. including welding, bolting, cutting, drilling, scaffolding, setting etc. all complete.	5.00	MT	0.0097980
704	Supply, Fabrication, transportation, delivery at site and erection, installation and alignment of mild steel foundation bolt assembly conforming to IS:2062 and grade 1 of IS:432 in concrete along with nuts, lock nuts (as per IS:1363, 1364 and IS:3138), washers, anchor plates, stiffner plates, protective tape, pipe sleeves, templates etc. including welding, cutting, grinding, threading, drilling etc. all complete.	2.00	MT	0.0051695
705	Supplying, fabricating, erecting and installing following items in concrete/brickwall for all kind of works, including setting material in concrete, layout, scaffolding, cutting, forming, grinding, drilling, bolting, welding, jointing, testing etc. all complete.			
c	UPVC pipes / conduits of all diameters	1.00	Quintal	0.0001293
d	Expansion fasteners (mechanical galvanised) of HILTI make or equivalent of safe tensile capacity as specified below for brick work with expansion sleeve of A6 polyamide:			
i	Upto 250 kg	5.00	Each	0.0000436

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ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
ii	Beyond 250 Kg and upto 500 kg	5.00	Each	0.0000691
iii	Beyond 500 Kg and upto 750 kg	5.00	Each	0.0001113
e	Expansion fasteners (mechanical galvanised) of HILTI make or equivalent of safe tensile capacity as specified below for concrete work with expansion sleeve of stainless steel:			
i	Upto 250 kg	5.00	Each	0.0000527
ii	Beyond 250 Kg and upto 500 kg	5.00	Each	0.0000800
iii	Beyond 500 Kg and upto 750 kg	5.00	Each	0.0001261
800	GROUTING			
	Grouting including all labour, material, equipment, roughening surface, cleaning, ramming, curing etc. at any level unless otherwise specified as per specification, drawings and as directed by engineer - in - charge.			
803	Providing & grouting of pocket holes, pipe sleeves and under base plate of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing etc. all complete with mix 1:1.25:2 (1 cement : 1.25 coarse sand : 2 aggregate of 10 mm down graded stonechips) using non shrink admixture. (Cost of all material and cleaning the pocket by compressed air shall be in the scope of the contractor).	0.20	CUM	0.0001237
804	Providing & grouting of pocket holes, pipe sleeves and under base plates of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing etc. all complete with ConbextraGP-1 or equivalent. (Cost of all material and cleaning of the pockets by compressed air shall be in the scope of the contractor).	2.00	CUM	0.0031235

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ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
805	Providing & grouting of pocket holes, pipe sleeves and under base plates of structural steel work/ machinery/ pipe supporting structures including roughening of surface, cleaning, ramming, curing, etc. all complete with Conbextra GP-2 or equivalent. (Cost of all material and cleaning of the pockets by compressed air shall be in the scope of the contractor).	2.00	CUM	0.0034015
900	DOORS, WINDOWS, VENTILATORS, LOUVERS			
	Doors, windows, ventilators, louvers, roof ventilators, rolling shutters, partitions including all labour, material, equipments, transportation, handling, preparation of working drawings etc. at any level as per specification, drawings and as directed by engineer - in - charge.			
904	Providing and fixing single or double steel door shutters with 45mm thk flush design shutter comprising of two outer sheets of 18 gauge steel sheets rigidly connected and reinforced inside with continuous vertical 20 gauge stiffeners, spot welded in position at not more than 150mm on centres including void filled with mineral wool (density as per specification), all fittings, Godrej or equivalent make mortice lock with handle on both sides, shop and final painting etc all complete.	6.00	SQM	0.0008489
907	Providing and fixing fire proof steel doors (single or double shutter) with panic devices shall be 44mm thk flush design comprising of two outer sheets of 18 gauge steel sheets rigidly connected and reinforced inside with continuous vertical 20 gauge stiffeners, spot welded in position at not more than 150mm on centers including all fittings, shop painting with approved post office/signal red color fire resistant paint and mineral wool insulation (64 kg/cum density) complete and shall be fire proof as per IS:3614, TAC requirements and as per specification. Minimum ratings shall be 2 Hrs.	3.00	SQM	0.0006576

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
909	Providing and fixing anodised aluminium work of Jindal, Hindalco or other equivalent approved make for door frames, windows, ventilators, partitions, railing etc with extruded standard tubular and other sections including all fittings & fixtures and accessories of approved make conforming to IS733 and IS1285, anodised and electro color dyed to required shade according to IS 1868 (minimum anodic coating of grade AC15), fixed with rawl plugs, expansion fasteners, SS screws or with fixing clips, including necessary filling of gaps at junctions, at top, bottom and sides with required PVC/neoprene felt for bi-mettalic protection etc.including preperation of working drawings, aluminium cleat angle, aluminium snap-on-beading for glazing/panelling, stair case tread nosing, with all fittings and fixtures (like tower bolts, handles, door stopper with rubber shoes, 'L' drops, stays, floor springs, hydraulic door closures etc.), CP brass/stainless steel screws, providing and fixing hinges/pivots, and making provision for fixing of fitting wherever required including cost of PVC/neoprene gasket, all complete as per drawing, specification and instructions of engineer in charge (Glazing and panelling shall be paid seperately).Weight of aluminium section only shall be measure.	500.00	Kg	0.0072318

CONTRACTOR/ TENDERER

ACCEPTING OFFICER

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
913	Providing and fixing in position rolling shutter of hot rolled double dipped galvanised steel lath section of 18 SWG tested mild steel strips at 75mm rolling centres interlocked together through their entire length and jointed together at the end by end locks mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation including wire springs, top cover, primer & shop coats of approved enamel paint etc, all complete as per IS 6248 and specification of approved make of following types: The bottom lath shall be coupled to a lock plate fabricated from 3mm thick galvanised steel plate and securely rivetted with stiffening angles.(partly coiled and lath/full lath).			
c	Electrically operated including motors and other accessories	12.00	SQM	0.0012151
915	Providing, fixing and fitting of glazing of first grade class in steel/aluminium/wooden frames, where ever required, cleaning after fixing including hardware, gaskets, clips, beadings etc. all complete.			
b	4 mm thick clear float glass	20.00	SQM	0.0002944
c	5.5 mm thick clear float glass	25.00	SQM	0.0009720
f	4 mm thick ground glass	3.00	SQM	0.0001060
e	6mm thick Polycarbonate sheet multi (twin) wall fire retardant and ultra violet resistant with sealed open edges.	3.00	SQM	0.0001701
1000	BRICKWORK			
	Brickwork masonry including all labour, material, equipment, transportation, handling, scaffolding etc. at all levels as per specification, drawings and as directed by engineer - in - charge.			

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
1001	Providing brick work in cement mortar 1:6 (1 part cement 6 parts coarse sand) in walls, chambers etc. in thickness varying from 230mm to 460mm at all depths, places and positions below plinth including raking out joints, curing, scaffolding etc. complete excluding plastering and painting.			
a	Using fly ash lime bricks confirming to IS 12894 with crushing strength of 75kg/cm ²	30.00	CUM	0.0057748
1002	Providing brick work in cement mortar 1:6 (1 cement 6 coarse sand) in walls, chambers etc. in thickness 230mm at all heights, places and position above plinth including raking out joints, curing, scaffolding etc complete excluding plastering and painting.			
c	Using fly ash lime bricks confirming to IS 12894 with crushing strength of 75kg/cm ²	200.00	CUM	0.0448248
1003	Providing brick work in cement mortar 1:4 (1 cement 4 coarse sand) in partition walls, chambers etc. in thickness 115mm at all heights, places and position above or below plinth/graded level including providing two nos. 6 mm diameter MS bars at every third layer, raking out joints, curing, scaffolding etc complete excluding plastering and painting as per specification.			
c	Using fly ash lime bricks confirming to IS 12894 with crushing strength of 75kg/cm ²	25.00	SQM	0.0007037
1006	Breaking of existing brick work at all levels including plastering, removing the rubbish up to a distance of 500 m including transportation, loading, unloading etc. all complete as directed by the engineer.	5.00	CUM	0.0002073
1009	Making openings in existing brick wall or partition wall including making good the broken edges/surface with cement mortar etc. complete.	1.00	CUM	0.0000480

CONTRACTOR/ TENDERER

ACCEPTING OFFICER

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
1011	Filling existing brick wall/ partition wall opening at all level including making good the broken edges/surface with cement mortar, painting, finishing to match with existing finishing, scaffolding/supporting at any level, removal of debris upto a lead of 1 km including loading, unloading, transportation etc. all complete.	1.00	SQM	0.0000274
1100	DAMP PROOF COURSE			
	Damp proof course including all labour, material, equipment, transportation, handling, shuttering, centering, curing etc at any level as per specification, drawings and as directed by engineer - in - charge.			
1101	Providing Damp Proof Course 50mm thick 1:1.5:3 concrete (10mm and down graded aggregate) with 2% of approved admixture of water proofing compound all complete. Two layers of hot bitumen coating 85/25 grade as per IS:702 @ 1.7Kg./sqm shall be applied one before & one after the DPC.	86.00	SQM	0.0009388
1200	CEMENT MORTAR PLASTER			
	Cement mortar plaster including making grooves wherever required including all labour, material, scaffolding, curing etc at any level as per specification, drawings and as directed by engineer - in - charge.			
1201	Providing 18 mm thick plaster in two layers (under layer 12 mm thick in CM 1:6 and top 6 mm thick layer in CM 1:4 with approved water proofing compound) outer side the building/boundary wall, finished to a smooth finish, all complete.	525.00	SQM	0.0034091
1203	Providing 12mm thick plaster in cement mortar 1:6 on walls with rough finish all complete.	525.00	SQM	0.0020737
1203A	Providing 12mm thick plaster in cement mortar 1:4 on walls with smooth finish all complete.	1419.00	SQM	0.0060885

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
1204	Providing 6mm thick plaster on ceiling in cement mortar 1:4 finished to a smooth all complete.	165.00	SQM	0.0007740
1300	FINISHES TO CONCRETE / PLASTERED SURFACES			
	Finishes, painting to concrete, plastered surfaces including all labour, material, equipment, surface preparation, scaffolding etc. at any level as per specification, drawings and as directed by engineer - in - charge.			
1301	Three or more coats of white wash/ colour wash as per IS 627 of approved brand and manufacture to give an even shade including a priming coat as per specifications.	345.00	SQM	0.0002673
1303	Providing and applying two or more coats of oil bound destemper as per IS 428 of approved brand, shade and manufacture to give smooth, hard, durable & glossy finish over a coat of primer over prepared plaster surface as per manufacturers guideline.	340.00	SQM	0.0007414
1305	Providing and applying two or more coats of acrylic emulsion paint as per IS 5411 of approved brand, shade and manufacture to give smooth, hard, durable & glossy finish over a coat of primer over prepared plaster surface as per manufacturers guideline.	200.00	SQM	0.0007023
A1310	Providing and applying textured finish (Sandtex matt or equivalent), for external applications of approved natural color/shade applied on cured and dried plaster surface. Cost shall include surface preparation and primer application. The final finish shall have UV resistance, fungus, bacterial resistance properties all complete with grooves filled with poly sulfide sealant of matching color and shade as per specification /drawing/approval of engineer in charge.	365.00	SQM	0.0072933

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
B1310	Providing and applying resin bonded granular textured finish (Vineratex or equivalent), for external applications of approved natural color/shade applied on cured and dried plaster surface with a dry film thickness of minimum 2 mm. The final finish shall have UV resistance, fungus, bacterial resistance properties all complete with grooves filled with poly sulfide sealant of matching color and shade as per specification /drawing/approval of engineer in charge.	125.00	SQM	0.0024977
1312	Providing and applying 2 mm thick plaster of paris punning conforming to IS: 2547 on walls including preparation of surface, staging, etc. to achieve a smooth even surface all complete as per specification and as directed by Engineer.	200.00	SQM	0.0005303
1313	Providing and applying ready made Epoxy Paint over areas other than steel structure with suitable pigments of approved shade as per specification and direction of Engineer. The epoxy paint shall be a two pack material and shall be resistant to water, splash, spillage & acidic environment. The epoxy paint coating shall be of 150micron thickness over epoxy primer.	618.00	SQM	0.0069813
1314	Providing and applying a coat of water repellent siliconate based (transparent) paint over the final finished surface.	360.00	SQM	0.0008419
1400	FLOORING AND SKIRTING			
	Flooring and skirting at any level including base layer, labour, material, equipments, transportation, handling, curing, polishing etc. at any level as per specification, drawings and as directed by engineer - in - charge.			

CONTRACTOR/ TENDERER

ACCEPTING OFFICER

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
A1401	Providing and laying 50 mm thick heavy duty cement concrete in flooring with metallic hardener pigmented topping 12mm thick uniform graded treated iron paricles in flooring. Under layer of 38mm thick cement concrete mix 1:2:4 (1 cement: 2 sand: 4 stone aggregates 12.5mm well graded) and top layer of 12mm thick metallic concrete of mix with approved quality metallic hardening compound: 2 stone aggregate 6mm nominal size) by volume including cement slurry, rounding off edges, glass strips etc. all complete for following (Quoted item rate shall be inclusive of providing glass joint strips).	590.00	SQM	0.0105900
1406	Providing and laying polished Kota stone 18mm to 20mm thk in flooring. Under bed shall average 30mm thk of 1 cement : 2 sand : 4 stone aggregates by volume and brought to proper level. The kota stone slabs/tiles laid over under bed, pressed and tapped down with wooden mallet to the proper level, lifted and pressed again with thick cement slurry spread over the surface with fine joint finished including pigments, curing, grinding, granite polishing etc. all complete.	5.00	SQM	0.0001029
A1417	Providing and laying vitrified ceramic tiles of matt finish of size 300x300mm from reputed / approved manufacturer including underbed of 12mm thick cement mortar 1:3 with neat cement slurry etc. all complete for following.			
a	7mm thick tiles In skirting and dado upto specific height	11.00	SQM	0.0002874
1420	Providing and laying Heavy duty dust pressed anti skid vitrifid ceramic tiles with matt finish of 7mm thick of approved/reputed manufacturer of approved finish shade and colour including underbed of cement mortar 1:3 minimum 20mm thick underbed for flooring and 12mm thick under bed for dado/skirting with neat cement slurry @3.3kg/sqm etc. all complete.			

CONTRACTOR/ TENDERER

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
a	300X300 mm	160.00	SQM	0.0041801
1422	Providing & fixing Acid / Alkali resistant (Chemical resistant) tiles confirming to IS:4457 in Flooring/Dado and shall be laid over bitumastic lining of min 12mm thick (to be laid in layers of 6mm each). The tiles shall be applied with an underbed of 6mm thick Potassium Silicate bedding mortar as per IS:4441, 4443 & 4832 and including preparation of surface, application of bitumen primer, curing, pointing joints with acid/alkali resistant epoxy/furane mortar to a depth of 20mm, bitumastic end sealing etc. all complete for following thickness. The tiles should be abrasion resistant & durable.			
a	20mm thick	315.00	SQM	0.0218773
b	38mm thick	150.00	SQM	0.0108283
A1422	Providing & fixing bitumastic lining of min 12mm thick (to be laid in layers of 6mm each) as per relevant IS codes and including preparation of surface, application of bitumen primer, curing, bitumastic end sealing etc. all complete.	16.00	SQM	0.0001840

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
1424	Providing & fixing chemical resistant (AR)(Acid / Alkali) bricks (75mm thick) conforming to IS:4860 in the floor of neutralization pit. Surface on which lining to be applied shall be prepared in accordance with IS:2395. Bitumen primer as per IS:158 followed by 18mm thick bituminastic followed by 6mm thick potassium silicate mortar bedding shall be provided before laying AR bricks. The joints between AR bricks shall be filled with resin type of mortar conforming to IS:4832, part II, seal coat of readymade epoxy paint shall be provided on joints to cover up any porosity that may be left in mortar. End sealing shall be done with bituminastic AR bricks shall be laid with 6mm wide & 50mm deep pointing (epoxy / furnace / CNSL) & acid curing shall be done all complete as per specification.	110.00	SQM	0.0114906
1424A	Providing & fixing chemical resistant (AR)(Acid / Alkali) bricks (115mm thick) conforming to IS:4860 in the walls of neutralization pit. Surface on which lining to be applied shall be prepared in accordance with IS:2395. Bitumen primer as per IS:158 followed by 18mm thick bituminastic followed by 6mm thick potassium silicate mortar bedding shall be provided before laying AR bricks. The joints between AR bricks shall be filled with resin type of mortar conforming to IS:4832, part II, seal coat of readymade epoxy paint shall be provided on joints to cover up any porosity that may be left in mortar. End sealing shall be done with bituminastic AR bricks shall be laid with 6mm wide & 50mm deep pointing (epoxy / furnace / CNSL) & acid curing shall be done all complete as per specification.	125.00	SQM	0.0200410
1500	ROOFING / SIDE CLADDING			

CONTRACTOR/ TENDERER

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
	Roofing / side cladding work including all labour, material, equipment, transportation, handling, scaffolding, laps, hooks, washers, corner pieces etc. at any level as per specification, drawings and as directed by engineer - in - charge.			
1503A	Designing, providing and fixing External sheet of Permanent colour coated metal cladding with troughed permanently colour coated sheet for roof sheeting, side sheeting, covering of exposed metal/ concrete/ brick surfaces, having steel feed material of minimum bare metal thickness of 0.6mm (i.e. excluding galvanizing and colour coating) having minimum yield strength 250 MPa and of drawing Grade as per IS : 513, coated with Zinc Aluminium alloy @ 150 gm/sqm (as per AS1397), total on both sides including fixing to supports / rails by concealed fixing system, corrosion resistant self tapping / self drilling type fasteners with suitable cap, flashing etc. all complete, colour coated to total minimum coating thickness(dry film thickness) of 35 microns (nominal) comprising of Silicon Modified Polyester (SMP with silicon content of 30% to 50%) paint of minimum 20 microns (nominal) Dry Film Thickness (DFT) on one side over 5 micron(nominal) primer coat and 5 micron (nominal) SMP over 5 micron (nominal) primer coat on back surface (SMP shall be of category 3 of AS2728), and approved profile, sectional properties (suitable for the specified loading/ deflection and runner spacing). All roofing accessories like ridge, flashing, north light curves etc. shall be fabricated out of the approved pre-coated sheet as per specification/drawing. Fasteners shall be of specialized coating tested for 1000 hours salt spray test and conforming to Class 3 of AS3566, price inclusive all complete etc.	1410.00	SQM	0.0343686
1600	FALSE CEILING			

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ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
	False ceiling including all labour, material, equipment, transportation, handling, suspension system etc at any level as per specification, drawings and as directed by engineer - in - charge.			
1602	Providing, fixing and laying false ceiling constructed from 12 mm thick flat pre - laminated pressed teak wood particle board (MDF exterior grade) panels of size 600 mm x 600 mm with coloured anodised aluminum grid of 32 mm x 32 mm tees suspended from RCC slab/structural steel or catwalkway grid(if available) above with 4 mm (minimum) galvanised wires (rods) with special height adjustment clips, including preperation of working drawing, providing openings for AC ducts(if required), return air grills, light fixtures etc (but excluding the cost of catwalkway grid), 50 mm thick mineral wool insulation (conforming to IS : 8183) bound in ploythene bags shall be laid on top of panels,all complete as per drawings, specification and instructions of the engineer.. Additional hangers and height adjustment clips shall be provided for return air grills, light fixtures, Air conditioning ducts etc. Required MS channel shall be measured & paid extra under respective item unit rate.	60.00	SQM	0.0033496
1700	RAIN WATER DOWN TAKE PIPES			
	Rain water down take pipes including all labour, material, transportation, 2 coats of approved paint over one primary coat, fixtures, accessories etc at any level as per specification, drawings and as directed by engineer - in - charge.			
1702	Providing and fixing GI down take pipes of 100 mm dia-Medium quality as per IS:1239(part-I) / IS:3589 all complete.	25.00	RM	0.0004998
1705	Providing and fixing UPVC down take pipes of 110mm diameter- Class 3 as per IS:4985 all complete.	120.00	RM	0.0016148

CONTRACTOR/ TENDERER

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
1800	MISCELLANEOUS WORKS			
	Miscellaneous works including all labour, material, equipment etc. at any level unless otherwise specified as per specification, drawings and as directed by engineer - in - charge.			
1801	Providing and Filling in trenches, plinths, area paving and other underground structures with graded stone aggregate of size range 63 mm to 45 mm in layers not exceeding 230 mm in thickness including breaking of stone boulders to required sizes, filling the interstices with selected sand and compacting to 85% of original volume of stone stack for all lifts etc. all complete. Payment shall be made for the measurement of the volume of the compacted fill.	404.00	CUM	0.0205570
1805	Providing 50mm thick premix carpet surfacing laid to slope in two layers 30mm and 20mm respectively with 12mm downgraded stone chips mixed with 80/100 grade bitumen @ 52 Kg/Cu.M including compaction etc. all complete.	20.00	SQM	0.0002689
1806	Providing 50mm thick anti corrosive layer laid to required slope consisting of clean & well graded coarse sand mixed with A90 grade bitumen for softening point upto 45 degree Celcius or A65 grade bitumen for softening point above 45 degree celcius as per IS: 73 or its equivalent quality 8 to 10% by volume and rolled or compacted all complete.	20.00	SQM	0.0003236
1809	Providing Chemical injection grouting with pressure pump for water retaining concrete structures conforming to IS:6494, including fixing nozzles, cost of approved cement, admixture, curing etc. all complete . Payment shall be made as per the consumption of chemical grout.	10.00	Kg	0.0004570

CONTRACTOR/ TENDERER

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
1810	Providing, laying and fixing rails and guide rails in concrete for transformer, rail track including cutting of rails, joining of rails, anchoring lugs etc all complete.	0.50	MT	0.0010282
1811	Providing and fixing weep holes in Drains consisting of 100 mm dia HDPE pipe sleeves with single side covering for the pipe mouth with galvanised welded wire fabric of 20 mm sq. opening covered with 40 mm downgraded aggregates in 300 X 300 mm sq. and 300 mm deep size all complete.	5.00	EACH	0.0000259
1812	Laying of earthing mats/rods including risers, transportation from yard stores, loading, unloading, cutting to length, welding, protective painting of joints etc. all complete. (Excavation & Back filling shall be paid separately under respective item of earth work. Earthing mats/rods shall be supplied by BHEL free of cost)	0.10	MT	0.0000255
1815	Providing and fixing GI rungs in concrete/brick walls having zinc coating of minimum 900 g/sqm etc. all complete.	100.00	Kg	0.0002401
1825	Supply and laying approved quality Stone aggregate 40mm size in transformer yards.	25.00	CUM	0.0018331
1831	Sprinkling of water by water tanker fitted with perforated GI pipe (portable tanker minimum 3000 litre capacity) for roads and miscellaneous area within plant boundary, for dust suppression and reduction of suspended material at site for day to day work, as directed by BHEL site engineer (water for this purpose shall be provided by BHEL free of cost and utilisation of machine will be in terms of Tank-hour put in actual use for water sprinkling).	10.00	TANK-HR	0.0002285
2000	FENCING AND GATES			

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ACCEPTING OFFICER

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
	Fencing and gates including all labour, material, equipment etc at any level as per specification, drawings and as directed by engineer - in - charge.			
2001	Supplying and erecting in position 2.4 m high PVC coated galvanized chain linked fencing of minimum 8 gauge (including PVC coating) of mesh size 75mm x 75mm with 600mm high HTSW (High Tensile Serrated galvanized wire) concertina at top with clips, security nut & bolts etc. all complete as per specification, drawing & instructions of engineer in charge . The diameter of the hot dip galvanized steel wire for chain link fencing excluding PVC coating shall not be less than 12 gauge. The PVC coated chain link will be stretched by the clips at 0.5m intervals to three strands of galvanized high tensile spring steel wire (HTSSW) of 12G interwoven chain link wire mesh and kept under tension which in turn is attached to the fence post with security nuts and bolts. On every fourth post a clamping strip will be threaded through the links of chain links and bolted to the fence post with the help of security nuts and bolts. Cost of clips, security nut & bolts, rings & post etc. are included in this item. (Precast RCC post shall be paid separately). Cost of concertina & its HTSSW strands shall be paid separately.	30.00	RM	0.0014835

CONTRACTOR/ TENDERER

ACCEPTING OFFICER

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
2002	Supplying and fixing 600mm high concertina on top of chain link fencing including three strands of galvanized high tensile spring steel wire(HTSSW), clips, anchors, accessories etc. all complete. Concertina shall be from tensile serrated galvanized wire (HTSW) made with wire diameter of 2.5 mm which will be stretched to 6m and attached on two strands of galvanized HTSSW (high tensile spring steel wire) of 2.5mm dia by means of clips at 1m intervals. These two HTSSW strands will be attached to the fence posts/angles with 12mm security fasteners. This item includes cost of all fasteners and accessories required for fixing of concertina to posts, HTSSW wires etc. all complete. Cost of chain link fencing is not included in this item.	30.00	RM	0.0002443
2003	Supply, fabrication and installing in position and testing galvanised MS Gates out of channels, joists, angles, flats, plates, pipes, welded steel wire mesh & sheets including stiffners, bracings, fabricated hinges, MS Aldrops with locking arrangement, tempered steel pivot, guide track of MS Tee, bronze aluminium ball bearing arrangements, castor wheels, paintings etc. all complete. (Galanization shall be paid seperately in 2302)	1.50	MT	0.0034372
2300	STRUCTURAL STEEL			
	Structural steel works including all labour, material, equipments, transportation, handling etc. at any level as per specification, drawings and as directed by engineer - in - charge.			

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
2301	Supply, fabrication and erection of structural steel with mild steel rolled section / built up section / combination of both conforming to IS:2062, pipes conforming to IS:1161/ IS:1239, chequered plate conforming to IS: 3052, mild steel rounds, monorails, stays, safety chains, ladders, MS grating etc. in columns, beams, gantry girders, bunkers, silos, hoppers, roof trusses, portals, laced purlins, space frames, hangers, struts, monorails, galleries, stiffeners, wall beams, sheeting runners, brackets, stub columns, bracings, cleats, trestles, base plates, splice plates, chequered plate flooring, decking and seal plates, steel frame grid over false ceiling, walkway platforms, ladders, stairs, stringers, treads, landings, hand-rails etc, connection design & preparation of fabrication drgs, collection of steel from stores, fabrication, straightening, cutting, bending, rolling, grinding, machining, drilling, welding, electrodes and other consumables, alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, edge preparation, preheating (min preheat and interpass temperature of 20o C for welding over 20 mm and upto 40 mm & 66o C for welding over 40 mm and upto 63 mm & 110o C for thickness over 63 mm & use of low hydrogen/ radiogenic electrodes), post heating, testing of welders, inspection of welds, visual inspection, non destructive and special testing, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete. Including appointment of a seperate agency, approved by BHEL, for review and approval of fabrication	55.00	MT	0.1130101

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
2302	Extra over above ST NO. 2301 for finishing the STRUCTURAL STEEL/ grating units with blast cleaning of steel structures to near white metal surface(Sa 2 1/2) with hot dipped galvanisation @ 610 gm/sqm over blast cleaned steel surfaces all complete.	56.00	MT	0.0389288
2303	Extra over ST NO. 2301 for manual cleaning of steel structures and applying Primer Coat of Chlorinated Rubber based Zinc Phosphate Primer of Minimum 50 Micron Dry Film Thickness (DFT) including touch-up painting etc all complete.	2.00	MT	0.0001575
2311	Providing and fixing in positing of high strength structural bolts (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	1.50	Quintal	0.0003812
2320A	Supply, fabrication and fixing of Galvanized MS Pipe @610gsm/GI hand railing of 32mm/40mm dia (Medium Grade) as per IS: 1161 including transportation, loading/ unloading, painting etc. all complete..	1.25	MT	0.0043681
2400	ROAD WORKS			
	Providing Road Work including necessary material, labour, machinery, transportation etc as per specification, drawing, relevant IRC & IS codes and as directed by the Engineer-in-charge for the following.			
2401	Preparation of sub grade by excavating earth to required depth for all types of soil/ rock, dressing to camber and consolidating the base including making good the undulation etc and disposal of surplus earth within a lead upto 1 km etc. all complete.	10.00	CUM	0.0000146

CONTRACTOR/ TENDERER

ACCEPTING OFFICER

Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
2402	Supplying and filling with selected good earth of approved quality in layers not exceeding 300 mm loose thickness using borrowed soil (borrowed soil to be arranged by the bidder) and compacted so as to achieve at least 95 % maximum dry density as per IS-2720 (Part-VII) including royalty/seignorage fee (if any), sorting, spreading, breaking clods, watering, ramming/compaction by manual/mechanical means, dressing, finishing to required lines, grades and slopes, tesing etc all complete.	30.00	CUM	0.0002230
2403	Providing, stacking & laying granular morrum for shoulder including watering, compaction with road roller to required camber etc all complete.	30.00	CUM	0.0006173
2404	Providing & laying water bound macadam sub base course in layers of required thickness with crushed stone aggregates 90 to 45 mm down size, stone screening & blinding material including screening, sorting, spreading to template & consolidation with road roller including carriage, spreading & consolidation of blinding material moorum etc all complete.	10.00	CUM	0.0005476
2405	Providing & laying water bound macadam sub base course in layers of required thickness with stone aggregate 63mm to 45mm size, stone screening and blinding material including screening sorting, spreading to template and consolidation with road roller including carriage, spreading and consolidation of blinding material moorum etc all complete.	10.00	CUM	0.0004284
2406	Providing & laying water bound macadam base course in layers of required thickness with stone aggregate 53mm to 22.4mm size, stone screening and blinding material including screening sorting, spreading to template and consolidation with road roller including carriage, spreading and consolidation of blinding material moorum etc all complete.	10.00	CUM	0.0005655

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount
2409	Providing, mixing & laying of dense bituminous macadam course of 75mm compacted thickness using bitumen of grade 60/70 conforming to IS 73, aggregates and binder material confirming to Grade-I of MORT-H & specification including hot mixing, hot laying, rolling etc all complete as per specification.	10.00	SQM	0.0001798
2410	Providing 25mm thick premix carpet surfacing laid to slope with 12mm downgraded stone chips mixed with 80/100 grade bitumen @ 52 Kg/Cu.M including compaction etc. all complete.	50.00	SQM	0.0002649
2411	Providing and applying 5mm thk mixed seal coat with bitumen comprising of an application of a layer of bituminous binder using medium setting grade bitumen at the rate of 9.8kg/10sqm followed by a cover of medium coarse sand at the rate of 0.06 cum/10sqm including rolling etc all complete as per specification.	50.00	SQM	0.0001283
2412	Supplying and laying 230mm wide x115mm deep x75mm long precast concrete block(kerb stone) of grade M-25 with 20 mm nominal size stone aggregate and of shape as per detailed drawing including fixing with cement mortar (1:2) in 13mm thick joints, finishing of joints with neat cement paste, making drainage opening where required etc all complete.	30.00	RM	0.0000427
	Total Weightage			1.00

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Civil works for M/s NTECL, Vallur for providing Ultra Filtration Plant of 56.7 MLD capacity for 3 x 500 MW Thermal Power Plant, Chennai				
ST. NO	Description of Item	Quantity	Unit	Weightage for amount of each item (Nearest to the 7 decimal points) w.r.t the total amount

Special Conditions:

- 1 Items of works other than those mentioned in Bill of Quantities will have to be carried out at the rates to be fixed by this organisation in line with General Conditions of Contract (GCC).
- 2 Few of the above items may / may not be operated. The tenderer / Contractor shall have no claims in this regard.
- 3 Safety precautions should be taken while doing the work. You will have to follow all safety requirements to carry out the work inside the factory premises.
- 4 TAXES & DUTIES:
 - a) The tenderer shall have been registered under Excise, Sales, VAT, Service Tax regulations if applicable and provide a copy of such registration to BHEL as part of the tender document.
 - b) Goods and Services Tax (GST) shall be paid by the tenderer as per GST rules. And the same will be reimbursed by BHEL as applicable as per rules.
 - c) If due to difficiency in the document submitted, BHEL could not avail CENVAT, VAT Credit, the credit amount will be recovered from the amount due to the contractor.
 - d) If payment of statutory dues are not made in accordance with the applicable provisions of the relevant Act within the time specified and Penalty, interests etc., paid / payable by the contractor, the same shall not be reimbursed by BHEL and the entire implication is only to be born by the contractor. The tenderer shall clearly indicate the rate of applicable taxes and duties for the work to be executed.
 - e) The quote submitted shall include all taxes and duties of whatsoever in nature but exclusive of GST, which shall be quoted seperately as applicable. After tender opening addition of any taxes and duties are not admissible.
- 5 The tenderer / contractor has to make their own arrangement for required water, compressed air etc. No extra claim shall be entertained on this account.
- 6 All materials shall confirm to the latest IS / IRC specifications and BHEL/NTECL specifications wherever specified.
- 7 Once the work is completed the contractor should remove all the unwanted materials from the site time to time and it should be disposed off as per the instructions of Engineer - in - charge without any delay.
- 8 Time is the essence of the contract. Any delay beyond the delivery date will be subjected to Liquidated Damage as specified in our General Conditions of Contract (GCC).

CONTRACTOR/ TENDERER

ACCEPTING OFFICER