



LIC HFL
Care Homes Ltd.

Corporate Office : 1st Floor, East Wing, Industrial Assurance Building,
Opp. Churchgate Station, Mumbai – 400 020.

Tel.; 2287 5621 / 2287 5622 E-mail: carehomes@lichousing.com

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.



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PART - II



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e-Tendering Programme

System Tender No.....

Online bids are hereby invited for the works mentioned below through online e-Tendering System portal **<https://tenderwizard.com/LIC> from the intended contractors.**

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

Sr. No.	Name of Work	Estimated Cost	Earnest Money Deposit (EMD)	Processing Fee
1.	As mentioned above	4,39,68,327.00	Rs. 6,60,000.00	Rs.2,000.00

Possession of Digital Signature Certificate (DSC) and registration of the contractors on the portal i.e. **<http://tenderwizard.com/LIC>** is a prerequisite for participation in e-Tendering.

For Digital Certificate issuance you may please contact our Service provider M/s. Antares Systems Pvt. Ltd. **Help Desk Nos.: Hemamalini.S 08040482113 or contact by Email: hemamalini.s@antaressystems.com**

Last Dates of various activities by bidder:

- i) Downloading of Tenders Documents: From 10.01 Hrs. on 30.07.2016 upto 17.00 Hrs. on 16.08.2016.
- ii) Pre Bid Meeting Date & Time : at 11.00 Hrs. on 17.08.2016.
- iii) Tender Closing Date & Time : upto 15.00 Hrs. on 25.08.2016.
- iv) Manual Submission of EMD & Tender document fees: up to 15:00 Hrs. on 25.08.2016.
- v) Opening BID – I & BID – II : From 15.30 Hrs. on 25.08.2016.

For Registration and for further details on e-tendering , please visit the below website portal.

<http://tenderwizard.com/LIC>



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CONDITIONS OF E-TENDERING

These conditions will over-rule the conditions stated in the tender documents, wherever relevant and applicable.

1. Registration of contractors on E-tendering Portal:-

All the Contractors intending to participate in the tenders processed online are required to get registered on the Electronic Tendering System on the Portal <http://tenderwizard.com/LIC> more details, please see the information on the Registration info link on the home page.

2. Obtaining a Digital Certificate:

2.1 The Bids submitted online should be encrypted and signed electronically with a Digital Certificate to establish the identity of the bidder bidding online. These Digital Certificates are issued by the Controller of Certifying Authorities, Government of India.

2.2 A Digital Certificate is issued upon receipt of mandatory identity (i.e. Applicant's PAN Card) and Address proofs and verification form duly attested by the Notary Public / Chartered Account / Any Gazatted Officer whose stamp carrying emblem of Ashoka. Only upon the receipt of the required documents, a digital certificate can be issued.

2.3 The contractors may obtain Class-III digital certificate from any Certifying Authority or Sub-certifying Authority authorized by the Controller of Certifying Authorities or may obtain information and application format and documents required for the issue of digital certificate from:

M/s. Antares Systems Pvt. Ltd., E – tenderhelpdesk, # 24, Sudha Complex, 03rd Stage, 04th Block, Basaveshwaranagara, Bangalore – 560079.

Contact Persons:

1. Lokesh HR - 08040482140.
2. Sowmya – 08040482133.
3. Raghuprashanth BG – 08040482121.
3. Helpdesk (Mumbai) – Sanjay K. Chandak – 09665721619.

2.4 Bid for a particular tender may be submitted online using the digital certificate, which is used to encrypt the data and sign the hash during the stage of bid preparation & hash submission. In case, during the process of a particular tender, the user loses his digital certificate (be it due to virus attack, hardware problem, operating system or any other problem) he will not be able to submit the



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bid online. Hence, the users are advised to keep a back up of the certificate and also keep the copies at safe place under proper security (for it's use in case of emergencies).

2.5 If the digital certificate issued to the authorized user of a firm is used for signing and submitting a bid, it will be considered equivalent to a no-objection certificate/ power of attorney/ lawful authorization to that User. The firm has to authorize a specific individual through an authorization certificate signed by all partners to use the digital certificate as per Indian Information Technology Act 2000. Unless the certificates are revoked, it will be assumed to represent adequate authority of the user to bid on behalf of the agency for LIC HFL Care Homes Ltd. , Mumbai tenders as per Information Technology Act 2000. The digital signature of this authorized user will be binding on the firm.

2.6 In case of any change in the authorization, it shall be the responsibility of management/ partners of the firm to inform the certifying authority about the change and to obtain the digital signatures of the new person / user on behalf of the firm / company. The procedure for application of a digital certificate however will remain the same for the new user.

2.7 The same procedure holds true for the authorized users in a private/ public limited company. In this case, the authorization certificate will have to be signed by the directors of the company.

3 Set up of machine:

In order to operate on the electronic tender management system, the user's machine is required to be set up. The machine must have running XP service Pack 3 or higher version of Windows like Vista or Window 7. Also need to install Mozilla Fire fox web browser and latest Version of Java. This can also be downloaded from the portal <http://tenderwizard.com/LIC>

4 Online Viewing of Detailed Notice Inviting Tenders:

The contractors can view the detailed N.I.T and the time schedule (Key Dates) for all the tenders floated through the electronic tendering system on the Life Insurance Corporation of India, Patna e-tenders <http://tenderwizard.com/LIC>

5 Download of Tender Documents:

The tender documents can be downloaded from the Electronic Tendering System through the Portal <http://tenderwizard.com/LIC>

6 Key Dates: The contractors are strictly advised to follow dates and times as indicated in the Notice Inviting Tenders. The date and time will be binding on all contractors. All online activities are time tracked and the system enforces time locks that ensure that no activity or transaction can take



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place outside the start and end dates and the time of the stage as defined in the Notice Inviting Tenders.

7 Submission of bids will be preceded by submission of the digitally signed bid seal (Hash) as stated in the time schedule (Key Dates) of the Tender.

8 Generation of Super Hash:

After the submission of Bids (Hash) by the Contractors, the bidding round will be closed and a digitally signed Super Hash will be generated by the authorized officers of Life Insurance Corporation of India. This is equivalent to sealing the tender box.

9 Submission of actual online bids:

Contractors have to submit their encrypted bids online for which they generated the hash at the stage of hash generation & submission after the generation of Super Hash. The process is required to be completed within the date and time as stated in the Notice Inviting Tenders (Key Dates). The electronic bids of only those contractors who have submitted their bid seals (Hashes) within the stipulated time, as per the tender time schedule (Key Dates), will be accepted by the system. A contractor who does not submit his bid seal (Hash) within the stipulated time will not be allowed to submit his bid.

Note: - Bidders participating in e-tendering shall check the validity of his/ her Digital Signature Certificate before bidding in the Tenders floated online at e-tendering portal i.e. <http://tenderwizard.com/LIC>

10.No alterations or additions are to be made by the tenderer to the text or the Schedule of these tender papers. Any tender which proposes any alterations to any of the condition/s laid down or which proposes any other conditions of any description whatsoever is liable to be rejected.

11.The tenderer is required to check the numbers of the pages and should any be found missing or in duplicate, or the figure or writing indistinct, he must inform the Employer/ Consultant / Issuing Officer at once and have the same rectified. Should the tenderer be in doubt about the precise meaning of any item or figure, for any reason whatsoever, he must inform Employer/ Consultant in order that the correct meaning may be decided upon before the date for the submission of the tender.

12.No liability whatsoever will be admitted nor claim allowed in respect of errors in the submitted tender due to missing / duplicate pages, indistinct writing or any other error in the tender documents which should have been rectified in the manner described above.



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13. Proforma of Articles of Agreement (Annexure – 'A') should not be filled in by the tenderer. While the contract shall be deemed to have come into existence on issue of letter of acceptance to the successful tenderer, formal agreement shall be signed thereafter with the successful tenderer on non-judicial stamp paper of requisite value as per the proforma of Articles of Agreement. Tenders containing errors are liable to be considered non-bonafide at the discretion of the Employer.

14. Tenderer should note that tender should remain open for consideration for a minimum period of THREE MONTHS from the date fixed for the receipt of tenders.

15. The LIC HFL Care Homes Ltd. , Mumbai reserves the right to accept any tender or to accept tenders in part; to reject any or all tenders without assigning reasons thereof.

Employer



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INSTRUCTIONS IN REGARD TO SUBMISSION OF TENDERS

NOTE : Tenderer should note that non-compliance of the following instructions will render the tender liable for rejection.

1. Address to which the envelope containing EMD in the form of DD of requisite amount is to be submitted:

The Dy. Chief Engineer, Life Insurance Corporation of India, Jeevan Praksh Building, Engg. Deptt. , 1st Floor, Unit – VII , Suryanagar, Bhubaneswar – 751001. The envelope should be superscripted as **"EMD FOR LIC HFL CARE HOMES PROJECT ALLIED WORKS AT BHUBANESWAR"**

2. **Uploading, Downloading and Submission of tenders will be as per the Key Dates mentioned in the Tender Notice.**
3. Tenderer should fill in all the relevant information in prescribed templates/forms and put his **Digital signature** on the relevant places as required in the e-Tendering System.
4. The schedule of quantities should be filled as per the instructions and format given in this tender inserting offer of percentage above / below / at par only on the schedule rates.
5. No liability whatsoever will be admitted nor claim allowed in respect of errors in the submitted tender due to missing / duplicate uploaded documents.
6. Proforma of Articles of Agreement (Annexure – 'A') should not be filled in by the tenderer. While the contract shall be deemed to have come into existence on issue of letter of acceptance to the successful tenderer, formal agreement shall be signed thereafter with the successful tenderer on non-judicial stamp paper of requisite value as per the proforma of Articles of Agreement.
7. Earnest Money for the tender will be accepted only in the form of "CROSSED DEMAND DRAFT" of any of the Nationalized Banks / Approved Scheduled Banks drawn in favour of **the "LIC HFL Care Homes Ltd. payable at Mumbai only,** and not in favour of any other Authority or location. A scanned copy of the draft may be submitted on the on-line portal.



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OR

50% amount i.e. Rs. 3,30,000.00 (Rupees three lacs and thirty thousand only) in the Form of Bank Guarantee of any Nationalised/Scheduled Bank & another 50% i.e Rs: 3,30,000.00 (Rupees three lacs and thirty thousand only) in the form of Demand Draft/Pay Order/Banker's Cheque in favour of " **LIC HFL Care Homes Ltd.**" payable at Mumbai.

8. The tender shall be accompanied by a certified true copy of Power of Attorney in favour of the signatory to the tender documents. If the tender is submitted on behalf of a firm, it must be signed either by all partners or person holding a valid power of attorney from all partners constituting the firm. The person signing the tender on behalf of another partner(s) or on behalf of a firm on Company shall attach with the Tender a proper Power of Attorney duly executed in his favour by such other person(s) or by all the partners in accordance with the Constitution of the Company / Articles of Association, stating that he has the authority to sign on behalf of such other person(s) of the firm or the Company as the case may be, in all matters pertaining to the contract including the Arbitration Clause. The certified true copy of Power of Attorney should be submitted in physical form in the EMD Envelope which needs be submitted manually. The tenderers have to submit the scanned copy of the same on the online portal.
9. **In addition to the EMD, the Contractor has to submit Rs 2,000.00 (Rupees two thousand only) as processing fee in the form of crossed DD of any of the Nationalised Banks / Approved Scheduled Banks drawn in favour of the "Life Insurance Corporation of India" payable at Bhubaneswar only which is non-refundable.**
10. The Contractor has to write the name of the firm on the backside of both the DDs.
11. Contractors are warned that Cash or Encashable Cheque, or Bank or Insurance Guarantee, or Fixed Deposit receipt in lieu of the aforementioned form of Earnest Money remittance will not be accepted.
12. Tenders containing errors are liable to be considered non-bonafide at the discretion of the Employer.
13. Tenderer should note that tender should remain open for consideration for a minimum period of THREE MONTHS from the date fixed for the receipt of tenders.



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14. The LIC HFL Care Homes Ltd. reserves the right to accept any tender or to accept tenders in part; to reject any or all tenders without assigning reasons thereof.
15. Specifications as applicable for the trades and as given elsewhere in the tender are applicable in toto except where otherwise mentioned in the following paras or in the wording of items. The rates quoted shall cover for complying with the same.
16. If on check there are differences between the rates/ Percentage given by the contractor in words and figures or in the amount worked out or no rate /amount quoted by him, the following shall be considered:
 - a. When there is a difference between the rates/ Percentage in figures and in words, the rates which correspond to the amounts worked out by the contractor, shall be taken as correct.
 - b. When the rate quoted by the contractor in figures and in words tallied but the amount is not worked out correctly, the rate quoted by the contractor shall be taken as correct and not the amount.



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LETTER TO CONTRACTOR FROM DIRECTOR AND CHIEF EXECUTIVE OF LIC HFL CARE HOMES LTD.

To,

Dear Sir / Sirs,

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

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1) We hereby publish the TENDER on eTendering Portal (Website) through <httpshttp://tenderwizard.com/LIC> in **Electronic Mode** hereinafter referred as “eTendering” and TENDER will be hereinafter called as “eTender”. The eTender published online through above portal (website) consisting of standard tender conditions, specifications, Schedule of Quantities, drawings (if any) for above referred work. Please note that copy of above eTender can be downloaded from above portal (website) and should be mandatorily submitted in **Online Electronic Mode** hereinafter referred as “Online Offer”. The submission of Online offer duly Encrypted & Digitally Signed on above portal should be in prescribed Electronic Forms (Online) available on above portal for respective tender in Online Envelope(s) on or before **As per the Key Dates mentioned in the Tender Notice in this document and online portal for above tender.**

2) The drawings for the work will be available for inspection at the following Office:

Chief Engineer, LIC of India, East Central Zonal Office, **Engineering Department, Jeevan Deep Building, Exhibition Road, Patna – 800001 and its subsidiary office at Dy.Chief Engineer Office, LIC of India, Jeevan Prakash Building, Surya Nagar, Bhubaneswar -751001.**

3) The bidders should submit required Earnest Money Deposit (EMD) as mentioned in eTender in a



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Physical Envelope accompanied by **Earnest Money Deposit amount of Rs.6,60,000.00 (Rupees Six lacs and sixty thousand only)** in the form of crossed demand draft on a Nationalised Bank in favour of "**LIC HFL Care Homes Ltd.** " payable at Mumbai, will be received at the office of **Dy. Chief Engineer Office, LIC of India, Jeevan Prakash Building, Surya Nagar, Bhubaneswar - 751001 on or before As per the Key Dates** and the eTenders will be opened at **As per the Key Dates** in the presence of contractors or accredited representatives, who wish to attend the online Tender Opening process. The bidders can view the Tender Opening details through their respective Login IDs on the above mentioned eTender portal (Website). The Tenderer should ensure that their tender is received **Online Electronically** on or before the due date and time as specified in "**Key Dates**" in the Tender Document and above mentioned Portal (website). **Please note that above eTendering System is an automatically time locked system which will be locked immediately as soon as due date and time is over and will not accept any offer after that. So, the tenderers are strictly advised to do their process well before the due date and time to avoid any such instances.** The bidders should submit required Processing fees as mentioned in eTender in a Physical Envelope **of Rs 2000.00 (Rupees two thousand only)** in the form of crossed demand draft on a Nationalised Bank in favour of "**Life Insurance Corporation of India**" payable at Bhubaneswar, will be received at the office of Dy. Chief Engineer at above address **on or before As per the Key Dates**.

- 4) An annexure for Guidelines to Submit tenders on Electronic Tendering System (ETS) is attached in the Tender document. The tenderers are advised to carefully read the above document for understanding of eTendering System. The above Annexure will supersede all the terms & conditions mentioned for submission of tender in document.
- 5) The LIC HFL Care Homes Ltd. does not bind itself to accept the lowest or any tender without assigning any reason whatsoever.

Yours faithfully,

EMPLOYER



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**LETTER FROM CONTRACTOR TO EMPLOYER (DIRECTOR AND CHIEF EXECUTIVE OF
LIC HFL CARE HOMES LTD.)**

Date: _____

To,
The Director and Chief Executive
LIC HFL Care Homes Ltd.
1st Floor, East Wing, Industrial Assurance Building
Opposite to Church Gate Station
Mumbai – 400 020.

Dear Sir,

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

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1. Having examined in details, the tender documents relating to the above works and having visited and inspected the site of the proposed works and having acquired the requisite information relating thereto as affecting the tender invited by you on behalf of the LIC HFL Care Homes Ltd. , I/We, the undersigned hereby offer to execute and maintain the proposed works on **Item Rate Basis** in strict accordance with the contract conditions and specifications for the sum or such other sums as may be ascertained in accordance with the said conditions.
2. I/We, undertake to complete and deliver the whole of the works within a period as specified in Appendix to the Conditions of Contract from the date of issue of an intimation from you that the tender has been accepted and upon receiving possession of the site. I/We, shall be under the obligation to pay the sum as stated in the Appendix to the Conditions of Contract for every day that the works shall remain incomplete, damages as compensation subject to the Conditions of Contract relating to extension of time.
3. I/We have already submitted the Earnest Money Deposit in physical form . I/We, attach herewith scanned copy of **Earnest Money Remittance of Rs.6,60,000.00 (Rupees Six lacs and sixty thousand only)** in the form of CROSSED DEMAND DRAFT in favour of "**LIC HFL Care Homes Ltd.** " payable at Mumbai. I/We, hereby agree that this sum shall be forfeited by the "**LIC HFL Care Homes Ltd.** ", in the event of my/our tender being accepted and I/We, fail to execute the Contract when called upon to do so. I/We, note that **EARNEST MONEY REMITTANCE IN FORM OTHER THAN CROSSED DEMAND DRAFT ON A NATIONALISED BANK AT MUMBAI SHALL NOT BE ACCEPTED.**



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4. I/ We also attach scanned copy of DD for processing fee of **Rs.2,000.00 (Rupees two thousand only)** which has also been submitted in physical form as per instruction alongwith the EMD.

5. In the event of the tender being accepted:

I/We, agree to the retention of my/our EMD as a part of Security Deposit and the balance amount of Security Deposit to be recovered at 7.5% of Gross Value of work done from my / our Running Account Bills till the sum along with the sum already deposited as EMD equals the total security deposit.

OR

I/We, agree to furnish a lump sum Security Deposit amounting to 5% of estimated tender amount in the form of Bank guarantee from any Nationalized Bank or other approved Bank located at **Mumbai** as per specimen given in Annexure "B" to Conditions of Contract, within 21 (twenty one) days of intimation of acceptance of tender, which shall remain in-force till the Defects Liability Period with claim period of further six months.

OR

I/We, agree to furnish a lump sum Security Deposit amounting to 5% of estimated tender amount in the form of two Bank guarantees of like amount from any Nationalized Bank or other approved Bank located at Mumbai as per specimen given in Annexure "B" to Conditions of Contract, within 21 (twenty one) days of intimation of acceptance of tender, one shall remain in-force till the period of virtual completion of the work and the second shall remain in-force till the Defect Liability Period, with claim period of six months for both the BG.

6. I/We, note that the Earnest Money Deposit of **Rs.6,60,000.00 (Rupees six lacs and sixty thousand only)** would be refunded to me/us.

a. On expiry of the validity of the tender or earlier at the discretion of Chief Engineer / Employer in case my/our tender is not accepted and

b. In case my/our tender is accepted, after I/We, furnish Bank Guarantee as mentioned above.

Yours faithfully,

(SIGNATURE OF THE CONTRACTOR)

Name and Seal

NAME OF THE PARTNER OF THE FIRM

OR

NAME OF THE PERSON HAVING POWER OF
ATTORNEY TO SIGN THE CONTRACT
(CERTIFIED TRUE COPY OF THE POWER
OF ATTORNEY SHOULD BE ATTACHED)

CONTRACTOR

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EMPLOYER



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APPENDIX TO CONDITIONS OF CONTRACT

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ESTIMATED COST	:	Rs. 4,39,68,327.00
PERIOD FOR COMPLETION	:	06 (Six) Months
EARNEST MONEY DEPOSIT	:	Rs.6,60,000.00
Tender Processing Fee (Non-refundable)	:	Rs. 2,000.00

Sl.No.	Clause No. of Conditions of Contract.	Description	Remarks
1	11	Minimum requirement of Technical staff ; Recovery for Non employment	a) Graduate Engineer Rs.40, 000.00 per month. b) Diploma Engineer Rs.25, 000.00 per month.
2	13	Date of commencement	1. Either 21 (twenty one) days from the date of acceptance letter issued to the contractor OR 2. The day on which contractor is instructed to take possession of the site, whichever is earlier.
3	13 & 26	Date of completion	06 (Six) months from the date of commencement
4	19	Liquidated damages	1.% of the contract sum subject to a maximum of 10% of accepted contract sum.
5	21	Period of final measurement	90 (ninety) days
6	22	Minimum value of work for interim certificate	Rs.75,00,000.00(Rupees seventy five lacs only)
7	22	Period of honouring interim certificate	20 (Twenty) days
8	22	Period of honouring final certificate	90 days
9	27	Defects Liability Period	Twelve (12) months after Virtual Completion of work



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Sl.No.	Clause Nos.	Description	Remarks
10	35	a) Security Deposit b) Performance Guarantee	a) Rs. 11,00,000.00 (Rupees Eleven lacs only) b) Rs. 21,99,000.00 (Rupees twenty one lacs and ninety nine thousand only)
11	35	Recovery of Security Deposit	In case of cash option, EMD of successful tenderer shall be retained as part of Security Deposit and balance of Security Deposit shall be recovered from R.A. Bills at 7.5% of Gross amount of bill. (If Security Deposit is paid in the form of Bank Guarantee, no recovery from R.A Bills shall be made and EMD shall be refunded after acceptance of Bank Guarantee). If the EMD is submitted in form of Bank Guarantee, then the Security Deposit should also be in the form of Bank Guarantee and if the contractor, having paid EMD in form of Bank Guarantee, wants to avail cash option for Security Deposit ,then he has to deposit 1% estimated cost in form of Demand Draft/Pay Order drawn in favour of LIC HFL Care Homes Ltd. payable at Mumbai within 21days of intimation to the contractor of acceptance of tender and balance Security Deposit shall be accumulated through deductions from Running Account Bills at 7.5% (maximum) of gross amount of bill.
12	17	Contractor's All Risk Policy inclusive of Third Party Liability	Not less than 7.5% of the accepted Tender Amount
13	17	Workman's Compensation Policy	As per requirement of prevalent Laws.
14	37	Interest on Lump sum Advance	10.00 % per annum(Simple Interest)



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APPENDIX TO GENERAL INSTRUCTIONS TO CONTRACTORS

CLAUSE NO. 2 :

NAME AND LOCATION OF THE PROPOSED WORK :

PROPOSED CONSTRUCTION OF LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT +9) NAMED AS A-1,A-2,A-3,A-4 AND ONE BLOCK OF BASEMENT +STILT + 3 (NAMED B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

SCOPE OF WORK :

- i) Supply, Installation, Testing and Commissioning of 200 KLD capacity of Sewage Treatment Plants.**
- ii) Supply, Installation, Testing and Commissioning of 125 KVA Diesel Driven Genset with acoustic enclosure etc.**
- iii) Supply, Installation, Testing and commissioning of Two Nos. 33/11 KV, 1.6 MVA, Power Transformer and Five Nos.11/0.4 KV, 500 KVA plinth mounted Sub Stations and other allied works.**
- iv) Supply, Installation, Testing and commissioning of Wet Risers for fire suppression system.**
- v) Infrastructure work of Rain water Harvesting structure – Recharge well–cum bore well including drainage system etc. complete.**



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ADDITIONAL CONDITIONS

1. PHOTOGRAPHS OF THE BUILDING

- 1.1 The contractor shall submit 3 sets of the prints with negatives of the photographs size 4" x 6" to LIC HFL Care Homes Ltd. on the following stages:
- The plot before the start of construction showing any localized depression, rock outcrop, if any and any other things which affects construction.
 - Excavated pits for foundation showing type of soil/rock.
 - Foundation work, reinforcement, concreting and curing. Columns (floor wise) reinforcements, shuttering, concreting and curing.
 - Shuttering and reinforcement details floor wise before laying of concrete. Photographs during concreting and after laying of concrete including curing.
 - Completion stage of masonry work before plastering.
 - External filling and compaction process.
 - Water proofing of terrace and testing. Toilet water proofing, testing of internal water supply line before concealing the same.
 - After plastering but before painting.
 - Completed building before handing over the building.
- The photographs can also be submitted in CD / DVD/Pen Drive in lieu of printed photographs.
- 1.2 One or more photographs shall be taken to have complete clear views of the project as directed by Consultant. The further stage of work shall proceed only on confirmation of such photographs (as mentioned above clause 1.1) seen by Consultant and a written site instructions obtained in this regard. The concerned Engineers shall also put up to the Employer the said stage wise photographs and confirmation conveyed to the contractor.
- 1.3 The quoted rates shall include for the same and no extra is payable to contractor on this account.

2. TESTING OF MATERIALS

During the progress of work, tests as prescribed below for various materials of construction shall be conducted as per the frequency noted in the table below. Contractor's attention is also drawn to Clause 9 of Conditions of Contract as well as Clause 9 of General Preambles to Schedule of Quantities.



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Following charts to be followed for the frequency of tests:

TABLE-A

Sl. No.	Materials	Test	Frequency
1.	Water	Chemicals & Physical properties for water	One test per source before commencement of work
2.	Sand (Fine Aggregates)	a) Slit content(field test) b) Gradation c) Bulking (Field test)	This is a routine test and should be carried out for sand for each consignment. Every 45 Cum or part thereof or whenever moisture content is doubtful.
3.	Stone (Coarse Aggregate)	a) Aggregate crushing value b) Gradation	One in beginning of stacking of materials thereafter for every change of source. Every consignment.
4.	Cement	a) Initial and final setting time b) Compressive strength	One in beginning of stacking of materials thereafter for every change of source. One test for 100 tones or part there of and for every change of brand of cement if the cement is used for structural work
5.	Steel	1. Tensile strength a) Ultimate tensile stress b) Yield stress c) % Elongation	One test per category for every consignment used in work.
6.	Brick	a) Water absorption b) Efflorescence c) Compressive strength	One test for every 200000 Nos. or part there of and for every change of brand (set of 5 bricks)
7.	Timber	a) Moisture content b) Specific gravity c) Species in sample of teak wood	One test for every 30cum or part thereof.
8.	Anodized coating of aluminum	Thickness of Anodic Coating.	One Test for material costing Rs.8.00 Lac or part thereof.
9.	Marble mosaic tiles	a) Wet Transverse Strength b) Water Absorption c) Abrasion Test	One test for every 1 lakh tiles or part thereof.



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Sl. No.	Materials	Test	Frequency
10.	Flush Door	End Immersion Knife Adhesion	Destructive test based on no. of shutter. 1-100 one test 101-200 two test 201-500 three test 500 & above four test
11.	Ceramic Tiles / Vitrified Tiles	Water absorption Crazing Test	One test for every 5000 nos. or part thereof.
12.	Marble	Moisture Absorption test	One test for every 800 sq.mt. or part thereof.
13.	Panel Door Shutter	a) Physical Test b) Glue Adhesion Test	One test from each lot. One test from each lot.
14.	Particle Board	a) Identification (Physical verification) b) Dimensional Tolerance	One test from each lot. One test from each lot.
15.	Sand Stone	Water Absorption	Frequency of test as specified by CPWD

- 3. The contractor shall obtain the NOC / Clearance certificate for all the works and shall carryout all that necessary to obtain the NOC / Clearance certificate from all concerned authorities such as BMC / BDA/ CESU/ Electrical Inspector/ Pollution Control Board / Ministry of Environment & Forest etc.. The quoted tender amount shall be inclusive of all expenses for obtaining the NOC / Clearance certificate and other allied works relating to obtaining Building occupancy/occupation certificate. However, any official fees required to be paid shall be borne by LIC HFL Care Homes Ltd.**
- 4. During construction of the work / building the entire premises shall be covered by protective measures to ensure pollution free atmosphere in the surrounding and inconvenience to general public should not be made by construction.**

(SIGNATURE OF THE CONTRACTOR)



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GENERAL PREAMBLES TO SCHEDULE OF QUANTITIES

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

These preambles apply to all the sections of the "Schedule of Quantities".

1. RATE TO COVER:

- 1.1 The rates quoted by the Contractor shall be held to include for providing and fixing, all conveyance and delivery, loading & unloading, carrying in, storing, hoisting, all labour, setting, fitting and fixing in position, making straight, cutting, waste, return of packing and all materials and labour and everything else necessary for the proper completion of each item of work to the approval of Consultant and for Establishment Charges, overheads and profits. The Contractor shall provide at his expense all labour, materials and things required by the Consultant for testing and measuring the work, for weighing, testing the efficiency of any portion of the work, all planking, gangways etc. necessary for affording access to every part of the work except where specifically stated otherwise.
- 1.2 The Contractor should also cover in his rates for the method of work, cost of materials, labour etc., to comply with the "Trade Specifications", General Instructions to Contractor", "Conditions of Contract", "Special Conditions", (if any), and all documents of this contract.
- 1.3 All the materials or procedure or Specifications for work, unless otherwise stated, shall conform to the current Indian Standard whether or not specific mention is made thereof. The Contractor shall be responsible for and shall replace or make good at his own expense, any materials lost or damaged, or of quality not approved, temporarily disturbed roads, pavements, approaches, gates, walls or any such dismantling carried out to execute the work.
- 1.4 All rates quoted shall include for Supplying and fixing although the same may not have been mentioned in the item of the Schedule of Quantities. Words "Providing and Fixing where used shall have same meaning as "Supplying and Fixing".



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- 1.5 **Rates quoted shall include for hoisting to any height, and the work at all levels and lift of materials shall not form any criterion for any extra claims, except where otherwise specified.**

2. ANCILLARY WORKS:

- 2.1 The Contractor shall have to carry out all ancillary and connected work within and near vicinity of the plot of the proposed work and inside the Building if ordered to do so by the Employer / Consultant at the rates quoted in the Schedule of Quantities, at any time during the currency of this Contract including extension of time, if any granted.

3. PRICE FLUCTUATION / VARIATION:

- 3.1 Rates quoted by the Contractor shall be firm throughout the currency of the Contract including extensions of time, if any granted. No price adjustment due to variation in cost of materials or labour or any variation under any State or Central Legislation or any other reason whatsoever shall be allowed, except as stated in relevant clauses below with regard to variation in price on materials & labour and price fluctuation in Cement & Steel.

**4. CEMENT:
CONTRACTOR'S QUOTED RATES:**

- 4.1 Contractor shall quote his rates for various relevant items in the tender on the basis of provisions of the clause detailed hereunder and on the basis of the price of Cement at site of work as mentioned in Annexure "P" attached herewith (hereinafter called the Basic Price of Cement).

APPROVAL OF SOURCE OF PURCHASE AND PRICE:

- 4.2 Contractor shall purchase cement from approved reputed cement manufacturers such as ACC, UltraTech, J. P. Rewa, Vikram, Shree Cement, Birla Jute, CCI, Madras cement, Chettinad cement, India cement etc. as approved by Ministry of Industry, Govt. of India and having license to use ISI Certification mark for their products and from C&F agents and authorized_dealers (with dealership certificate). Cement shall be Ordinary Portland Cement 33 / 43 Grade of fresh manufacture conforming to IS: 269/ IS: 8112 respectively; Portland Pozzolana Cement: IS: 1489 (Part 2): 1991; Portland Slag Cement: IS: 455 (1989) or relevant Indian Standards (latest revision). Cement shall be purchased and transported to the work site by the contractor in bulk quantity required to achieve desired progress in next 3 months, from the above source of purchase (including brand of cement). At the time of starting the work, the request for approval shall be submitted within 15 days of receipt of tender acceptance letter. The contractor shall



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intimate the Consultant the quantity of cement being procured, with the names, full addresses and telephone numbers of cement suppliers. For subsequent approvals the contractors shall approach Consultant at site at least 20 days in advance of the desired date of delivery of cement. The contractor shall submit his request for the approval through Consultant. The contractor's request letter shall mention the quantity of cement to be/ being purchased and also the quantity of cement in stock at site on the date of submitting the request.

BASIC PRICE OF CEMENT:

- 4.3 The Basic price of cement stated in Annexure "P" is inclusive of all costs upto the site of work, including purchase price, all levies and duties including excise duty, sales tax, octroi / town duty, transportation charges including loading and unloading charges at all points (except unloading at site), transit insurance but does not include any incidental expenses incurred by the Contractor for arranging to take delivery, transportation or payment of octroi charges etc. which shall be solely to the account of the Contractor and shall be included by the Contractor in his quoted rates. All other costs such as unloading the cement at site, handling, stacking, storing, providing watch and ward arrangements, loss due to pilferage, theft, damages if any including Cement which has become unfit for consumption due to prolonged or improper storage or due to rains etc. shall be to Contractor's account.

QUALITY OF CEMENT:

- 4.4 The contractor shall satisfy himself that the cement arriving at site is ordinary port-land cement conforming to the requirement of IS: 269/8112 for 33 / 43 Grade respectively; Portland Pozzolana Cement: IS: 1489 (Part 2); Portland Slag Cement: IS: 455 (1989) or relevant Indian Standard and shall procure Manufacturer's Certificate to this effect. In case the contractor has any doubt regarding the quality of cement, it is up to him to have it tested at his own cost and make sure before incorporation in the works that the cement is of right quality. Each consignment of cement supplied should have Test Certificate of the Manufacturer.

PAYMENT DUE TO VARIATION ON PRICE OF CEMENT

- 4.5 If after submission of the tender, the price of Cement specified in Annexure "P" increases/ decreases beyond the price(s) prevailing at the time of the last stipulated date for receipt of tenders including Tender opening extensions, if any for the work, then the variation in amount shall accordingly be paid and that any such variations shall be effected only for stipulated period of Contract including the justified contract period extended without imposition of liquidated clauses.



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However for work done/during the justified period extended as above, it will be limited to indices prevailing at the time of stipulated date of completion or as prevailing for the period under consideration, whichever is less. In case of extension granted with imposition of liquidated damage, no price variation shall be allowed during extended period but recovery due to price variation shall be effected.

The increase/decrease in prices of cement, shall be determined by the Price indices as published by Economic Advisor to Government of India, Ministry of Commerce and Industry and base price for cement, as indicated in Annexure 'P' as valid on the last stipulated date of receipt of tender, including extension if any and for the period under consideration.

The amount will be worked out as per the formula given below for individual material:-

Adjustment for component of cement.

$$V = P \times Q \times \frac{CI - CI_o}{CI_o}$$

Where,

V = Variation in Cement cost i.e. increase or decrease in the amount to be paid or recovered.

P = Base Price of cement as indicated in Annexure 'P' valid at the time of the last stipulated date of receipt of tender including extensions, if any.

Q = Quantity of Cement consumed in the works since previous bill.

CI_o = All India Whole Sale Price index for cement, as issued by Office of the Economic Advisor, Dept. of Industrial Policy & Promotion under Ministry of Commerce and Industry, Government of India as valid on the last stipulated date of receipt of tenders including extensions, if any.

CI = All India Whole Sale Price index for cement, as issued by Office of the Economic Advisor, Dept. of Industrial Policy & Promotion under Ministry of Commerce and Industry, Government of India for period under consideration.

CONTRACTOR'S OTHER RESPONSIBILITIES / LIABILITIES:

4.6 (i) Contractor shall comply with all requirements/procedures etc. that may be stipulated if any, by Government /controlling authority from time to time and accordingly obtain the requisite supply of cement for the work.

(ii) Even though the source of cement is approved by the employer but the employer shall not be responsible for quality of cement or any loss/ damage in transit, delays due to non-



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availability of cement with the factory / C&F agents /authorized dealers and/or required transport etc. The contractor shall not be entitled to make any claim and Extension of time or Cost on the employer on such grounds.

(iii) Cement shall be kept in custody of the contractor at site. The contractor shall be responsible for the safety of the cement by providing watch and ward as is necessary and directed. In case any cement is damaged, unaccounted for or lost due to pilferage or any other reason either in transit or at site, the accountability will be with contractor. If any quantity of cement is found in excess of requirement or left over after completion of the work, same shall not be removed from site without the written permission of the Consultant.

(iv) The contractor shall maintain a stock register at the site and shall record therein the receipt and consumption of cement, the same day it is received or consumed. He shall also get the entries in the register for receipt and consumption of cement countersigned by Consultant , on the same day cement is received or consumed.

(v) Pozzolana/ Slag cement shall be used only if specifically permitted by the Consultant. The Consultant reserves the right not to allow the use of Pozzolana/ Slag cement. In case Pozzolana / Slag cement is used, the Contractor shall have to observe increased periods for striking form and additional period of one week for curing for which no claim shall be entertained.

(vi) The cement shall be got tested by the Consultant as and when new consignment comes and there is change in manufacturer's brand. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laboratories. The cost of tests shall be borne by the contractor/Department in the manner indicated below:-

- (a) By the contractor, if the results show that the cement does not conform to relevant BIS codes.
- (b) By the Department, if the results show that the cement conforms to relevant BIS codes.

(vii) The contractor is allowed to use reasonable quantity from the cement brought at site for constructing temporary water storage tank to store water for construction, site office and godowns at site. The quantity used for this purpose shall not be account for payment due to price variation defined elsewhere.



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(viii) The actual issue and consumption of cement on work shall be regulated and proper accounts maintained. The theoretical consumption of cement shall be worked out as per procedure prescribed elsewhere in the contract. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment shall be made.

(ix) If the work executed is not conforming to acceptable standard as prescribed in the tender elsewhere, the work will not be considered for payment.

The damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Consultant. If he does not do so within 3 days of receipt of such notice, the Consultant shall get it removed at the cost of the contractor.

Employer / Consultant may change the brand of Cement depending upon availability in local market, if needed. Instructions in this respect can be issued by them at regular intervals. The name of manufacturers should be finalized after taking into consideration the suggestions of contractors during pre bid meeting, if any.

Similar conditions for cement of other types like slag cement etc. may be incorporated wherever required by the authority by providing for relevant BIS Codes, suitable brands of cement and instructions issued by the department.

5. MILD STEEL BARS AND HIGH STRENGTH DEFORMED BARS FOR REINFORCEMENT IN R.C.C. WORK TO BE SUPPLIED BY CONTRACTOR:

CONTRACTOR'S QUOTED RATES:

- 5.1 Contractor shall quote his rates for relevant items in the tender on the basis of provisions of this clause detailed hereunder and on the basis of price of steel at site of work as mentioned in Annexure "P" attached herewith (hereinafter called the Basic Price of Steel).



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APPROVAL OF SOURCE AND PRICE OF PURCHASE:

- (1) **The contractor shall procure TMT bars of Fe415/ Fe500 grade (the grade to be procured is to be specified) from primary producers such as SAIL or TISCO or RINL as approved by Ministry of Steel.** The TMT bars procured from primary producers shall conform to manufacturer's specifications. In case of non-availability of steel from primary producers, the approving authority may permit use of TMT reinforcement bars procured from secondary producers. In such cases following action is to be followed:
 - (a) The grade of the steel such as Fe415/Fe500 or other grade to be procured is to be specified as per BIS 1786 /2008.
 - (b) The secondary producers must have valid BIS license to produce HSD bars conforming to IS 1786: 2008. In addition to BIS license, the secondary producer must have valid license from either of the firms Tempcore, Thermex, Evcon Turbo & Turbo Quench to produce TMT Bars.
 - (c) The TMT bars procured from primary producers shall conform to manufacture's specifications.
 - (d) The TMT bars procured from secondary producers shall conform to the specifications as laid by Tempcore, Thermex, Evcon Turbo & Turbo Quench as the case may be.
 - (e) TMT bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 2008/2012 pertaining to Fe415D or Fe 500D grade of steel as specified in the tender (while preparing Tender the grade of the steel to be specified).
- (2) The contractor shall have to obtain and furnish test certificates to the Consultant in respect of all supplies of steel brought by him to the site of work.
- (3) Samples shall also be taken and got tested by the Consultant as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications as defined under para (1)(d) & (1)(e) above, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the Consultant to do so.
- (4) **The steel reinforcement bars shall be brought to the site in bulk supply required to achieve desired progress of the work in next 3 months, from the above source of purchase (including brand of steel) as decided by the Consultant. At the time of starting the work, the request for approval shall be submitted within 15 days of receipt of tender acceptance letter. The contractor shall intimate the Consultant the quantity of steel being procured, with the names, full addresses, and telephone numbers of steel suppliers. For subsequent approvals the contractors shall approach Employer's Engineer at site at least 20 days in advance of the desired date of delivery of steel. The contractor shall submit his request for the approval through Consultant**



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at site with one copy of the letter to Consultant. The contractor's request letter shall mention the quantity of steel to be/ being purchased and also the quantity of steel in stock at site on the date of submitting the request.

- (5) The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent their distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.
- (6) For checking nominal mass, tensile strength, bend test, re-bend test etc. specimens of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified in the tender.

BASIC PRICE OF STEEL:

- 5.3 The Basic Price of Steel stated in Annexure "P" is inclusive of all costs upto the site of work, including purchase price, all levies and duties like excise duty, sales tax, octroi/town duty etc transportation charges inclusive of bending and binding charges, loading and unloading charges at all points (except unloading at the work site), weighing charges at the weigh bridge, transit insurance etc. Any other incidental expenses incurred by the Contractor for arranging to take delivery of steel, its transportation, Weighment or for making payments of octroi charges, etc. shall be to the account of Contractor and shall be included by him in quoted rates. All other costs such as wastage, variation in weights due to rolling margins, as per ISI practices, handling, stacking, storing, providing watch and ward arrangements, loss if any due to pilferage, thefts or any other reasons, shall also be to Contractor's account and shall be borne by him / included by him in rates quoted in tender.

BASIC PRICE OF STEEL:

- 5.3 The basic price of steel stated in Annexure 'P' is inclusive of all costs upto the site of work, including purchase price, all levies and duties including excise duty, sales tax, octroi / town duty, transportation charges including loading and unloading charges at all points (except unloading at site), transit insurance, and any other expenses (*expenditure*) not mentioned above but required etc. and shall be included by the contractor in his quoted rates. All other costs such as unloading the steel at site, handling, stacking, storage, providing watch and ward arrangements, loss due to pilferage, thefts or any other reasons shall also be to contractor's account and shall be included by the contractor in rates quoted in the tender.



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QUALITY OF STEEL:

- 5.4 The contractor shall satisfy himself that the steel arriving at site is TMT bars of Fe415/ Fe500 grade as per BIS 1786-2008/ 2012 or other grade bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 2008/ 2012 pertaining to Fe 415D or Fe 500D grade of steel as specified in the tender and shall be supported by test certificate from the suppliers. In case the contractor has any doubt regarding the quality of steel, it is up to him to have it tested at his own cost and make sure before incorporation in the works that the steel is of right quality. Each consignment of steel supplied should have Test Certificate of the Manufacturer.

CONTRACTOR'S OTHER RESPONSIBILITIES / LIABILITIES:

- (i) Contractor shall comply with all requirements/procedures etc. that may be stipulated if any, by Government /controlling authority from time to time and accordingly obtain the requisite supply of steel for the work.
- (ii) Even if the source of steel is approved by the employer, the employer shall not be responsible for quality of steel, correctness of diameter/ size or any loss /damage in transit, delays due to non-availability of steel with the manufacturer/suppliers and/or required transport etc. The contractor shall not be entitled to make any claim & Extension of Time or Cost on the employer on such grounds.
- (iii) The contractor shall be responsible for proper storing arrangement at site. Steel shall be kept in custody of the contractor at site. The contractor shall be responsible for the safety of the steel by providing watch and ward as is necessary and directed. In case any steel is damaged, unaccounted for or lost due to pilferage or any other reasons either in transit or at site, the accountability will be with contractor. If any quantity of steel is found in excess of requirement or left over after completion of the work, same shall not be removed from site without the written permission of the Consultant.
- (iv) The contractor shall maintain a stock register at the site and shall record therein the receipt and consumption of steel (category wise), the same day it is received or consumed. He shall also get the entries in the register for receipt and consumption of steel countersigned by Consultant, on the same day steel is received or consumed.
- (v) The wastage shall be to contractor's account and shall be taken away by the contractors after obtaining written permission from the Consultant and the rates quoted shall allow for the same.



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- (vi) The payment of steel reinforcement shall be made on weight worked out on the basis of measurement of lengths of various categories as incorporated in the work and sectional weights mentioned in tender.
- (vii) The contractor shall obtain a test certificate from the manufacturer for the lot of steel purchased for the work. The employer's Consultant may also order testing of steel when new consignment comes and / or there is change in manufacturer's brand, by the contractor before allowing its use in the work irrespective of the test certificate and in such case the contractor shall supply free of charge the steel required for testing including its transportation cost to testing laboratories. The cost of tests shall be borne by the contractor/Department in the manner indicated below but not any other incidental expenses for arranging the testing, which shall be to contractor's account and included in quoted rates:-
 - a. By the contractor, if the results show that the steel does not conform to relevant BIS codes.
 - b. By the Department, if the results show that the steel conforms to relevant BIS codes.
- (viii) The actual issue and consumption of steel on work shall be regulated and proper accounts maintained. The theoretical consumption of steel shall be worked out as per procedure prescribed elsewhere in the contract. In case the steel consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made. In case of excess consumption no adjustment shall be made.
- (ix) The substitution of any category of steel shown in drawing with any other category of steel shall be done only if permitted by the Consultant in writing.
- (x) The steel brought to site and the steel remaining unused shall not be removed from site without the written permission of the Consultant.
- (xi) 6.0 PAYMENT DUE TO VARIATION IN PRICE OF STEEL**
- (xii) If after submission of the tender, the price of Steel specified in Annexure "P" increases/ decreases beyond the price(s) prevailing at the time of the last stipulated date for receipt of tenders including Tender opening extensions, if any for the work, then the variation in amount shall accordingly be paid and that any such variations shall be effected only for stipulated period of Contract including the justified contract period extended without imposition of liquidated clauses.



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- (xiii) However, for work done/during the justified period extended as above, it will be limited to indices prevailing at the time of stipulated date of completion or as prevailing for the period under consideration, whichever is less. If the extension is granted with imposition of liquidated damage, no price variation shall be paid but recovery due to price variation shall be effected.
- (xiv) The increase/decrease in prices of steel, shall be determined by the Price indices as published by Economic Advisor to Government of India, Ministry of Steel and base price for steel, as indicated in Annexure 'P' as valid on the last stipulated date of receipt of tender, including extension if any and for the period under consideration.
- (xv) The amount will be worked out as per the formula given below for individual material:-
- (xvi) Adjustment for component of steel.
- (xvii)
$$V = P \times Q \times \frac{CI - CI_o}{CI_o}$$

Where,

V = Variation in Steel cost i.e. increase or decrease in the amount to be paid or recovered.
- (xviii) P = Base Price of steel as indicated in Annexure 'P' valid at the time of the last stipulated date of receipt of tender including extensions, if any.
- (xix) Q = Quantity of Steel consumed in the worksite i.e. as measured and recorded since previous bill. Wastage if any, to be on contractor's account.
- (xx) CI_o = All India Whole Sale Price index for steel, as issued by Office of the Economic Advisor, Dept. of Industrial Policy & Promotion under Ministry of Commerce and Industry, Government of India as valid on the last stipulated date of receipt of tenders including extensions, if any.
- (xxi) CI = All India Whole Sale Price index for steel, as issued by Office of the Economic Advisor, Dept. of Industrial Policy & Promotion under Ministry of Commerce and Industry, Government of India for period under consideration.

6. WASTAGE OF CEMENT AND STEEL:

- 6.1 The wastage of Cement and Steel shall be to the contractor's Account and the rates quoted shall allow for the same.



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7. BALANCE STOCK OF CEMENT / STEEL ON COMPLETION OF JOB:

- 7.1 Irrespective of what is mentioned anywhere else in this tender the surplus stock of Cement/Steel remaining at the site on completion of work, shall be the property of the Contractor. However, he shall remove the surplus stock only after furnishing the necessary details of such stock in writing to the Corporation's Engineer who shall give approval after satisfying himself that the amount advanced for the above stock has been fully recovered.

8. STEEL OTHER THAN USED FOR REINFORCEMENT:

- 8.1 Rolled steel sections such as angles, joists, channels, flats etc. and mild steel used for M.S. Grills, railing, gates and M.S. Plates etc., shall be procured by the Contractor and Annexure "P" will not apply for cost of these items.

9. TESTING OF MATERIALS INCLUDING CEMENT AND STEEL:

- 9.1 Testing of all materials including cement & steel during the progress of work shall be as per frequency given in Table A, clause 2 of Special Conditions.
- 9.2 Contractor shall facilitate testing of materials viz, cement, steel, cubes and any other material as per the frequency/sampling mentioned in Table-A, clause-2 of Special conditions. Contractor shall also facilitate testing of any material to be incorporated in work even if it is not specifically mentioned. The testing charge against invoice shall be directly remitted by the Corporation to the test house. If the material fails to conform to the Standards (BIS), the test charges shall be recovered from Contractor's bill.
- 9.3 For all other materials listed in Special conditions, expenses towards testing shall be borne by Employer. If the material fails to conform to the Standards (BIS), the test charge shall be recovered from Contractor's bill.
- 9.4 The Consultant may get tested any material to be incorporated in work even if it is not specifically mentioned. In all such cases, testing charges will be borne by Employer. **If the** material fails to conform to the Standards (BIS), the test charges shall be recovered from Contractor's bill.
- 9.5 For all tests, incidental charges such as cutting, loading, unloading, casting wherever applicable such as mortar briquettes/cubes and facilitating in transportation including materials required for testing shall be borne by the contractor.

Above stipulations (9.1, 9.2, 9.3, 9.4 and 9.5) supersede any other conditions /stipulations pertaining to testing of materials mentioned elsewhere in this tender.



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10. "PRINCIPAL MAKE/S OR OTHER EQUAL AND APPROVED" FOR MATERIALS / PRODUCTS:

- 10.1 The Contractor shall note that materials having "ISI" monogram shall primarily be used in the work. If in the tender "Certain Principal Make / Makes or other equal and approved of any material / Product is mentioned in any item or Trade Preambles relating to the particular items in its respective Trade Schedule, the Contractor shall have to use the Principal Make/Makes specified in the relevant item or the trade Preambles. In case the specified particular Principal make / makes of the materials product is/are not readily available, the Contractor shall take prior permission and approval of the Employer / Consultant in writing before use of the alternative equivalent make of the Material / Product.
- 10.2 All principal makes specified for any item shall be treated at par as per the accepted quoted rate.
- 10.3 Use of the make other than the Principal Make/Makes (which shall be treated as an Equivalent make) shall be at the discretion of the Employer / Consultant and such Make/Makes shall be used after the approval of the Employer / Consultant.
- 10.4 In such cases the Contractor will not be paid any extra payment over the accepted quoted rate in any case. However if it is ascertained that the price of approved Equivalent Make or the Material/product is lower than that for the Principal Make/Makes of the same material / product the difference of the price shall be payable by the contractor to Employer. Such difference of price shall be suitably decided by the Employer whose decision shall be final and binding to the Contractor in this regard.

11. ADJUSTMENT IN PRICES OF MATERIALS AND LABOUR (OTHER THAN CEMENT & STEEL):

- 11.1 Adjustment in price of material, labour shall apply to original civil work for construction of building which may include piling, plumbing & sanitary work, electrical installations and which shall have a stipulated completion period of more than six months. **The adjustment in prices under this clause shall not apply to works such as tube-well, lifts and substation equipment, interior work, repair & maintenance contracts etc. unless otherwise specified.**
- 11.2 Adjustment in prices of material & labour shall be allowed on the basis of clause-11.6 subject to the condition given below.
- 11.3 Adjustment shall be made only for tender items and deviated items for the stipulated contract period.
- 11.4 & 11.5 **In case of extension of time, the escalation is paid as follows:**



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- a) When there is authorized extension i.e. no imposition of Liquidated Damage, escalation may be paid for the extended period with prevailing index.
- b) Extension granted but with imposition of Liquidated damages:- The escalation may be paid by considering index as that prevailing on scheduled date of completion or that prevailing on the date of billing during the extended period of contract whichever is lower .
- c) Extension granted due to failure on the part of the contractor but due to reasons beyond his control – The Department has taken a lenient view for not imposing Liquidated Damages, no escalation shall be paid whatsoever after scheduled date of completion.

ADJUSTMENT OF MATERIALS

- 11.6 For the purpose of adjustment in price of materials, the component shall be 60% of the value of work done upto a given stage. While computing the adjustment, the cost of cement, steel or any other materials for which basic price has been stipulated in the tender shall be deducted from the component worked out at 60% of the value of work. The cement and steel as covered under Clauses 4 and 5 of the General Preambles to schedule of quantities shall be excluded from the purview of the adjustment.

$$Vm = \{60/100 (R_n - R_{n-1}) - C_m - M_{n-1} + M_n\} \times (W - W_0) / W_0,$$

Where,

V_m = Variation in price for materials i.e. increase or decrease in the amount in rupees to be paid or recovered.

R_n = Total value of work done (excluding prime cost items, extra items, and advance on materials at site upto the period under reckoning) on the basis of accepted tender rates. The deviated items worked out fully on the basis of rates prevailing at the time of last date of receipt of tender to be included.

C_m = Total value of cement and steel at basic price stipulated in the tender and shall comprise of C & S as explained below and any other material which basic price is mentioned:

C = Cost of cement used in the work and recorded for any specific bill period under reference and worked out at basic price stipulated in Annexure 'P' attached in the tender.

S = Cost of steel for reinforcement (covered under Clause 5.1 AND 5.2 of the General Preambles to schedule of quantities) used in the work and recorded for any specific bill period under reference and worked out at issue price / basic price stipulated in the tender.

R_{n-1} = Total value of work done (excluding prime cost items, extra items and advance on materials at site) considered in the bill prior to the period under reckoning. The deviated items and such other items shall be considered as per R_n above.



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Mn = Advance being allowed in the bill under consideration against materials at site (other than cement and steel)

Mn-1 = Advance allowed in the bill prior to the period under scrutiny against materials at site (other than cement and steel)

W₀ = All India Wholesale Price Index for all commodities (Base = 100; Year 2004-05) as prevailing on the last day for submission of tender (including extended date, if any).

W = Average All India Wholesale Price Index for all commodities Base = 100; year 2004-05; as published in the RBI Bulletin for the period of the bill under consideration viz. from the date of previous bill (date of commencement in case of first bill) to date of current bill (date of virtual completion in case of final bill or any earlier cut off date as fixed).

- 11.7 The adjustment on materials is worked out on the basis that material component in the building construction work is 60% of the value of work done, the rest being labour and profit. But in the initial stages of construction work, it might so happen that the cost of materials used exceeds 60% which is taken as an average and therefore adjustment gets worked out on negative side even though the economic index might have gone up. In such cases, the negative adjustment shall also have to be made in the bill.

ADJUSTMENT ON LABOUR:

- 11.8 The contractor shall pay wages to the skilled and unskilled labour not less than the rates prescribed under the minimum wages act and as stated in clause no.18 of the General Instructions to contractors for Builders' work. Variation in prices of labour shall be worked out by applying the following formula and necessary payment/ recovery made:

$$VL = 25 / 100 \times (R_n - R_{n-1}) \times (I - I_0) / I_0$$

VL = Variation in price for labour i.e. increase or decrease in the amount in rupees to be paid or recovered

I = Average All India Consumer Price Index for Industrial Workers (base 100 year – 2001) declared by Labour Bureau, Govt. of India, as published in Reserve Bank of India Bulletin during the period under reckoning.

Average All India Consumer Price Index for Industrial Workers for the period of the bill under consideration viz. from date of previous bill (date of commencement in case of first bill) to date of current bill (date of virtual completion in case of final bill or any earlier cut off date as fixed)

I₀ = All India Consumer Price Index for Industrial workers (base 100-year 2001) ruling on the last date of submission of tender (including extended date, if any)

R_n = As defined under 11.6 above



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Rn-1 = As defined under 11.6 above.

- 11.9 If the last date for submission of tender / date of bill is between 1st to 15th of a particular month the relevant economic index (W, W₀, I, I₀) for the previous month is to be considered. However, if the last date of submission of tender / date of bill is between 16th and end of month, the relevant economic index for the month shall be reckoned while calculating the material / labour price adjustment.

- NOTE:** 1) The adjustment in prices of Materials and Labour shall be considered /effected only when the Contractor submits authentic data for prevailing indices along with the RA/Final Bill. The Employer reserves the right to set aside certain amount from the Bill if the Contractor does not submit the authentic data of prevailing indices along with the bill.
- 2) For adjustment in prices of materials & labour the indices (WPI / CPI) published by RBI as mentioned above which are available as on the date of submission of final bill (final / provisional indices) will only be considered for settlement of final bill . No further review will be done, even if there are variations in indices (WPI / CPI) after the final bill is settled.
- 3) In case during the period of contract, the base years for publishing Economic Indices are changed as per statute, then the revised indices will be considered as per the published data available at the time of settling the bill/s.

12. ADJUSTMENT OF PRICE AND LABOUR FOR LIFT WORKS:

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices and the wholesale price index numbers for metal products and all India average consumer price index number for industrial workers as specified in the adjustment clause given below. In case of any variation in these indices, the price payable shall be subject to adjustment up or down, in accordance with the following formula:

$$P = P_0 / 100 \{ 15 + 55(MP / MP_0) + 15(W_0(D) / W_0) + 15(W_0(I) / W_0) \}$$

Wherein,

P=Price payable as adjusted in accordance with the above formula.

P₀ = Price quoted.

MP₀ = Wholesale price index number of metal products. This index number is as applicable on the month, four months prior to the date of tendering.



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$W_0 =$

All India average consumer price index for Industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt of India (Base 2001=100). This index number is as applicable for the month four month prior to date of tendering.

For example, if the date of tendering falls in the month of December 2015, the applicable wholesale price index number for metal products (MP_0) and all India average consumer price index number (W_0) should be for the month of August 2015.

MP =Wholesale price index number for metal products. This index number is as applicable on the month, four months prior to the date of delivery.

$W_0(D)$ = All India average consumer price index number for Industrial workers (Base 2001=100), as published by labour bureau, Ministry of Labour, Govt of India. This index number is as applicable for the month, four months prior to the date of delivery of manufactured material.

$W_0(I)$ = All India average consumer price index number for Industrial workers, (Base 2001=100) as published by labour bureau, Ministry of labour, Govt. of India. This index number is as applicable for the month, four months prior to the date of completion of installation work.

The date of delivery is the date on which the manufactured material with its entire components are available at site and ready for inspection by the Consultant or the contracted delivery date i.e. six month before the scheduled date of completion of the entire project whichever is earlier.

The date of completion of installation is the date on which the lift work is notified as being completed and ready for testing or two months before the scheduled date of completion of the entire project whichever is earlier.

Wholesale price index number for metal products is as published by the office of Economic adviser, Ministry of Commerce and Industry, Govt of India with Base = 100; Year 2004-05.

(SIGNATURE OF THE CONTRACTOR)



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ANNEXURE "M"

MEASUREMENTS: -

All items having a financial value shall be entered in the sheets by the contractor in the prescribed Format given in Annexure – "M". The contractor shall be paid by the Employer, from time to time by installment under Interim Certificate to be issued by the Employer's Engineer to the Contractor on account of the work executed, as mentioned in the Appendix to the Conditions of Contract subject to recoveries under this Contract. The Interim Certificate shall be based upon Interim Bills or Running Account Bills to be prepared by the Contractor and supported by the detailed measurements (as per Annexure M and M1). Adequate references, sketches and cross references wherever necessary are also to be provided with detailed measurements. The Employer may allow inclusion in the Interim Certificate such amount as he may consider proper on account of materials delivered upon the site by the Contractor for use in the work but not incorporated in it.

ANNEXURE – "M"

Note: This is an actual format shall be used by the contractors during the course of work which shall be used for recording the measurement /submission of bill.

Name of the work:

Bill No. RA Bill No. ----- / Final Bill No.

Item No	Description	No	Measurements			Quantity
			Length	Breadth	Height	


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"ANNEXURE – "M1"

Name of the Work:

Abstract Bill No:

TI. No	Tender Qty.	Brief Description	Quantity			Unit	Rate	Amount (Rs)
			Last Bill	This Bill	Actual cost			
1.01								
1.02								
1.03								

Deviated items

Net value after rebate :

Value of Extra items

Value of escalation on material

Value of escalation on Labour

Total value of work done :

Advance for material at site

- a) Cement
- b) Steel
- c) Other materials (Materials advance for electrical & civil)

Reimbursement / adjustment for basic price of cement due to price variation

Reimbursement / adjustment for basic price of Steel due to price variation

Any miscellaneous reimbursement charges, cube testing charges

Devaluation if any

Total value of work done Rs -----



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Deductions -----

IT on value of work done

WCT @ % on value of work done

Cement consumed in the work

RMD

Recovery of any other material if any

Recovery of waterproofing items

Recovery of electricity

Recovery of Insurance lapses & liquidity damages

Amount release in earlier bills -----

Total recoveries -----

Net Amount Payable Rs -----



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ANNEXURE -"P"

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

BASIC PRICE OF CEMENT at the Work-Site.

(Refer Clause No. 4.3 of the General Preambles to Schedule of Quantities).

Contractor's Quoted rates shall be Based on the BASIC PRICE of Cement at the work-site which includes purchase price of Cement, all Levies and duties such as Excise Duty, Sales Tax, Octroi/ Town duty, Transportation charges from the factory / stockfish's go-down to the work-site, loading and unloading charges at all points, transit insurance etc.

A) Ordinary Portland Cement / Pozzolana

Portland Cement / Other Specified Cement

Rs. 5600.00 / TONNE

BASIC PRICE OF STEEL at the Work-Site:

(Refer clause No. 5.3 of the General Preambles to Schedule of Quantities)

Contractor's QUOTED rates shall be based on the BASIC PRICE of Steel at the Work-Site which includes purchase price of Steel, all Levies and Duties such as Excise Duty, Sales Tax, Octroi/ Town Duty, Transportation Charges from the factory / stockiest go-down to the work-site including bending and binding charges at all points, Transit Insurance, Weighment charges, etc.

A) High Strength Deformed Bars or other specified reinforcing steel of all diameters in coil or in straight lengths	Rs. 43000.00 / TONNE
B) Mild steel bars of all diameters in coil or in straight lengths.	Rs. 43000.00 / TONNE

Note:

1. Packing of Cement (like gunny bags, polythene bags. etc.) cost of which is included in the purchase price, shall **BE THE PROPERTY OF THE CONTRACTOR.**

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ANNEXURE - "Q"

STATEMENT SHOWING QUANTITIES OF THEORETICAL CONSUMPTION OF CEMENT FOR MAJOR ITEMS OF WORKS

Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
1.	PLAIN CEMENT CONCRETE WORK		
	A) Cement concrete (1:2:4)	Cu.M.	3.20
	B) Cement concrete (1:3:6)	Cu.M.	2.20
	C) Cement concrete (1:4:8)	Cu.M.	1.70
	D) Cement concrete (1:5:10)	Cu.M.	1.30
2.	DAMP PROOF COURSE		
	A) 25mm thick in C.C. (1:2:4)	100 Sq.M	8.0
	B) 38 mm thick in C.C. (1:2:4)	100 Sq.M	12.16
	C) 50 mm thick in C.C. (1:2:4)	100 Sq.M	16.0
3.	REINFORCED CEMENT CONCRETE WORK		
	A) R.C.C work in C.C. (1:2:4)	Cu.M.	3.20
	B) R.C.C. work in C.C. (1:1½ :3)	Cu.M.	4.00
	C) R.C.C. work in C.C. (1:1:2)	Cu.M.	6.10
	D) Providing and fixing precast R.C.C. (1:2:4) set in partition in CM 1:2 including finishing with cement plaster 1:3 of thickness not exceeding 6mm	Cu.M.	3.80
	i) Kerb, step and the like	Cu.M.	3.80
	ii) Copings, bed plates, Anchor blocks, window sills and the like	Cu.M.	3.80
	iii) Small lintels not exceeding 1.5m clear, coping, shelves and the like	Cu.M.	3.77
4.	A) Brickwork (all classes) In cement mortar 1:3		
	i) with modular Brick	Cu.M	1.12
	ii) with F.P.S. brick	Cu.M	1.28
	B) Brick work (all classes) in mortar 1:4		
	i) with modular Brick	Cu.M	0.84
	ii) with F.P.S. brick	Cu.M	0.95
	C) Brick work (all classes) In mortar 1:5		
	i) with modular Brick	Cu.M	0.68
	ii) with F.P.S. brick	Cu.M	0.78
	D) Brick work (all classes) In mortar 1:6		
	i) with F.P.S. brick	Cu.M	0.62



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	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	E) Half Brick work (all classes) In mortar 1:3		
	i) with modular Brick	100 Sq.M	12.75
	ii) with F.P.S. brick	100 Sq.M	14.28
	F) Half Brick work (all classes) In mortar 1:4		
	i) with modular Brick	100 Sq.M	9.50
	ii) with F.P.S. brick	100 Sq.M	10.64
	G) Brick work 3" thick in cement mortar 1:3 with F.P.S. brick	100 Sq.M.	9.23
	H) Honey comb brick work half brick thick in C.M. (1:4)		
	i) with modular brick	100 Sq.M	5.54
	ii) with F.P.S. brick	100 Sq.M.	6.56
	I) Brick drip course at junction of roofs and walls in C.M. (1:4)		
	i) 10 cm thick with modular brick	100 M	0.84
	Ii) 7.6 cm thick with F.P.S. brick	100 M	0.83
	J) Brick drip course at junction of rooms and walls in C.M. (1:6)		
	i) 10 cm thick with Modular Brick	100 M	0.55
	ii) 7.6 cm thick with F.P.S. Brick	100 M	0.54
	K) Providing brick band 5cm projected from wall face in C.M. (1:4)		
	i) 10cm thick 5 cm Projected with modular brick	100 M	0.42
	ii) 7.6 cm thick 5.7 cm projected with F.P.S. brick	100 M	0.41
5.	STONE WORK		
	A) Random Rubble masonry within foundations or superstructure in cement mortar 1:6 including leveling up with cement concrete 1:6:12 at plinth or sill or ceiling level	Cu.M.	0.85
	B) coarse rubble masonry in foundation and super structure in cement mortar 1:6	Cu.M.	0.75
	C) Stone work plain ashlar cyclopean, sunk or moulded and ashlar punched in cement mortar 1:6 including pointing with cement mortar 1:2 with an admixture of pigment matching the stone shade.	Cu.M.	0.54



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Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	D) Stone work plain ashlar cyclopean sunk or moulded arch, dome or circular moulded and curved columns in cement mortar 1:3 including pointing with cement mortar 1:2 with an admixture of pigment matching the stone shade.	Cu.M.	1.07
	E) Stone work plain in coping cronies; string courses and plinth course in cement mortar 1:6 including pointing with cement mortar 1:2 with an admixture of pigment matching the stone shade.	Cu.M.	0.54
	F) Stone work for wall lining etc. average thickness 40mm to 70mm in cement mortar 1:3 including pointing with cement mortar 1:2 with an admixture of pigment matching the stone shade	100 Sq.M	8.75
	G) 30mm thick sand stone shelves, fixed in walls in cement mortar 1:3 including finishing complete	100 Sq.M.	1.64
6.	FLOORING		
	A) Brick flooring in cement mortar 1:4	100 Sq.M.	11.02
	B) Brick flooring in cement mortar 1:6	100 Sq.M	7.25
	C) 25mm thick cement concrete flooring 1:2:4 finished with a floating coat of neat cement	100 Sq.M.	12.20
	D) 40mm thick cement concrete flooring 1:2:4 finished with a floating coat of neat cement	100 Sq.M.	17.00
	E) 50mm thick cement concrete flooring 1:2:4 finished with a floating coat of neat cement	100 Sq.M	20.20
	F) 75mm thick cement concrete flooring 1:2:4 finished with a floating coat of neat cement	100 Sq.M	28.20
	G) Cement concrete pavement (25mm to 50mm thick) with 1:2:4 including finished complete	Cu.M.	3.20
	H) 50mm thick cement concrete flooring with metallic concrete hardener topping, under layer of 40 mm thick cement concrete 1:2:4 and top layer 10mm thick metallic cement, hardener consisting of mix 1:2 by volume with metallic hardening compound of approved quality is mixed in the ratio of 4:1	100 Sq.M	21.10



LIC HFL Care Homes Ltd.

**Corporate Office : 1st Floor, East Wing, Industrial Assurance Building,
Opp. Churchgate Station, Mumbai – 400 020.**

Tel.; 2287 5621 / 2287 5622 E-mail: carehomes@lichousing.com

Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	I) 40mm thick cast - in situ m.m. flooring (28mm thick under layer and 12mm thick top layer)		
	i) Neutral shade with Grey cement	100 Sq.M	19.07
	ii) Light shade with white cement Grey Cement	100 Sq.M	8.10 10.97
	iii) Medium shades 50% Grey Cement White cemen	100 Sq.M	15.02 4.05
	J) Pre-cast terrazzo tiles 22mm thick with marble chips of sized upto 6mm, laid in 20mm thick bed of cement mortar 1:6, cement slurry, jointing with gray cement		
	i)Light shade using White cement Grey cement	100 Sq.M	4.40 10.00
	ii) Dark shades (with Grey cement)	100 Sq.M	14.40
	K) Pre-cast terrazzo tiles 22mm thick with marble chips of sizes upto 6mm. In skirting on walls, laid on 12mm thick cement plaster (1:3) jointed with neat cement slurry.		
	i) Light shade using white cement Grey cement	100 Sq.M	2.20 13.94
	ii) Medium shade using 50% white cement & 50% grey cement White cement /Grey cement	100 Sq.M	1.10 12.84
	iii) Dark shades (with Grey cement)	100 Sq.M	16.14
	L) checkered terrazzo tiles 22mm thick with marble chip of sizes upto 6mm on 25mm thick bed of lime mortar jointed with neat cement slurry		
	i) Light shade using white cement Grey cement	100 Sq.M	4.40 12.90
	ii) Medium shade using 50% white cement & 50% grey cement. White cement Grey cement	100 Sq.M	2.20 15.10
	iii) Neutral shades (with Grey cement)	100 Sq.M	17.30



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Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	M) White glazed tiles 5.5 mm thick in flooring, treads and risers of steps, skirting and dado on 12mm thick cement plaster 1:3 in base and jointed with white cement slurry etc. White cement Grey cement	100 Sq.M 100 Sq.M	2.50 9.42
	N) Marble stone slab flooring over 20mm thick base lime mortar and jointed with grey cement slurry etc.		
	i) 20mm thick	100 Sq.M	5.0
	ii) 30mm thick	100 Sq.M	5.12
	iii) 40mm thick	100 Sq.M	5.36
	O) Marble stone slab flooring over 20mm thick base of cement mortar (1:4 and jointed with Grey cement slurry)		
	i) 25mm thick	100 Sq.M	13.51
	ii) 30mm thick	100 Sq.M	13.63
	iii) 40mm thick	100 Sq.M	13.87
	P) Extra if white cement slurry used instead of Grey cement slurry in joints of stone flooring. (White cement)	100 Sq.M	0.76
	Q) Marble tiles 25mm thick in riser of steps, skirting and pillars, laid on 12mm thick cement mortar (1:3) and jointed with grey cement slurry	100 Sq.M	12.34
	R) Kotah stone slab flooring over 20mm thick base of lime mortar and jointed with cement slurry etc.		
	i) 25mm thick	100 Sq.M	6.40
	ii) 30mm thick	100 Sq.M	6.80
	Iii) 40mm thick	100 Sq.M	7.60
	S) Kotah stone slab flooring over 20mm thick base of cement mortar (1:4) and jointed with neat cement slurry etc.		
	i) 25mm thick	100 Sq.M	14.91
	ii) 30mm thick	100 Sq.M	15.31
	iii 40mm thick	100 Sq.M	16.11



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Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	T) Kotah stone slab 25mm thick in riser in steps, skirting dado and pillars laid on 12mm thick cement mortar 1:3 and jointed with neat cement slurry etc.	100 Sq.M	13.74
	U) 40mm thick sand stone flooring over 30mm thick base of cement mortar 1:5 with joints finished flush.	100 Sq.M	7.75
	V) 40mm thick sand stone flooring over 20mm thick base of cement mortar 1:5 including pointing with cement mortar 1:2 (1cement 2 stone dust)	100 Sq.M	9.31
	W) 40mm thick sand stone flooring over 20mm thick lime mortar including pointing with cement mortar 1:2	100 Sq.M	1.56
	X) 40mm thick fine dressed and rubbed stone flooring over 20mm thick base of cement mortar 1:5 (1cement 5 sand) with joints 5mm thick finished flush.	100 sq.M	8.28
	Y) 40mm thick fine dressed and rubbed stone, flooring, over 20mm thick base of cement mortar 1:5 with joints 5mm thick including pointing with cement mortar 1:2 (1cement 2 stone dust)	100 Sq.M	9.84
7.	FINISHING		
	A) 12mm cement plaster 1:3	100 Sq.M	7.34
	B) 12mm cement plaster 1:4	100 Sq.M	5.47
	C) 12mm cement plaster 1:5	100 Sq.M	4.46
	D) 12mm cement plaster 1:6	100 Sq.M	3.60
	E) 15mm cement plaster 1:3	100 Sq.M	8.77
	F) 15mm cement plaster 1:4	100 Sq.M	6.54
	G) 15mm cement plaster 1:5	100 Sq.M	5.33
	H) 15mm cement plaster 1:6	100 Sq.M	4.30
	I) 20mm cement plaster 1:3	100 Sq.M	11.42
	J) 20mm cement plaster 1:4	100 Sq.M	8.51
	K) 6mm cement plaster 1:3 to ceiling	100 Sq.M	3.67
	L) 6mm cement plaster 1:4	100 Sq.M	2.74
	M) Neat cement punning	100 Sq.M	2.20
	N) 18mm cement plaster in two coats underlay 12mm cement plaster 1:5 finished with a top layer 6mm thick cement plaster 1:6	100 Sq.M	6.26



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Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	O) 18mm cement plaster in two coats under layer 12mm cement plaster 1:5 finished with a top layer 6mm thick cement plaster 1:3	100 Sq.M	8.13
	P) 12mm cement plaster 1:2 (1 cement 2 stone dust)	100 Sq.M	9.79
	Q) 18mm thick or artificial red stone plaster of 12mm thick under layer of cement plaster 1:4 with 6mm thick finishing coat of cement mortar 1:1:3 mixed with red oxide (1cement:1marble dust:3stone dust)	100 Sq.M	9.47
8.	POINTING	100 Sq.M	
	A) Flush or ruled or cut or Weather pointing on brick work with cement mortar 1:3	100 Sq.M	1.53
	B) Raised and cut pointed on brick work with cement mortar 1:3	100 Sq.M	2.04
	C) Flush or ruled pointing on stone work with cement mortar 1:3	100 Sq.M	1.17
	D) Raised and cut pointing on stone work with cement mortar 1:3	100 Sq.M	2.35
9.	MORTAR		
	A) Cement mortar 1:1	Cu.M	10.20
	B) Cement mortar 1:2	Cu.M.	6.80
	C) Cement mortar 1:3	Cu.M.	5.10
	D) Cement mortar 1:4	Cu.M.	3.80
	E) Cement mortar 1:5	Cu.M	3.10
	F) Cement mortar 1:6	Cu.M	2.50
10.	SANITARY INSTALLATIONS:		
	A) Fixing long pan or Orissa Pattern, squatting or pedestal type W.C pan	Each	0.025
	B) Fixing Flat back or wall corner type lipped front urinal basin	Each	0.01
	C) Fixing sink or wash basin	Each	0.015
	D) Fixing Holder bat clamps for 100 / 75 / 50 mm dia sand cast iron pipes	Each	0.005
	E) Fixing sand cast iron trap	Each	0.025



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Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	F) Providing and fixing G.I fittings and clamps including cutting and making good the walls etc. (Internal work) Exposed Walls 15mm dia 20mm dia 25mm dia 32mm dia 40mm dia 50mm dia	100 RM 100 RM 100RM 100 RM 100 RM 100 RM	0.05 0.06 0.07 0.075 0.08 0.08
	G) Concealed pipe including ceiling chases and making good the walls 15/20 mm normal bore	100 R.M	0.88
	H) 100 mm dia SWG pipes	100 RM	22.91
	I) 150mm dia SWG pipes	100 RM	26.01
	J) Fixing square mouth S.W Gully trap	Each	0.40
	K) Inspection chambers Inside size 0.75 x 0.75 x 1.00 m depth	Each	2.13
	L) Inspection chamber Inside size 1.20 x 0.90 x 1.00 m to 2.00 depth	Each	3.70
11.	MISCELLANEOUS		
	A) Lime concrete terracing average 10cm thick with 25mm brick ballast and 50% lime concrete 1:2 (1 Lime putty: 2 surkhi) rammed and finished with gur and belgri finished with gur and belgri treatment and covered with flat brick tiles grouted with cement mortar 1:3 over 12mm layer of cement mortar 1:3	100 Sq.M	6.63
	B) Providing and laying average, 10cm thick cement based water proofing treatment with brick bat coba as per manufactures specification	100 Sq.M	(*)
	C) Providing and filling with waterproof brickbat cement concrete	100 Sq.M	(*)
	D) Rough cast or pebble dash plaster in two layers under layer 12mm cement plaster 1:4 and top layer 10mm cement plaster 1:3	100 Sq.M	11.59



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Sl. No.	Description	Units	Quantity of cement per unit / Quantity of work in quintal
	E) Plinth protection 50mm thick in cement concrete 1:3:6 over 75mm bed of dry brick ballast	100 Sq.M	11.0
	F) Brick edging 10cm wide 10cm deep to plinth protection including grouting with cement mortar 1:4	100 Sq.M	1.14
	G) Fixing of precast cement concrete jalli 1:2:4 in cement mortar 1:3 i) 50mm thick ii) 40mm thick iii) 25mm thick	100 Sq.M	1.64
	H) CC blocks for hold fasts	100 Nos.	1.10
	i) CC blocks for hold fasts for windows	100 Sqm.	1.30

(*) As specified by the specialist firm at the time of tendering

NOTE: For any other item of work, Site Engineer shall refer to the CPWD specification and norms. In case no coefficient is available for a specific item, the decision of Employer / Consultant, shall be final and binding on the contractor.



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ANNEXTURE - "R"

FORM OF GUARANTEE FOR WATERPROOFING

(To be given by Waterproofing Agency)

Name of the work: _____

Name of the Main contractor: _____

Name of Water Proofing Agency

M/s. _____

We M/s. _____

_____ hereby guarantee that the surfaces treated by us for waterproofing in the above work, for

M/s. _____

the General builders Contractors for the above work, shall remain entirely watertight. Should, however, due to any unforeseen defect left out in the work carried out by us at the time of execution of the work, there be any leakage from any surface treated by us during the period of ten years from the date of virtual completion of work i.e. from _____ to _____ the same shall be rectified by us without any cost to the LIC HFL Care Homes Ltd.

However, we shall not be responsible in any way if our work is tampered with or if the body of the structure is damaged due to sinking, cracking and/or by any other act of God.

The intimation received from LIC HFL Care Homes Ltd. during Guarantee period shall be deemed to have been received from Main Builder's Contractor and inspection as well as necessary work shall be carried out and reported upon by us forthwith.

Signature of Waterproofing Agency

Signature of the Main Builders' Contractor



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ANNEXURE - "S"

PROFORMA FOR REQUEST FOR PAYMENT TO CEMENT SUPPLIERS BY LIC ON BEHALF OF CONTRACTORS

Dated : _____

(Refer clause 4.5 of General Preambles to Schedule of Quantities)

To,
LIC HFL Care Homes Ltd.
Mumbai

Dear Sir,

Name of the work :

1. The cement balance in stock as on day is _____tonnes. It is expected to last upto _____. We now require_____ tonnes of additional quantity for the work upto_____. We shall be grateful if you arrange to place order and make payment for the cement to any one of the approved suppliers at approved rate on our behalf. We accept the responsibility of taking proper delivery of cement and all other responsibilities as per the relevant clause of tender referred to above
2. The order for transport of cement may also be placed on our behalf by you on any one of the approved transport agency at approved rate. The transport charges and octroi charges etc. shall be paid by us initially and the original bills/receipts produced to you later on for reimbursement.
3. We note that in case any quantity of cement is not delivered at site of work within reasonable time, the advance amount paid by you towards the quantity of cement to be supplied shall immediately be recovered from us from any amount due to us including Security Deposit lying with you.

Yours faithfully,

(SIGNATURE OF CONTRACTOR)



**LIC HFL
Care Homes Ltd.**

**Corporate Office : 1st Floor, East Wing, Industrial Assurance Building,
Opp. Churchgate Station, Mumbai – 400 020.**

Tel.; 2287 5621 / 2287 5622 E-mail: carehomes@lichousing.com

ANNEXURE - "T"

PROFORMA FOR REQUEST FOR PAYMENT TO STEEL SUPPLIERS BY LIC ON BEHALF OF CONTRACTOR

Dated : _____

(Refer Clause 5.5 of General Preambles to Schedule of Quantities)

To
LIC HFL Care Homes Ltd.
Mumbai

Dear Sir,

Name of Work: _____

We now require the following steel for the work. The approximate balance quantity at site for the required categories of steel as on date and further additional quantities are mentioned below.

<u>Category of Steel</u>	<u>Balance quantity at site</u>	<u>Further quantity required</u>
	<u>M.T.</u>	<u>M.T.</u>

We shall be grateful if you arrange to place order and make payment for the steel to anyone of the approved steel suppliers on our behalf. We accept the responsibility of taking proper delivery of steel and all other responsibilities as per the relevant clause of tender referred to above.

1. The order for transport of steel may also be placed on any of the approved transport agency at approved rate on our behalf by you. The transport charges and octroi charges etc., shall be paid by us initially and the original bills/receipts produced to you later on for reimbursement.
2. We note that in case any quantity of steel is not delivered at site of work within reasonable time, the advance amount paid by you towards quantity of steel to be supplied shall immediately be recovered from us from any amount due to us including Security Deposit lying with you.

Yours faithfully,

(SIGNATURE OF CONTRACTOR)

CONTRACTOR

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EMPLOYER



LIC HFL
Care Homes Ltd.

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Tel.; 2287 5621 / 2287 5622 E-mail: carehomes@lichousing.com

ANNEXURE "U"

LIST OF SOME CEMENT MANUFACTURERS

A. MEMBERS OF CEMENT MANUFACTURERS ASSOCIATION :

1. The Associated Cement Company Limited.
121, Maharshi Karva Road, Bombay - 400 020.
2. The Birla Cement Corporation Limited.
9/1, R.N. Mukherjee Road, Kolkata - 700 001.
3. Century Cement.
P.O. Neora, 493114, Dist Raipur (M.P)
4. Cement Corporation of India Ltd.
59, Nehru Place, New Delhi - 110 019
5. Larson & Toubro Limited.
L & T House, Ballard Estate, Bombay - 400 038.
6. Modi Cement Limited.
Modinagar 201 204, Gaziabad, U.P.
7. Orissa Cement Ltd.
Rajgangpur, Dist- Sundergarh, Orissa - 770 017.
8. Reymond Cement Works
Narottam Morarjee Marg, Ballard Estate, Bombay - 400 038

B. ASSOCIATE MEMBERS OF C.M.A.

1. Damodhar Cement & Slag Ltd.,
6, Camac Street, Kolkata - 700 017.

*** MINI CEMENT PLANTS.**

NOTE: Particulars about factories, regional officers, Stockists /agents/ suppliers at various places may be obtained from the respective cement manufacturers as above.



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ANNEXURE -V

(ON STAMP PAPER OF REQUISITE VALUE)

FORM OF GUARANTEE FOR ANTI-TERMITE

Name of the project:-

Location and Approx. plinth area:-

We hereby guarantee that the area treated by us for Anti-termite in the above work shall remain Termite-proof. Should, however, due to any reasons, there be any traces of termite within the area treated by us during the period of ten years from the date of virtual completion of the work i.e. from..... to.....the same shall be rectified by us without any extra cost to the **LIC HFL Care Homes Ltd.**
Mumbai

Signatures of the Contractor



**LIC HFL
Care Homes Ltd.**

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(ON STAMP PAPER OF REQUISITE VALUE)

FORM OF GUARANTEE FOR ANTI-TERMITE

Name of the project:-

Location and Approx. plinth area:-

Free Maintenance Guarantee-Anti-termite Work
by M/s _____

We, The.....hereby guarantee that the areas treated by us for Anti-termite in the above work, for M/s, the General Builders, contractors for the above work, shall remain termite-proof. Should, however, due to any reasons, there be any traces of termite during the period of ten years from the date of virtual completion of the work i.e. from to.....the same shall be rectified by us without any extra cost to the **LIC HFL Care Homes Ltd. Mumbai**

The intimation received from the Consultant during guaranty period shall be deemed to have been received from main contractors and inspection as well as necessary work shall be carried out and reported upon by us forthwith.

SIGNATURE OF ANTI-TERMITE AGENCY

SIGNATURES OF THE GENERAL
BUILDER'S CONTRACTOR.



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LIST OF PRINCIPAL / APPROVED MAKES FOR CIVIL WORKS

SL. No.	ITEM	MAKES/AGENCIES/BRANDS
1.	GI PIPES	Jindal Zenith Apollo GST Prakash QST
2.	GI PIPES FITTINGS	R-Brand K.S. Brand Zoloto RR SSS NMC
3.	COPPER PIPES /TUBES	Rajco Metal Industries B.P. Conex Comap
4.	MULTI LAYER COMPOSITE PIPES	Ki-TEC Kisan Flowguard CPVC Astral
5.	PVC PIPES AND FITTINGS	Chemplast Prince Supreme Finolex Oriplast
6.	UPVC (UNPLASTICIZED PIPES & FITTINGS)	Prince Supreme Paras
7.	GATE VALVES, GLOBE VALVE	Leader Kirloskar Zoloto Orient
8	FOOT VALVES, CHECK VALVE	Kirloskar Leader Ashoka
9	WATER METERS	Capstan Anandaasahi Dasmesh Remco
10	FERRULES	Leader Hindco Neta Annapurna



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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
11.	BIB COCKS, STOP COCKS, PILLAR TAPS	Jaguar (Continental Series) Marc (Orient Series) Essco ARK GEM
12.	LOW LEVEL FLUSHING CISTERNS (PVC/CERAMIC)	Parryware Cera Hindware Commander
13.	VITREOUS SANITARY WARE LIKE WC, WASH BASIN, URINALS, EWC ETC	Parryware Cera Hindware Neycer
14.	PLASTIC SEAT AND COVER	Commander Parryware Bestolite Duroshine
15.	BATH ROOM FITTINGS	Jaguar (Continental Series) Essco GEM ARK Marc (Oriental Series)
16.	C.I. PIPES & FITTINGS	Hind BIS BIC Neco
17.	C.I. NAHANI TRAP	BIC SKF NECO RAJCO
18.	SW PIPES	HIND PERFECT BURNS
19.	PVC CABINET MIRROR	Commander
20.	SLUICE VALVE	Leader Kirloskar
21.	HDPE/LDPE/LLDPE WATER STORAGE TANKS	Sintex Polycon G & P



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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
22.	CERAMIC /GLAZED TILES	Nitco Somany Kajaria Euro H.R. Johnson
23.	VITRIFIED TILES	Nitco Somany Kajaria RAK EURO
24.	PLY WOOD (BWR,BLOCK BOARD)	Kitply Archid Green Ply Century Ply Bhutan Ply Sharon Anchor Swastik National
25.	FLOAT GLASS	Saint Gobin Modi Guard Triveni Sheet Glass Indo Asahi Glass Co. Tata Atul
26.	PVC DOORS & DOOR FRAMES	Rajshri Sintex Supreme
27.	ALUMINIUM EXTRUDED SECTIONS	Hindal Jindal Indal Hindalco
28.	STAINLESS STEEL KITCHEN SINKS	Nirali Farnkee Jayna Diamond Neelkanth
29.	PRELAMINATED/ VENEERED PARTICLE BOARD	Novopan Green Lam Kitlam Archid Lam Swastik



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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
30.	FLUSH DOOR SHUTTERS	Kutty Flush Door Century Green Ply Shiva Hari Plywood Ltd.(Corbett) Anchor Ply Swastik Ply Western India Parvathi Wood
31.	DECORATIVE LAMINATES	Green Lam Merino Sunmica/Formica Century Durian Sundeek Anchor Decolam
32.	FLOOR SPRINGS	Everite Hardwyn Efficient Gadgets Garness Dormer
33.	VENEERS	Decowood Euro Veneers Durian Green Lam
34	MDF BOARDS	Duratuff Nuwood Century Novopan Kitply Green Ply
35	ADHESIVE	Fevicol SH Araldite Ciba Giegy Mowiool HV of Mafatlal
36	WOOD PRESERVATIVES	Bison Godrej Kot



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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
37	HARDWARE FITTINGS	Jyoti Argent C.I.E.F. Classic Everite Metaco India JH Aluminium PV Radhakrishna Etalite Hardwin
38	DOOR CLOSER	Everite Hardwyn Efficient Gadgets Ebco Dorma Garness
39	DRAWER SLIDERS	Efficient Gadgets Ebco Etahoa Sisco
40	LOCK	Godrej Golden Efficient Gadgets Mark Sheet Vision Dorma
41	MIRRORS	Atul Sun Commander Modi Guard Saint Gobin Globe
42	WATER PROOFING COMPOUND	Impermo Cico Pidliite Roff Choksey Hindustan –Ciba Gaigey Accoproof Sika Fosroc



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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
43	STEEL WINDOWS AND VENTILATORS	Agew Steel Mfg. Co. Ltd. Sen Harvic Hopes Diana Casement Madhu Industries Bangalore Multiwin Unique Metal Windows Ankur Industries Modern Fabricators
44	AC PIPES/SHEETS	Charminar Everest Visakha Orient Ramson
45	SPECIAL PROTECTIVE & DECORATIVE FINISH	Snowcem Paint Asian Paints Berger Jenson & Nicholson Kansai Nerolac ICI Godawari
46	OIL BOUND DISTEMPER	Asian Berger Jenson & Nicholson ICI Kansai Nerolac Godawari
47	CEMENT PAINT	Snowcem Plus Berger Asian Paints Jenson & Nicholson Kansai Nerolac ICI Godawari
48	SURFACE TEXTURE	Heritage (Bakelite Hylam Ltd.) Spectrum


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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
49	TEXTURE PAINT	Snowcem India Ltd. Santex Matt Asian Jenson & Nicholson Berger Kansai Nerolac
50	ENAMEL PAINT PRIMERS/READY MIXED PUTTY FOR WOOD WORK , IRON & STEEL	Asian Berger Jenson & Nicholson Kansai Nerolac ICI MRF Godawari
51	WALL PUTTY	Birla wall Care Snowcem paints JK Asian paints
52	EXTERIOR EMULSION	Asian Paints - Apex Berger Paints Kansai Nerolac MRF Jenson Nicholson ICI Godawari
53	CEMENT CONCRETE PIPE	The Indian Hume Pipe Premier Pre-stressed Co.
54	EXPANSION JOINT BOARD	Shalimar Tar Products Lloyds Insulations Fosroc Shalitex
55	FALSE CEILING	India Gypsum Armstrong Daikin Insula QED Panels
56	VERTICAL BLINDS	Vista Levlor TRAC MAC Marvel



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SL. No.	ITEM	MAKES/AGENCIES/BRANDS
57	ADHESIVE FOR TILE FIXING	Roffe Balendura Cera Bond Fosroc Choskey Chemicals Dr. Fixit Sika Sunanda
58	PAVING TILES	Eurocon Ultra Duracrete
59	PVC FLOORING	Flora Armstrong
60	VINYL FLEXIBLE FLOORING	Wonder Floor Armstrong BHOR Rikvin Tusker
61	FIBRE GLASS DOORS	Master Craft
62	SS/CP FRICTION HINGES	Ebco Jyoti Everest Magnum
63	SOFT BOARD	Jolly Board
64	SCREW	Nettelefold GKW
65	FIBRE REINFORCEMENT COMP.DOOR	Loknath Unique



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APPROVED MAKES OF MATERIALS FOR ELECTRICAL, FIRE ALARM & STRUCTURAL CABLING WORK

SR. NO	MATERIAL	MAKES		
		(a)	(b)	(c)
1	COPPER CONDUCTOR PVC INSULATED FR GRADE WIRES	(a) FINOLEX	(b) HAVELLS	© V GUARD
		(d) RRS		
2	PVC INSULATED ARMoured CABLES (LT/HT)	(a)FINOLEX	(b) FORT GLOSTER	© CCI
		(d) RR KABLE	(e) DELTON	
3	MAIN SWITCH WITH HRC FUSES	(a) L & T	(b)SIEMENS	© GE
		(d) ENGLISH ELECTRIC	(e) STANDARD	(f) HAVELLS
4	MAIN SWITCHES WITH REWIRABLE FUSE	(a) L & T	(b) CROMPTON	© STANDARD
		(d) HAVELS		
5	MCCB	(a) SIEMENS	(b) L & T	© SCHNIEDER – MJ
		(d) LEGRAND		
6	MCB / ELCB / ELMCB / DB	(a) LEGRAND	(b) SIEMENS	© HAGGER
		(d) SCHNEIDER MJ		
7	CHANGE OVER SWITCH / SWITCH FUSE UNIT UPTO 100 AMP	(a) HPL	(b) L & T	© HAVELLS
		(d) STANDARD	(e) SIEMENS	
8	CHANGE OVER SWITCH / SWITCH FUSE UNIT ABOVE 100 AMP	(a) HPL	(b) L & T	© SIEMENS
9	RISING MAINS	(a) ENGLISH ELECTRIC	(b) GEC	© SCHNIEDER


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SR. NO.	MATERIAL	MAKES		
		(a)	(b)	(c)
10	PVC CONDUIT (ISI MARK)	(a) PRECISION	(b) AVON PLAST	© ESSARKE
		(d) SUDHAKAR	(e) KALINGA	(f) AKG
11	PVC CASING CAPING	(a) PRECISION	(b) KALINGA	© AKG
		(d) SUDHAKAR	(e) DIAMOND	
12	M.S. CONDUIT	(a) SUPREME	(b) BEC	© NIC
		(d) AKG		
13	FLOOR TRUNKING SYSTEM	(a) LEGRAND	(b) MK ELECTRIC	© PRECISION
		(d) MODI		
14	G.I. PIPE	(a) JINDAL	(b) SENITH	© PRAKASH
		(d) TATA	(e) GST	(f) APOLLO
15	MODULAR SWITCHES, ACCESSORIES & ELECTRONIC REGULATOR	(a) ANCHOR ROMA	(b) SSK	© LEADER
		(d) CRABTREE	(e) MK	
16	NON MODULAR SWITCHES, ACCESSORIES & ELECTRONIC REGULATOR	(a) ANCHOR	(b) LEADER	© SSK
		(d) CPL		
17	INDUSTRIAL PLUG & SOCKET	(a) LEGRAND	(b) HAVELLS	© CROMPTON
		(d) HAGGER	(e) STANDARD	
18	CEILING / EXHAUST / WALL FAN	(a) USHA	(b) CROMPTON	© ORIENT
		(d) BAJAJ	(e) ALMONARD	
19	INDOOR LIGHT FITTINGS	(a) PHILIPS	(b) WIPRO	© CROMPTON
		(d) GE		
20	OUTDOOR LIGHT FITTINGS	(a) PHILIPS	(b) WIPRO	© CROMPTON
		(d) GE	(e) K - LITE	

CONTRACTOR



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SR. NO.	MATERIAL	MAKES		
		(a)	(b)	(c)
33	MEASURING INSTRUMENTS	(a) AMP	(b) MECO	© AE
		(d) ENERCON	(e) PROK-DV's	
34	PF IMPROVEMENT CAPACITOR & APFC PANEL	(a) EPCOS	(b) NEPTUNE	© L & T
		(d) CROMPTON		
35	RELAY FOR AUTOMATIC PF IMPROVEMENT	(a) EPCOS	(b) CONZERVE	© L & T
36	CURRENT TRANSFORMER	(a) AE	(b) RISHABH	© KUPPA
		(d) L & T		
37	DATA CABLES & FACTORY MADE PATCH CHORDS	(a) LEGRAND	(b) D LINK	© FINOLEX
		(d) MOLEX	(f) AMP	
38	INFORMATION OUTLET / RJ 45 CONNECTORS / RJ – 11 SOCKETS	(a) D LINK	(b) LEGRAND	© MOLEX
		(d) SYSTEMAX	(e) AMP	
39	TELEPHONE WIRES	(a) FINOLEX	(b) DELTON	© HAVELLS
		(d) RR KABLE		
40	RG 6 CABLE FOR TV	(a) FINOLEX	(b) DELTON	© NATIONAL
41	JACK PANEL	(a) D LINK	(b) LEGRAND	© MOLEX
		(d) SYSTEMAX	(e) VALRACK	(f) AMP
42	RACK	(a) VALRACK	(b) DIGITRON	© HCL
		(d) A LINK		
43	FIRE ALARM PANEL	(a) HONEY WELL	(b) CARMEL	© ZICOM
		(d) NOTIFIER	(e) MIRCOM/SEC UTRON	(f) MORLEY IAS


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SR. NO.	MATERIAL	MAKES		
		(a) APOLLO	(b) MORLEY IAS	© EDWARD
44	SMOKE / HEAT DETECTOR	(d) SYSTEM SENSOR	(e) HONEY WELL	(f) MIRCOM/SECUTRON
45	MANUAL CALL POINT / HOOTER/ RESPONSE INDICATOR	(a) HONEY WELL	(b) ZICOM	© NOTIFIER
		(d) SIMPLEX	(e) MIRCOM/SECUTRON	(f) CARMEL
46	DISC / PIN INSULATOR	SIGMA,JAYSHREE,BHEL,SESHASAI		
47	Termination Kit for 33/11 KV cable	Raychem, Mseal		
48	Vacuum Circuit Breaker(33 KV/36 KV)	Megawin/Schinder/BHEL/ABB)		
49	Vacuum Circuit Breaker(11 KV)	EASUN/Schinder/BHEL/Siemens).		
50	Battery Charger with Battery	Exide/Aplab/Numeric power system/Emersion/AMCO)		
51	Fire Extinguisher(CO2)	Fireshield/OMEX		
52	HG FUSE	SIGMA,INDIA METAL/ Pactil/Atlas/JENCO/CROMPTON		
53	Air Conditioner	Blue Star/Voltas/Carrier/Hitachi		
54	33/ 11KV, Double Break Isolator	Crompton/GR Power/AREVA/Siemens		

Note:

All Switch-gear and the Distribution Boards should be clearly marked with Red. Yellow, Blue and Black colour for phases and neutral. All busbar enclosures Angle iron frame and switch-gears should be painted with battleship grey oil paint. Danger and caution boards at appropriate places on main boards and Distribution Boards should be fixed. All controlling main switches on main boards and distribution boards should clearly indicate with white oil paint lettering the floor and section controlled by it. All equivalent alternative materials used on the job will have to be approved by the Consultant / Employer before it is actually used. If any item is installed without prior approval, the contractor will be asked to dismantle the installation and use materials as specified. The insulated wire used for concealed wiring shall be with Red, Yellow, Blue colour for respective phases, Black for neutral & Green for earth wires.



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LIST OF PRINCIPAL / APPROVED MAKES FOR FIRE FIGHTING WORKS

Sl. No.	ITEM	MAKE
1	Pressure Boosting Terrace Pump	KIRLOSKAR / CROMPTON GREAVES / CRI
2	Hydrant (Landing) Valve. Conforming to IS-5290	NEW AGE / EVERS SAFE / MINIMAX / SAFE GUARD
3	Fire delivery hose-IS-636-type-B fitted with delivery hose coupling-conforming to IS-903	NEW AGE / EVERS SAFE/CRC / JAYSHREE
4	Short branch pipe universal-conforming to IS-2871	EVERSAFE / VIKING/GE / MINIMAX / NEWAGE / SAFE GUARD
5	Hose cabinet :	NEW AGE / EVERS SAFE / MINIMAX / SAFE GUARD
6	Isolation valve	KIRLOSKAR / LEADER / ZOLOTO / ORIENT
7	Non-return valve	KIRLOSKAR / LEADER / ASHOKA
8	Fire service inlet	EVERSAFE /NEW AGE / MINI MAX / SAFE GUARD
9	First Aid Hose Reel Swinging Type:-	EVERSAFE / NEW AGE / MINI MAX / SAFE GUARD.
11	Piping	JINDAL / ZENITH / APOLLO / GST / PRAKASH / QST
12	Pressure Gauge	H GURU / DWYER / FIEBIG / INDFOS / DANFOSS
13	Butterfly Valve	AUDCO / DANFOSS / CASTLE
14	Fire Alarm Control Panel	HONEY WELL / NOTIFIER / MORLEY IAS / MICROM / SECUTRON / CARMEL / ZICOM
15	Manual call Point	HONEY WELL / ZICOM / NOTIFIER / SIMPLEX / MICROM / SECUTRON / CARMEL
16	Hooter	HONEY WELL / ZICOM / NOTIFIER / SIMPLEX / MICROM / SECUTRON / CARMEL
17	Connecting wire / Cable	FINOLEX / HAVELLS / V GUARD / RR CABLES.
18	PVC Conduit	AKG / PRECESSION / AVON PLAST / ESSARKE / SUDHAKAR / KALINGA
19	Carbon dioxide type portable fire extinguisher	EVERSAFE / FIRESHIELD / MINIMAX / CEASE FIRE
20	ABC type stored pressure portable fire extinguisher	EVERSAFE / FIRESHIELD / MINIMAX / CEASE FIRE
21	Water Co2	EVERSAFE / FIRESHIELD / MINIMAX
22	Amplifier battery backup. With microphone & AUX line.	AHUJA / PHILIPS
23	Speaker	AHUJA / PHILIPS



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TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

SUB : E-TENDER FOR THE WORKS OF ELECTRICAL SUBSTATIONS , RAIN WATER HARVESTING , SEWAGE TREATMENT PLANT , FIRE FIGHTING SYSTEM AND INSTALLATION OF DG SET FOR LIC HFL CARE HOMES ON GOING PROJECT CONSISTS OF FOUR BLOCKS (STILT + 9) NAMED AS A-1, A-2, A-3, A-4 AND ONE BLOCK OF BASEMENT + STILT + 3 (NAMED - B) STORIED RESIDENTIAL BUILDINGS AT PLOT NO. L/1(R) REVENUE PLOT NO. 1231 (PT) AND 1 (PT) OF MOUZA AIGINIA AND GHATIKIA, BHUBANESWAR.

1. EARTH WORK

1. SITE CLEARANCE :

Contractor's rate shall cover for clearing the site of shrubs, brush wood, under growth and trees not exceeding 30cm. in girth measured at 1 meter above ground before commencement of work. The rubbish which may thus be obtained would be disposed off as directed.

2. BLOCK LEVEL PLAN:

Before starting earth work on site, the requisite block level of the entire site shall be taken by the contractor in consultation with Consultant . The record of levels shall be prepared and shall be jointly signed by the contractor and the Consultant . The copy of the said level sheet shall be sent to the Employer for record.

Excavation in trenches / over areas - Rates shall include for cartage of materials outside the/Contractor's own dump including all cost for transportation.

3. FILLING WITH APPROVED EXCAVATED EARTH:

The plinth and low laying areas on site shall be first filled in by approved excavated surplus earth, consolidated and quantity of filling measured. Before the item of filling with approved sand/soil brought from outside is operated, the contractor shall take prior permission of the Consultant . The rate of Contractor shall include the filling of approved excavated earth, unless otherwise specified in description of item.

4. FILLING WITH APPROVED EARTH BROUGHT FROM OUTSIDE BY THE CONTRACTOR:

- a. Black cotton soil shall not be used for back filling. Soil used for filling shall be free from roots and vegetable moulds and shall be approved by the Executive Engineer.
- b. Earth for filling brought by the contractor from his own source from outside shall be of approved quality and from approved source.

5. METHOD OF EARTH FILLING:

Earth filling shall be in layers not exceeding 15 cms. (30 cms in case of site filling) thick, watered and thoroughly consolidated. All lumps clods are to be broken up so as to allow a regular subsidence of the work through out. The finished surfaces shall be formed to correct lines, levels, slopes, shapes, etc. as directed.



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6. RATES OF EARTH/SAND FILLING BROUGHT FROM OUTSIDE BY THE CONTRACTOR:

Rates quoted shall include cost of earth, royalty, taxes, octroi, duties, all transport, plant and machinery required for carrying, handling, dumping and consolidation, labour, loading and unloading at all points, stacking, lead and lifts, dumping sectioning, dressing consolidation, making payments and deposits to all concerned (local and Government) authorities. Rates shall also include bailing out surface water due to rains or sub soil water if encountered and de-watering by pumps wherever required.

7. TEMPORARY DRAINAGE ARRANGEMENTS:

Adequate drainage arrangement must be made to provide katcha drainage at suitable intervals as directed by the Consultant so as to prevent flooding in the locality on account of filling, Some gaps may also be kept and suitable pipe drain or katcha culverts be provided so as to keep the area dry. No extra payment will be made for the temporary drainage arrangements so provided.

8. MODE OF MEASUREMENTS :

**i. (Mode of taking cross sectional areas :
(IN CASE OF FILLING OF LARGE AREAS)**

- a) Before commencing filling in the low lying site detailed cross sections shall be taken at every 5 mtrs or at suitable intervals, as may be required both ways as decided by Executive Engineer. For this purpose a base line shall be fixed along edge of the area and parallel cross sections lines will be fixed at every 5 mtrs. or suitable intervals along this base line. Levels shall be taken at sufficiently close intervals and at salient points along each of these cross section lines. In all cases leveling must precede filling. The cross section along which levels are taken will be permanently demarcated with their starting and terminal points to represent fixed chain age of their respective cross section. all further leveling for finding out quantities will be done on these cross sections only.
- b) In order to fix these base lines and cross section lines etc., before start of work the contractor shall provide the pillars for bench marks at his cost and maintain them till completion of work and till final measurements are recorded. The said pillars for bench marks shall be 25 cms x 25cms brick masonry with plaster.
- c) After levels in a 5 mtrs. (or suitable intervals as may be decided) grid have thus been taken and jointly signed by the contractor and Consultant the filling shall be commenced. The method of quarrying, conveying and filling is left to the contractor who shall however have to get the same approved by Consultant before starting the work. The materials may be quarried by a bull dozer, shovel, etc., and conveyed by trucks to site.
- d) The final measurement of the filling will be with reference to the stipulated level as directed by the Consultant only. Other measurements being treated as purely interim for part payment. Thus the final measurements will be for the quantity inclusive of consolidation that takes place till then.
- e) The interim payments shall be based on the quantity of filling arrived at by cross sections used on average of existing Ground level and the top levels of filling under development of



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area. However, for final measurements the quantity of the earth filling should be worked out on sectional method.

- f) The contractor shall carry out the filling in the area marked by boundary stones as and when directed. No payment shall be made for materials dumped in any other area without the knowledge and permission of the Consultant.
- ii. Interim payments will be made by taking spot levels and thereby arriving at the average depth of filling which will be multiplied with area to arrive at cubical contents.
- iii. The final measurement will be by section measurements using following formula:
 - A. Area of cross section = $d/3 \{(\text{first ordinate} + \text{last ordinate}) + 4 (\text{total of even ordinates}) + 2 (\text{total of odd ordinates})\}$ where d = Distance between the ordinates.
The above formula shall be used for odd number of ordinates.
Note: In case the numbers of ordinates are even, the area of last section shall be computed on the basis of average ordinate of last section.
 - B. Volume = $D/3 \{(\text{area of first section} + \text{Area of last section}) + 4 (\text{total of areas of even sections}) + 2 (\text{total of areas of odd sections})\}$

Where D = Distance between the Section.

NOTE: The above formula shall be used for odd number of sections. In case the number of section is even the volume of last section shall be computed by average method.

- iv. **The net quantity of filling for payment shall be arrived at by applying five percent (5%) deductions from the total consolidated quantity of filling computed as above.**

2. CONCRETE WORK

GENERAL :

P.C.C shall mean Plain Cement Concrete.

R.C.C. shall mean Reinforced Cement Concrete.

R.M.C shall mean Ready Mixed Concrete

1. All concrete specified in this tender shall be ordinary mix./ Design Mix/ Ready Mix concrete.

2. MIXES OF CONCRETE:

Concrete used shall be in volumetric mix such as 1:4:8, 1:3:6, 1:2:4, 1:1.5:3, 1:1:2, etc. (Cement: Sand: Stone Chips) / Design Mix/ RMC such as M20, M25 etc.

3. WORKABILITY:

Workability of concrete should be controlled by direct measurement of water content, making allowance for any surface water in the fine and coarse aggregates. The slump test or compacting



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factor test shall be carried out at intervals as directed by the Consultant. The slump test is suitable for slump of 5 cm. to 15 cm.

4. ALLOW IN RATES FOR CONCRETE ITEMS:

Apart from various factor mentioned elsewhere in the tender, rates quoted for all concrete items shall include for:-

- a) All labour, materials, use of equipments, tools and plants etc.
- b) All necessary operations for the proper volume batching, mixing, handling, transporting, placing, directed, hacking of concrete surfaces where they have to receive plaster (but the plaster on concrete surfaces shall be measured and paid separately under respective plaster items) etc.
- c) Pouring concrete around reinforcement for reinforced concrete work but reinforcement shall be measured and paid for separately, unless otherwise stated in the tender.
- d) Rates quoted for all concrete items shall include for concreting of structural members of any shape and sections as per drawings including providing slopes to slabs, beams, chajjas, canopies etc. wherever required. Form work shall be measured and paid separately.
- e) Allowing work of another agencies being carried out by them like laying conduits, boxes, pipes, clamps etc. as directed before laying concrete and coordinating with other agencies viz, electrical, sanitary ,air conditioning and ventilation Contractor and other agencies working on site.
- (a) Filling the bolt holes (of the shuttering) on concrete surface with cement mortar (1:3) and finishing the same as directed.

5. FORM WORK:

- a) Irrespective of what is stated in general specifications for builder's work, trade preambles for "CONCRETE", contractor's rates quoted for concrete items shall be exclusive of form work. Formwork for all concrete items shall be measured and paid for separately. Form work or shuttering shall be water tight and for all concrete of mix 1:2:4 and higher grades shall be of timber/Steel/Plywood unless otherwise specified. Area of shuttering in contact with concrete surface shall be measured for payment purposes.
- b) Unless otherwise stated, rates quoted for formwork shall include columns /slabs /beams etc. at regular floor heights upto 3.5 meter or at smaller heights as shown on the drawings.
- c) The materials used for shuttering, if not confirming to the specifications required for providing waterproof shuttering, shall be rejected.



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- d) For the purpose of measurement of formwork for external side of external/end beams full heights from top of slab to bottom of beams shall be considered under formwork for the beams.

6. **ALLOW IN RATES FOR FORM WORK:**

Apart from various factors mentioned elsewhere in the tender, rates quoted for the formwork items shall include for:-

- a) All labour, materials, use of equipments, tools, nails, bolts, screws, Centering, oiling etc. required for formwork specified in the tender.
- b) All necessary operation for the proper erection and removal of the formwork when directed.
- c) For necessary provision in the formwork for forming holes and pockets for bolts, balusters, for taking out dowels bars, fan hooks and for other inserts in the concrete as shown including making provisions for other large size openings for doors/ windows/ ventilators/grills etc. in the walls.
- d) For formwork of any shape and sections as per drawings including providing necessary slopes, camber to slab, etc. wherever required.
- e) For necessary provisions in the formwork for forming chamfers, bands, splays, drip moulding, rounded or curved angles, chases, grooves, rebates, making notches, dowels etc. in the concrete wherever directed.
- f) For making construction joints and dummy joints as directed.
- g) Work involving plain or circular, straight or curved forms or in slopes etc. as directed.
- h) Sinking of formwork wherever shown on drawings.

7. **CEMENT SHOULD CONFORM TO FOLLOWING STANDARDS (IS: 269-1976 / IS: 8114) / IS: 455:**

a) **FINENESS:**

When tested for fineness in terms of specific surface by Blaines' air permeability method as directed in IS:4031-1968, the cement shall comply with the following requirements:

<u>Type of Cement</u>	<u>Specific Surface Sq/Cm/g</u>
Ordinary	Not less than 2250
Low heat	Not less than 3200

b) **SOUNDNESS:**

- b.1. When tested by the 'Le Chatelier' method described in IS:4031-1968, unaerated ordinary and low heat Portland cements shall not have an expansion of more than 10mm.



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- b.2. In the event of the cement failing to comply with the above requirement, a further test shall be made by the 'Le Chatelier' method described in IS:4031 - 1968, from another portion of the same sample, after aeration, by being spread out to a depth of 75mm at a relative humidity of 50 to 80 % for a total period of 7 days, when the expansion of each of the two types of cements mentioned above, shall not be more than 5mm.
- b.3. Un-aerated ordinary and low heat Portland cements having a magnesia content of more than 3 % shall be tested for soundness by autoclave test described in IS:4031-1968 and shall not have an expansion of more than 0.8%. However, if specified by the purchaser at the time of placing the order, cements having a magnesia content of less than or equal to 3%, shall be also tested for autoclave expansion as described in IS:4031-1968 and shall not have an expansion of more than 0.8%.

c) SETTING TIME:

The setting time of the cements, when tested by the Vicat apparatus method described in IS: 4031-1968 shall confirm to the following requirements:

	<u>Ordinary</u>	<u>Low heat</u>
i) Initial setting time in Minutes, not less than	30	60
ii) Final setting time in Minutes, not more than	600	600
d) Compressive Strength: The average compressive strength of at least three mortar cubes (area of face 50 Sq.cm.) composed of one part of cement, three parts of standard sand (Confirming to IS: 650-1966) by mass and P/4 + 3 % (of combined mass of cement plus sand) water and prepared, stored and tested in the manner described in IS: 4031-1968 shall be as follows:		
Kgf/SqCm.	Ordinary	Low Heat
a) 72 + 1h, not less than	160	100
b) 168 + 2h, not less than	220	160
c) 672 + 4h, not less than	-	350

Note 1: Standard sand shall confirm to IS:650-1966

Note 2: P is the percentage of water required to produce a paste of standard consistency.

8. WATER PROOFING COMPOUND:

Cement water proofing compound wherever mentioned in the items shall be "IMPERMO" manufactured by M/s SNOWCEM (India Ltd.) , 2% by weight of cement or "CICO" waterproofing



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compound manufactured by M/s STRUCTURAL WATERPROOFING Co. Pvt. Ltd., Kolkata, 3% by weight of cement or other equal and approved as per Manufacturer's Specification and rates quoted shall include for the same (As per approved materials).

9. MATERIALS: ALL MATERIALS SHALL BE OF APPROVED QUALITY.

10. AGGREGATES:

Aggregates shall conform to IS:383/1970 and IS:2386-1963 and shall be from approved sources.

11. LOADING OF FLOOR SLABS:

Materials shall not be stored or stacked on suspended floors and roofs without the Corporation's Engineer's prior approval.

12. WATER :

Water used for both mixing and curing shall be potable and free from injurious amounts of deleterious materials which are likely to affect the strength or durability of concrete. Water containing any sugar shall not be allowed for use. Also, water which fails to satisfy the following requirements shall be not be used

- a. To neutralize 100 ml. sample of water, it should not require more than 5 ml. of 0.2 normal HCL.
- b. To neutralize 100 ml. sample of water, it should not require more than 25 ml. of 0.02 normal H₂SO₄.
- c. Water should not contain solids in excess of the following :-

Organic	200 mg/ltr.
Inorganic	3000mg/ltr.
Sulphate (as SO ₄)	400mg/ltr.
Chloride (as Cl)	2000mg/ltr. (for P.C.C)
Chloride (as Cl)	500 mg/ltr. (for R.C.C)
Suspended matter	2000mg/ltr.

The PH value of water shall be between 6 to 8.

13. SAMPLES AND TEST:

Every facility shall be provided to enable the Consultant to obtain samples and carry out test on the materials of construction, if these tests show that any of the materials of construction do not



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comply with the requirements of this specification, the Contractor will be responsible for the cost of the tests and the replacement of the defective materials and/or construction.

14. REJECTED MATERIALS:

All materials which have been damaged contaminated or have deteriorated or do not comply in any way with the requirements of the specifications shall be rejected and shall be removed immediately from the site at the Contractor's own expense.

3. BRICK WORK

1. Nominal Size of brick shall be 250 x 125 x 75 mm. from approved source. Bricks shall be well burnt first quality, having regular shape with sharp corners, edges and should stand all tests as required by I.S.I. specification. One brick wall shall be considered as 250 mm thick, half brick thick shall be 125 mm thick and brick on edge shall be 75 mm thick.
2. The brick should have minimum crushing strength of 75 kg per sq.cm.
3. The rates quoted shall include for all work like those in walls, jambs, pillars, mullions, steps, kerbs or thresholds, corbels, nibs and raking out joints, cutting, scaffolding and curing.
4. The rates quoted shall also include for recesses, cutouts etc., in brick work for electrical/plumbing works if required.
5. Sand for masonry mortars shall be as per I.S. 2116-1965 as applicable to unreinforced brick work.
6. For exposed brick work, selected and approved facing, bricks shall be used having uniform colour, size and sharp edges. Faces of bricks shall be protected from staining by cement mortar splashing.

4. STEEL AND IRON WORK

1. Rates for M.S. Door and window frames shall include for fabrication, cutting and bending to required size and shape, drilling, punching, counter sinking, welding, filling etc. finishing, erecting, fixing in position and all concrete work for grouting/ embedding wherever required including painting. Concrete for grouting/embedding shall not be considered in the measurement of the weight and shall not be paid separately also.

SPECIFICATION FOR PRESSED STEEL DOOR FRAMES:

I. MATERIAL:

- a. Steel door framed shall be manufactured from commercial mild steel shall be 1.25mm thickness conforming to I.S.:435±-1976.
- b. Steel door framed with or without fan light shall be made in the profiles described which may be manufactured to suit doors of either and, opening inwards or outwards as directed by Engineer-in-Charge.



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II. **CONSTRUCTION:**

Each door framed shall consist of hinges, jamb, lock jamb, head and if Required, angle threshold. The whole shall be welded or rigidly fixed together by mechanical means. Where no angle threshold is required, temporary bar tie shall be screwed to the feet of frames in order to form rigid unit. Where no specified base ties shall be pressed mild steel 1.25mm thick adjustable to suit floor thickness of 35 or 40 mm and removable, or alternatively, threshold shall be provided for external frames

FABRICATION: The fixing lugs there shall be 3 adjustable lugs with the split and tail to each jamb without fan light, and 4 for jamb with a light. The head of the fixing lugs shall be of one of the following lengths.

- i. 95mm long for use with profile A.
- ii. 120mm long for use with profile B.
- iii. 160mm long for use with profile C.

The head shall be made from flat steel strip 25mm wide and not less than 1.6 mm thick. The tail of the locks shall be 200mm long and shall be made to steel strips not less than 40mm wide and not less than 3mm thick.

Hinges 100mm mild steel butt thickness shall be used. For frames for door shutters width less than 90 cm. 3 hinges shall be welded to one jamb for single shutter. For frames for door shutters width more than 90 cm. 4 hinges shall be welded to one jamb for single shutter. 3 hinges of each jamb of framed shall be welded for double shutters.

In all cases the hinges, shall be fixed, that the distance from inside of the head rivet to the top of the upper hinges and the bottom of the lower, to floor is about 175 mm.

Hinges shall be made of steel 2.5 mm thick with a zinc coated removable pin of 6mm dia. The space between the two leaves of the hinge when closed shall be 3 mm and the leaf that is not welded to the frame shall have for counter sunk holes to take No. 10 wood screws.

MORTAR GUARDS:

Mortar guards as instructed by Consultant shall be provided. These shall be welded to the frame, at the head of the frame for double shutter doors to make provision for bolts.

LOCKS STRIKE PLATE:

There shall be an adjustable lock strike plate of Steel, complete with mortar guard, to make provision for locks or latches complying with the relevant Indian Standards. Lock strike plate shall be of galvanized mild steel and fixed at 95 cm from the head of the frame.



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SHOCK ABSORBERS:

For side hung door shutters, there shall be not less Than buffers of rubber suitable material inserted in the holes in the rebate and one shall be located on the CENTRE line of the lock strike plate and other two at least 45 cm. above and below the centre line of the lock strike plate. For double shutter doors, there shall be two buffers of rubber or similar suitable material inserted in holes in the rebate in the lock jamb only at the head and spaces 15 cm. at either side of the centre line of the door.

FINISH :

The door frame shall be either hot drip galvanized or painted or as specified. The surface shall be thoroughly cleaned, free of dust, mill-scale dirt, oil etc. Either by mechanical means, for example, sand or shot blasting or by chemical means such as picking and then painted or galvanized as directed by Consultant,

After pre treatment of the surface one coat of steel primer (Zinc Chromate) and two coats of enamel paints as directed by Consultant shall be applied to the exposed surface.

MEASUREMENT:

The length shall be measured in running meter correct to a cm. out to out of the frames.

RATE:

The rate shall include the cost of labour and material involved in all the operation described above including one coat of approved steel primer (Zinc Chromate) and two coats of enamel paint etc., complete as directed.

5. WOOD WORK AND JOINERY

1. Unless otherwise specified, rates quoted shall include for cost of copper oxidized iron butt hinges heavy quality extruded section, 3 nos. 100 mm size per shutter of doors and 2 Nos. 75 mm size per shutter of windows and ventilators with mild steel pins and copper oxidized screws. Hardware other than the hinges shall be paid separately.
2. Unless otherwise specified, rates quoted shall include for clear sheet waveless glass of approved make such as Triveni, Modi, Asahi or other Equivalent.
3. Doors shall be painted with 3 coats of synthetic enamel paints (First quality) of approved colour and shade including suitable primer. Although 3 coats of paints are specified, Contractor will have to do additional coats of paint, if well finished surface is not obtained to the satisfaction of the Consultant and there shall be no extra payment on account of this.
4. Panel inserts for door shall be both side commercial veneered particle water proof quality bonded with phenol formaldehyde synthetic resin adhesive and conforming to I.S./3097:1980.



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5. Timber in contact with masonry or concrete shall be coal tarred or creosoted before fixing and rates quoted shall include for the same.
6. Rates quoted for wood work and joinery shall include for rebates, joints, chamfers, molding, grooves, beads laps, rounded angles, notches, nails, screws, pins, anti-termite treatments etc.
7. Hardware for doors and windows shall be of approved make, all hardware shall be fixed with screws to match the hardware and rates quoted shall include for the same.
8. For factory made door shutters B.W.R. ply used as panel insert should confirm to I.S.: 303-1989.
9. All internal doors shall be provided 2 coats/or more if necessary at Synthetic enamel painting over a coat of primer.
10. Rate quoted by the contractor shall allow for above factors, all labour charges, all taxes and conveyance excluding cost of fixtures only.
11. Prime cost of item : Contractor shall purchased in the open market at competitive rates and fix in position hardwares, fixtures and fittings for doors etc., such as door handles, tower bolts, aldrops, night latches, door stopper, safety chain, magic eye etc., of quality size and make approved by the Employer and Consultant or his authorised representative, Contractor shall quote in item the percentage amount he would charge over the actual cost of the material and fixing them in position (Contractor will be paid the actual cost of materials, supported by vouchers plus percentage amount over it as per the quotation in this item.
A set of the approved samples shall be lodged with the Consultant until the completion of the work. The rates for the purchase of materials must be competitive. In case the Consultant is able to obtain the quotation in the open market for any material similar in specification to the one obtained by the Contractor as per vouchers produced by him, then the Contractor will be paid only according to the competitive rates obtained by the Consultant plus percentage amount over it as per this item and not according to the Contractor's claim. Hardwares for doors and windows shall be approved make and shall be fixed with required screws to match the hardware and rates quoted shall include for the same.
12. Flush doors shall be solid core ISI marked.
13. Factory makes panel door shutters as per IS: 1003 made from approved hard wood duly kiln seasoned as per IS-1141, chemically treated as per IS-401.

6. FLOORING AND FINISHING

1. Plain or colour cement tiles and terrazzo tiles shall be manufactured as per latest version of I.S.:1887/195¹ using gray or white cement and pigments and marble chips of sizes as required. Tiles shall be of size 250 X 250 X 20mm (10" X 10" X 7/8") or any other approved size.



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Thickness of wearing layer of the tiles shall not be less than 8 mm. Tiles shall be of approved colour, shade and make. A few approved samples of tiles is to be used shall be deposited by the Contractor in the office of the Corporation's Engineer.

2. White Glazed earthen ware tiles shall be of first quality as per our approved material list enclosed:-

	<u>Minimum</u>	<u>Maximum</u>
a. Glazed	- 5 mm. :	7mm
b. Ceramic	- 6 mm. :	8mm

3. **KOTA STONE** : Kota Stone specified in the item shall be got approved from Consultant. At its thinness part, no stone shall be thinner than minimum thickness specified in the tender item. Kota Stone used in the work shall be hard, sound, durable, resistant to wear. It shall be cut to shape and size as directed. Rough Kota stone shall have plain surface.

For machine polish Kota Stone, the exposed surface of the stone slab shall be machine polished, having smooth even and true plane. The stone slab shall be without any soft veins, cracks or flaws and shall have uniform colour. Kota stone for flooring, skirting, trade and risers shall have even natural surface free from broken flakes on top and shall be machine cut, edges shall not be marred by careless dressing of slab.

TOLERANCE:

The thickness or slab shall be as specified in the description of item. Tolerance of plus minus 2mm shall be allowed for the thickness. In respect of length and breadth of slabs, a tolerance of plus minus 5 mm. is allowed.

4. Cement Waterproofing Compound wherever mentioned shall be " IMPERMO" manufactured by M/s Snowcem (India) Ltd., 2% by weight of cement or CICO water proofing compound manufactured by M/s. Structural Water roofing Company Pvt. Ltd., Kolkata, 3% by weight or Cement or other equal and approved as per manufacturer's specification. The rates quoted shall include for the same.
5. Terrazzo / Marble mosaic/Ceramic/Kota/Kudappa/Shahabad/Tandur Stone/ Glazed tile in flooring, skirting, dado, treads and risers shall be laid as described in the schedule.
6. Rate quoted in the tender shall allow for above factors with all cost of labour, materials, taxes, conveyance, royalties, T&P etc., complete.
7. Internal Cement plaster to brick walls, columns, beams, lintels etc., shall be 12mm thick. R.C.C. slab soffits shall have cement plaster not less than 6mm thick. External cement plaster shall be 20mm thick in two coats (Under coat 12mm thick and finishing coat 8mm thick. except for R.C.C. members not flush with brick work which shall be 12mm thick in 2 coats (Under coat 8mm thick and finishing coat 4mm thick) such as R.C. facials, chajjas, canopies, drop walls, beam ribs, projected slabs etc. the rates quoted for plastering and finishing items shall include



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for Jambs, sills, drip moulds, bands, forming grooves, chambers, curved Angles, arises etc., and such other projections, which shall not be measured separately and paid for.

8. Rates quoted for painting and colour washing etc., shall include for providing shade or approved colour.

In case of painting, white washing and colour washing items, although number of coats are specified, Contractors will have to do additional coats if well finished surface is not obtained to the satisfaction of the Consultant and there shall be no extra payment on account of this.

Sand for mortar bedding for floors shall be from approved source and shall conform to I.S. 2216-1965 as applicable to unreinforced masonry works.

Sand for plaster shall be from approved source, and shall conform to I.S. 1542-1977 as applicable to internal walls and ceiling plastering and external wall plastering.

SPECIFICATION FOR SAND FOR PLASTER (IS:1542-1977):-

Table - I Grading of sand for internal wall or external wall or ceiling plaster:

SIEVE OF NOMINAL APPERTURE SIZE [See IS:460 (Part-I)-1978*]	<u>PERCENTAGE PASSING</u>
9.50mm	100
4.75mm	95-100
2.36mm	95-100
1.18mm	90-100
600 micron	80-100
300 micron	20- 65
150 micron	00- 15

NOTE : For crushed stone sands, the permissible limit on 150 micron nominal aperture size sieve is increased to 20% allowance permitted in

4.1 applying to other sieve size.

* specification for test sieves: part - I wire cloth test sieve (second revision).



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7. WATER PROOFING

GENERAL :

Specifications, as applicable for the trades and as given elsewhere in the tender are applicable in Toto except where otherwise mentioned in following parts or in the working of items. The rates quoted shall cover for complying with the same. Respective Trade Preambles wherever applicable shall apply to this section also.

The water proofing work shall be got executed from one of the specialist agency, names of which are given below or any other agency as approved by the competent authority, as per their specification under the overall supervision of the main builder's contractor. Rates quoted by the main Builder's contractor shall include for the waterproofing treatment through the water proofing agency and will cover for all over heads and profits.

Name of Specialized agencies:

a) M/s Kolkata Water proofing Co (b) M/s Asian Water Proofing Co, Ranchi (c) M/s New Asia Co. (Bangalore), Chennai & (d) M/s A.K Associates, Cuttack.

7.1 CRAZY MARBLE MOSAIC FLOORING/TOPPING ON TERRACES :

Work of Crazy Marble Mosaic tile topping on terraces shall be as given in the specification for Builders' work. Rates quoted shall include for the following factors also:

- a) Tile pieces shall be laid on screed of lime mortar 1:3 (1 lime: 3 sand) or Cement mortar 1:6, 20 mm thick (average) and floated in neat Cement slurry in required levels and slopes in crazy fashion.
- b) The joints between the pieces shall not exceed 3 mm. In width and shall be solidly filled with Cement mortar 1:3 mixed with waterproofing compound and finally flush pointed on top with neat Cement mixed with waterproofing compound.
- c) Cement waterproofing compound shall be as manufactured by one of the manufacturer/s as per the attached list and as per manufacturer's specification and shall be added to mortar bedding and Cement floating coat.
- d) The junctions of the topping/paving and the parapet wall shall be rounded/coved to be 75 mm radius and the topping/paving shall be extended up to the parapet wall for 15 cm. The top edge shall be finished in a neat horizontal line and tucked in a groove in a groove in the wall. Bell mouths around rain water pipe inlets etc. wherever required for effecting drainage, shall be formed in crazy marble mosaic tile-piece finish. Necessary channels/dishing as required shall be also formed.



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- e) After the topping/paving has been laid as required or the day's fixing work is completed, the surplus Cement grout that may have out of the joints on compacting shall be cleaned off.
- f) Proper slopes shall be imparted to the finished surface to drain off the rain water easily without any stagnation anywhere on the finished surface.
- g) Bitumen painting of slab shall extend upto parapet/curb/up stand for 150 mm.
- h) Necessary rounding/coves near parapet/curb/up-stand shall be done and junction made leak proof
- i) Dishing near rain water outlets.
- j) Preparation of channels as required.

7.2. MEASUREMENTS :

Measurements for Lime Concrete as well as for crazy marble mosaic flooring/topping on terrace shall be only the respective flat area in plan of the terrace between the exposed internal faces of parapet walls/curbs/up stand portions. Cover/rounding etc. shall not be measured. While measuring the average thickness mentioned in the item, thickness of rounding/coves near the parapet walls/curb and the portion carried over the in the parapet wall shall not be considered.

7.3. Wherever the R.C.C. and brick corbelling courses are required to be provided on the same terrace floor, they shall be in line and level with each other.

7.4. The Contractors shall ensure water tight/leak proof construction. The Contractors, if they so desire may carry any further (in addition to the waterproofing treatment specified above) for waterproofing of surfaces as considered necessary by them, however the rates quoted by them for the items shall be amount shall be paid for the same.

7.5. WATERPROOFING- "CETROOF" TREATMENT:

(CEMENT BASED WATERPROOFING TREATMENT THROUGH SPECIALIST AGENCIES)

I. TERRACE WATERPROOFING :

Terrace waterproofing shall be "CETROOF SURFACE TREATMENT" (Permanent waterproofing treatment) by one of the Specialized Agencies mentioned in the list attached and shall be as per their Specification and shall be under Guarantee of 10 years against leakage.

This treatment shall start directly over R.C.C. slab and shall include for providing and laying of brick bat coba with necessary gradient for the easy flow of water. This coba shall be done in special waterproof mortar and shall be finally covered with "CETROOF" waterproof joint less plaster, finished smooth with trowel in grey cement colour, marked into 30 X 30 cms. False squares. The treatment shall be carried along the inside of parapet or other adjoining walls upto a height of about 300 mm. In the shape of round vata (rounding off). The surface provided shall



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be hard; and tough, suitable for all normal domestic purpose. Rate quoted shall include for making round vata and also for tucking the treatment on the vertical face of the parapet at required height including making necessary groove in the parapet for tucking. Rate quoted by the Contractor shall include for the above waterproofing treatment of Specialized Agencies, with all overhead and profits.

MODE OF MEASUREMENT FOR CETROOF TREATMENT OVER TERRACE:

Unless otherwise specified in the item in Schedule of Quantities, flat area covered between inside of the parapet wall (unfinished) shall be measured.. To this the area of the vertical surface treatment calculated by taking the inside perimeter of the parapet wall and the height of treatment over parapet wall measured from finished horizontal "CETROOF" treatment shall be added. In case the treatment is continued over the horizontal portion of the parapet on top, the same shall also be added to the areas calculated as above.

II. TOILET WATERPROOFING:

Toilet waterproofing by approved specialist firm under guarantee of 10 years.

- a) The main contractor shall while the concrete is still green, carry out smooth cement punning in thin layer to the bottom of side of sunk portions at the time of concreting of the slab.
- b) The brick bats from well-burnt bricks of about 40 mm. Size completely saturated with water shall be used for filling in sunk portion of toilets including space around W.C. pan.
- c) The surface of sunk portion where waterproofing is to be done shall be thoroughly cleaned with wire brushes. All loose scales shall be removed and dusted off. The cleaned surface shall be treated with neat cement slurry admixed with acrylic waterproofing compound to penetrate into services and fill up all porosities in the surface. The cracks observed, if any, in the slab shall be appropriately treated.
- d) After treatment at II (c) above, brick bats fully saturated with water shall be laid in position within layers of cement mortar 1:1 duly admixed with acrylic water proofing compound. The topmost layer of brick bat shall not be covered with cement mortar.
- e) Treatments at and II (g) shall follow except that top layer will be 12 mm. Thick and finished.
- f) This item shall be carried out after nahani traps, W.C. pan, all pipes are laid in position and are duly jointed. The treatment shall be worked well around the nahani taps. "P" or "S" traps, pipes and their joints, holes made in the walls shall also be treated suitable.
- g) 12 mm. Thick waterproof plaster in cement mortar 1:4 with acrylic waterproofing compound shall be carried out upto proposed height of dado in the toilets. Before carrying out waterproofing treatment on the wall, the wall surface shall be thoroughly cleaned and the joints of brick work shall be raked out if required treatment of Cement slurry admix with acrylic waterproofing compound be carried out to the wall. Junction of wall and top of slab/beam shall be treated with cement slurry with acrylic, W.P. compound by injection method.



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h) MODE OF MEASUREMENT :

- a) The filling of waterproof brick bat coba in sunk floors of toilet blocks shall be measured in Cum. as actually laid at site to the required level.
- b) Waterproofing plasters treatment to floor and walls of toilet block above the sunken slab/beam shall be measured separately in Sqm.. as actually provided at site over the required areas.

III. RATES TO INCLUDE:

- a) Contractor shall obtain a guarantee for a period of 10 years from the Specialist Agency carrying out the work and shall be jointly responsible for any defects noticed in the work during the above period. Rate quoted shall include for the same.
 - b) Rates quoted by the Main Builder Contractor shall include for the above water proofing treatment by one of the Specialized Agencies with all overheads and profits to execute the work and no extra will be paid.
 - c) Rates quoted by the Contractor shall also allow for the leakage test to be carried out as stated below. Any leakage/dampness noticed shall be rectified by the Contractor at his won cost.
- IV. Waterproofing work shall be guaranteed for then years in approved proforma (see Annexure "R" attached herewith) acceptable to the Employer, on a stamp paper of required denomination. This guarantee will be given by the Specialist agency carrying out the work directly to Consultant and counter signed by the Main Builder's Contractor and furnished to Consultant as soon as the work is virtually completed and before the final bill is settled.

Although the waterproofing work is guaranteed by the Specialist Agency for 10 years, the Main Builders' Contractor shall be responsible, if at any time during the defects liability period, the surfaces treated for waterproofing by the Specialist Agency given way to the inadequacy of the work carried out or used or for any other reason what so ever relating to materials, workmanship etc. and shall be liable without any extra cost and inconvenience to the Employer or the occupants to carry out the necessary remedial measures as and when required during Defect Liability Period.

V. LEAKAGE TESTS:

(Applicable to all types of waterproofing treatments to terrace and toilet blocks).

After completion of waterproofing work of terraces as well as toilet blocks, the leakage test shall be carried out by impounding the water 75mm. to 150 mm. deep, over the surfaces treated for a period of 10 days, without any extra cost.

"Joint inspections shall be carried out by the Contractor daily with Consultant representative to find out leakage/dampness of the surface if any. In case, any leakage/dampness is noticed, the same shall be rectified by the Contractor without any extra cost to LIC HFL Care Homes Ltd. Rates quoted by the Contractor shall allow for the above test also.



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8. ALUMINIUM DOORS, WINDOWS AND VENTILATORS

1. Aluminium alloy section shall be as per "LIST OF PRINCIPAL/APPROVED MAKES "
2. All aluminium work shall be free from defects impairing strength, appearance and shall be of the best available quality for the purpose specified. All aluminium alloy sections used in the fabrication shall be of heavy quality, sturdy, extruded sections to withstand wind pressure of high intensity, other forces and day to day handling and shall be free from rattling, leakage, etc- all conforming to latest versions of IS-733-1956 and IS-1285-1958 for "Specifications for wrought Aluminium, Anodised Aluminium alloys, bars, rods and sections and extruded round, tube and hollow sections (for General Engineering Purposes only)."
3. Anodic coating shall be of minimum thickness of 15 microns. Anodising shall be of mat finish natural/coloured as specified, conforming to latest version of IS-1868-1968. Anodising shall be carried out on all exposed faces. Surfaces in contact with masonry, concrete, plaster or any other dissimilar materials shall be coated with Zinc chromate primer conforming to IS-104-1950. Further the contractors shall cover all anodised, finished work with a thick layer of clear, transparent laquer, based on methacrylates or cellulose butyrate to protect the surfaces from wet cement during installations. This lacquer coating shall be removed on completion. if necessary, the contractors shall provide for visits to his workshops where the manufacture of members, anodising, etc are being carried out by him.
4. Contractors shall commence manufacturing Doors, windows, ventilators, etc. only after the shop drawings showing full size sections, thickness of metal, detail of construction, hardware, etc. are approved by the Consultant
5. In case any modification in size, thickness and weight are required to any members of Doors, windows, ventilators, etc. same shall be carried out by the contractors and suitable adjustment shall be made on the basis of relevant tender items.
6. The Chief Engineer reserves the right to delete any or all items of this trade and allot the work under this head to any specialized agency/agencies. No claim whatsoever shall be entertained on this account.

7. HARDWARE :

Hardware shall be of best quality extruded section and shall be of anodised Aluminium with natural/Bronze finish. Hinges shall be of heavy pattern with stainless Steel pins and nylon/stainless steel washers. Contractor's rate shall include for necessary Screws, Bolts and other devices for neat and secure hardware arrangement. The bolts and wood screws etc. shall be cadmium plated brass, sheet metal screws wherever used shall be GKW or equivalent approved, of required size to securely and permanently fix the hardware in place. No steel or iron screws shall be used.

8. GENERAL :

All the manufactured Doors, windows, ventilators, etc. shall be stacked on site under cover. Damaged surfaces with defects like scratches, etc on finished work shall not be accepted.



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Fabricated materials shall be created in an approved manner to protect the material against any damage during transportation. Loading and unloading shall be carried out with utmost care. The Doors, windows, ventilators, etc. on arrival at site shall be carefully examined to detect any damaged pieces. Arrangements shall be made for expeditious replacement of damaged pieces/parts. Materials found to be acceptable on inspection only shall be used.

9. The frames shall be square and flat and corners of the frames being fabricated to true right angles. Both the fixed and opening frame shall be of sections which have been cut to length, mitred and mechanically jointed and/or electrically welded at corners as required for satisfactory performance. Subdividing bars shall be toned and riveted into the frames. All frames shall be accurately machine milled and fitted to form hair fine joints. The jointing accessories such as cleats, brackets, etc., shall be of such material as not to cause any bimetallic action and as per approved samples.

Dimensions shown in the drawings and tender are overall heights and widths to the outside of the frames of Doors, windows, ventilators, etc. and shall be considered as approximate, structural dimensions, only. Contractors are advised to verify the dimensions before fabricating and fixing the Doors, windows, ventilators, etc. in position after allowing the margins for sub frames (40 to 50 mm) as well. Payment shall be based on actual size provided.

10 **METHOD OF FIXING :**

- a) Aluminium members coming in contact with masonry shall be fixed by means of slotted steel lugs, not less than 100 mm x 16 mm, 3mm with counter sunk galvanized machine screws and nuts 19x 6.3 mm and to concrete works by means of 45 mm No.10 galvanized wood screws.
- b) Fixing screws and lugs

Outer frame/sub frame shall be provided with fixing holes centrally in the web of the section at approved intervals. Any steel lugs coming in contact with Aluminium should be either galvanized or given one coat of bituminous paint. After fixing the members in position as stated above, the space between the concrete surface and the frame of Doors, windows, ventilators, etc. shall be pressure grouted with CM 1:4 so as to achieve absolute water tightness between the frame and inside surface. Care shall be taken that exposed surface of opening is not damaged while fixing Doors, windows, ventilators, etc.

Further, all vertical, horizontal members of Doors, windows, ventilators, etc. shall be provided with Neoprene/ EPDM weather stripping.

The contractors shall design, fabricate and fix in position, sub frames, Doors, windows, ventilators, etc. in such a way that water penetration is totally and effectively sealed and any dampness on inner surfaces is totally eliminated. The shop drawing submitted by the contractor shall show the method of sealing the water penetration also.



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Doors, windows, ventilators, etc. shall be fixed to sub frames by means of screws of adequate size and numbers, which shall be cadmium plated brass.

The method of fixing as above shall generally be followed and members used in the manufacturing of units shall be designed accordingly. However, contractors are free to adopt any other equivalent, approved method of fixing. In no case, fixing shall be allowed over wooden runners.

Doors, windows, ventilators, etc. shall be designed not only for their strength, stability, stiffness against all odds but also for easy operation, water tightness, easy replacement of glass and cleaning from inside.

11. GLASS & GLAZING :

Glass shall be of specified thickness and shall be ASAHI or MODI float waveless glass or equivalent, approved, clear sheet glass or tinted as specified in schedule of quantities.

Before installation of glass, contractor shall ensure the following:-

- a) All glazing rebates shall be square, plumb, true in plane, clear, dry and free of dust.
- b) Glass edges shall be clear and cut to exact size, glass with chipped or damaged edges shall be rejected.
- c) Glass shall be set in glazing clips and so installed as to achieve proper water tightness.
- d) Suitable Neoprene, EPDM gaskets shall be used for fixing glass so as to prevent rattling.
- e) Beading shall be of anodized Aluminium section as per schedule of quantities.
- f) Putty shall be applied to beading face in contact with glass and if necessary also filled at back-conforming to the latest version of IS-420-1953. On completion of job, all glass shall be thoroughly cleaned and freed from dirt, putty or other adhering material.
- g) Wastage in cutting shall be to contractors' account. Frosted/Ground glass shall be set with smooth surface outside.

12. Contractors shall submit detailed drawings showing various members of Aluminum Doors, windows, ventilators, etc. which they propose to use, along with their filled in tender.

13. MODE OF MEASUREMENTS:

Aluminium Doors, windows, ventilators shall be measured in Kg. Any fixture or projection embedded in concrete/masonry work shall not be measured. Samples of all sections, accessories, beadings, etc. shall be got approved, weighed and preserved at site.

Rate shall include for fittings and fixtures shown on the shop drawings approved by the Chief Engineer.

14. RATE TO INCLUDE:

Part from other factors mentioned elsewhere in this tender document, rates for the items for supplying and fixing aluminium doors, windows and ventilators shall also include for the following :



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- a) All accessories, for fixing doors, windows and ventilators to concrete/masonry surface as described in the trade.
- b) Filling sealants as per details to ensure water tightness. All the sealants must be permanently resilient and of non-bleeding nature.
- c) EPDM weathering strips as directed.
- d) Drip strip to drain out water falling on the members of the frame.
- e) Pressure grouting in CM 1:4 the space between the concrete surface and the frame of windows and ventilators, or sub frames, as per site conditions.
- f) EPDM gaskets for fixing glass.
- g) Cadmium plated brass wood screws wherever specified.
- h) Galvanized/ Aluminum channels pieces, coach screws, raw plugs, etc. of required size and nos. for fixing doors, windows and ventilators frames in position.
- i) Necessary scaffolding/cradle for erection of aluminum doors, windows and ventilators in position.
- j) Rates for sliding/ doors/ windows and ventilators to include for adequate arrangements for draining out water collected in the channels of the outer frame.
- k) For all Doors, windows, ventilators, etc. openings, contractor shall prepare MS retrieval template frames with necessary tolerance for obtaining correct dimensions of openings in masonry/concrete works.
- l) Suitable, approved cleats, etc. at every joint of outer frame.

15. VARIATION OF WEIGHTS:

The contractors shall base their quoted rates on total weight of Aluminium content for Doors, windows, ventilators units excluding hardware and glass, proposed by Consultant in the items



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TECHNICAL SPECIFICATIONS.(SUB STATION)

1.0 Statutory and Reference Standards:

Statutory requirements are those which are mandatory and governed by Electrical Inspectorate of the state. These rules are covered under Indian Electricity Rules 1956.

1.10 IE Rule 35: Danger Notice

This rule specifies affixing permanently a danger plate on transformer in a clearly visible location. The descriptions shall be in English and local language of the place and approved by Electrical Inspector.

1.11 IE Rule 45

This rule stipulates the precautions to be adopted by consumer, owner electrical contractor, workman and supplier. It states that installation work shall be carried out by licensed contractor/person holding supervisor's license or party recognized by state government.

1.12 IE Rule 50

This rule deals with supply and use of energy and gives the requirement of isolation facility on both primary and secondary side of transformer.

1.13 IE Rule 51

This rule stipulates the minimum clearances to be kept around switchgear, transformer (though not explicitly said) (For the indoor installation of transformer, detail guidelines are given by IS:10028 (Part-II): 1981 and Tariff Advisory Committee which is subsequently described in this guide).

1.14 IE Rule 61 and 67: Connections with Earth

This is dealt in detail later in this guide under "earthing".

1.15 IE Rule 63: Approval by Inspector

This rule stipulates the necessity of getting the installation approved by Inspector.

1.16 IE Rule 64: Use of Energy at High or Extra High Voltage

This rule stipulates the requirement of providing fire proof walls, use of soak pit for transformers having oil more than 2000 litres, land requirement of cable trenches.

These guidelines are given in detail by both IS:10028 Part-II 1981 and TAC, which are subsequently described in this guide.

1.17 IE Rule 65: Testing operations and maintenance



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This rule stipulates the necessity for testing and maintaining records of testing operation and maintenance carried out on the transformer and other equipment connected with it.

1.18 IE Rule 68: General Conditions As to Transformation and Control of Energy

The requirements given under this Rule are elaborated in guidelines given by IS:10028.

1.19 IE Rule 114: Isolation and Fixing of Transformer Switchgear etc

1.20 **All the above rules shall be considered along with the guide lines given in IS:10028 (part-II):1981 Code of Practices for selection, installation and maintenance of Transformers (Part-II: Installation)**

1.21 IS:10028(part-II).

1.22 **Isolation: Clause 3.5 of IS:10028: A circuit breaker or a linked switch of requisite breaking capacity shall be installed on both sides of transformer, unless specifically exempted by the authorities so as to break the current on all phases and to isolate the transformer from both sides.**

33/11KV Power Transformer and 11KV/433v Distribution Transformer.

1.0 SCOPE:

- a. The work covers Loading, unloading at site, inspection, handling assembly & erection, testing & commissioning of oil cooled transformer.
- b. Loading, unloading at site, inspection, handling assembly & erection, testing & commissioning of 11 KV materials.
- c. Foundation / plinth for substation.
- d. Earth stations.
- e. H.T. & L.T. cabling and associated work.

1.1 **SPECIFICATIONS FOR 11KV/433V, DISTRIBUTION TRANSFORMER.**

1.2 Site Details :

Location	: LIC, HFL Care Home project at Bhubaneswar.
Reference ambient	: 40 deg C.
Supply	: 415 + 10%, 3 Phase, 4 Wire, 50 HZ

1.3 Standards:

The transformer shall conform to the latest edition of the following and other relevant Indian Standards.



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IS:2026 / IS:11171 – Power Transformers.

IS:335 -- Transformer Oil.

IS:10028(PARTII & III)—Installation & maintenance of Transformer .

IS:2099 – High Voltage Porcelain Bushings.

IS:3639 – Power Transformer Fittings & Accessories.

The Out Door Transformer shall confirm to IP 33 Protection.

1.4 **Rating and Specific Requirements :-**

- | | | |
|----|-----------------------|---|
| a. | Application | : L.T. Distribution Transformer./ Power Transformer |
| b. | Service | : Outdoor, Step Down. |
| c. | Type | : Oil cooled Cooper wound , Outdoor type |
| d. | Rated Output | : 500 KVA, and 1600 KVA |
| e. | Quantity | : 5 (Five sets) and Two sets |
| f. | Cooling | : ONAN |
| g. | Voltage ratio | : 11KV / 433V (DY11) and 33/11 KV |
| h. | Number of Phases | : Three |
| i. | Rated Frequency | : 50 Hz |
| j. | Temperature Rise | : 45 deg cent. (windings), 40deg cent (oil) |
| k. | Insulation Class | : B |
| l. | Connection on HV side | : Delta |
| m. | Connection on LV side | : Star |
| n. | Vector Group | : Dyn11 |
| o. | Terminal arrangement | : |
| | (a)H.V. side | : HT bushing. |
| | (b) LV side | : Cable Box |
| p. | LV neutral | : Neutral shall be brought out for connecting
Earthing conductor in addition to neutral terminal in cable box. |

1.5 **Fittings:**

- Conservator with oil Gauge.
- Cooling Radiators.
- Lifting Hooks/Terminals.
- Oil filling/Drain Valve.
- Bi- Directional Rollers.
- explosion Vent.
- Thermometer Pocket.
- Air release Plug.
- De hydrating silica Gel.
- Double float Buchholtz Relay with Trip & alarm contacts.

1.6 **Tests at works :**

All routine and other tests prescribed by IS2026 shall be carried out at the manufacturers works before despatch of the transformer in presence of the Engineer of the consultant and copies of the test reports are to be submitted to the consultant.

Test at Site:- All relevant pre commissioning checks and tests confirming to IS 10028 (part II & III) shall be done before energisation.The following tests are to be particularly done before cable jointing:-



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- a) Insulation test between HV to Earth and HV to MV with 5000 Volts Megger.
- b) Insulation test between MV and Earth with 500 Volts Megger.
- c) Di electric test of oil.

1.7 Unloading at site:

In case where the substations are having adequate crane facility the transformer is unloaded by crane. Alternatively mobile cranes shall be used for keeping the transformer into position.

1.8 INSPECTION AND STORAGE:

1.9 Inspection :

Transformers are liable to get damaged during transit and therefore, it is recommended that immediately on arrival the transformer shall be unpacked and examined for any sign of transit damage & particular attention being paid to the following:

- a. Bushings cracked or broken.
- b. Bolts lose due to vibration in transit.
- c. Damaged due to Auxiliaries.

If it is suspected that that the transformer has suffered physical damage, it shall be brought to the notice.

Serious damages - Serious damages shall be reported to the manufacturer. It is advisable that the representatives of the manufacturer be present before for further inspection to ascertain the extent of damage.

Slight damages which does not appear to be serious but which indicates heavy knocks shall be treated with caution in consultation with manufacturer, Consultant & client & report of this examination shall be made.

1.10 Storage:

Transformer received at site and not expected to be installed immediately are like to absorb moisture. Transformer shall be stored under cover and the transformer shall preferably be filled with oil to reduce the extent of possible condensation of moisture and the breathing pipe shall be plugged.

1.11 INSTALLATION:

1.12 General:

A set of record plans shall be provided by the installation Engineer clearly indicating the complete layout of the installation. A schedule of the works to be carried out with time required shall be charted out.

1.13 Precautions:

As far as possible no work shall be done during rainy seasons to avoid moisture absorption by the transformer.



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Extreme care shall be taken to prevent any foreign material from being dropped into the transformer. Workmen having access to the interior of a transformer shall empty their pockets of all loose materials. Any spanners or other tools used shall be securely tied so that they can be recovered easily if accidentally dropped.

The transformer shall be erected on a level foundation.

1.14 Handling:

Transformers shall have lifting hooks provided for the purpose lifting & keeping the Transformer on the foundation. Before lifting the complete transformer it shall be ensured that all covered bolts are tightened. No Jacks shall be used for lifting.

1.15 Site preparation:

All tools and other equipments required for the erection work to be arranged at the site before the work started.

1.16 Earthing of Transformer:

Transformer neutral shall be connected to two separate and distinct earth electrodes using appropriate size of the earthing conductors.

The body of the transformer shall be earthed at least at two points using appropriate size of earthing conductor and shall be connected to at least two separate & distinct earth electrodes.

1.17 Foundations:

The foundation shall be done as per the tender specifications.

1.18 Bushings and cables boxes:

If Bushings are removed from the transformer they shall be carefully inspected for cracks or chips before installing them and making sure that gaskets are in proper places. Nuts or bolts which exert pressure on the porcelain shall be tightened evenly or else bushing may crack.

If the transformer is fitted with cables boxes and it to be connected by cables, the cable ends shall be sealed to prevent their absorbing moisture. PVC & XLPE cable boxes need not be filled with compound or oil.

1.19 Factory Testing of Transformer:

- a) Polarity Test/Phasing Test.
- b) Voltage Ratio Test with tap changer.
- c) Resistance Measurement.
- d) No Load Test & No Load Losses.
- e) Short Circuit Test & Full load losses.
- f) Insulation Resistance Test.
- g) Voltage Regulation Test.
- h) Percentage Impedance Test.
- i) Oil Temperature, Alarm & Trip Test.



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LT Switch Gears and Panels

Medium Voltage switch panel for 433 Volt ,3 phase, 50 Hz, 4 wire system, the general construction shall confirm to IS: 8623/1993 , for factory assembled switch board. The degree of enclose protection shall be IP 42 as per IS: 13947 (PART I).

Busbars:

The busbars shall be copper of high conductivity electrolytic duly tinned with suitable size heat shrinkable sleeves. Please note that the dimensions cross sections of busbars , spacing's and support materials and support spacing's should be as per IS.

Incomer/Termination:

Terminations shall be suitable for receiving under ground cables. Cable terminations shall invariably be through terminal blocks or brought out solid terminals.

Instruments:

All Volt Meters and Ammeters shall be flush mounted confirming to class 1.5 of IS 1248.

Indicating Lamps:

On all the incomers of the MV panels , ON/OFF indicating LED lamps shall be provided and shall be suitable for operation with AC supply. The phase indicating LED lamps shall be associated with necessary ON/OFF toggle switch.

Wirings:

All wirings for controls, indications, metering etc shall be of suitable capacity copper conductor wires/ cables neatly bunched, supported and clamped. Identification ferrules are to be provided at both ends.



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Cable works :

Specification of cable

33/11 KV grade XLPE insulated PVC sheathed armoured Aluminium/ Copper cable shall be 3 core earthed as specified. The cable shall confirm to IS :1554, Part(ii).

1.1KV grade XLPE insulated PVC sheathed armoured Aluminium/ Copper cable shall be 3.5/4 core of sizes as specified. The cable shall confirm to IS:1554, Part(i).

All control wires shall be 650 Volt grade , copper conductor wires and confirm to IS:1554(i). The minimum size of the control cable shall be 1.5 Sqmm.

Laying/ Installation

The cables shall be laid under ground , in trenches or on wall as specified. Installation shall include all supports and clamps as required. The complete work shall be as per tender specifications.

Earthing System

The earthing system shall comprise earth electrodes as per relevant IS and tender specifications.

Safety Requirements

Safety provisions shall be provided in the Sub. Station for compliance with statutory regulations , safety and operational needs. Safety provisions shall be generally in conformity with relevant IS.

33kv outdoor vcb for feeder protection

Scope of supply: The scope of this order includes for design, engineering, manufacture, testing , inspection before dispatch packing, forwarding, transportation, inspection during transit, delivery to site/ stores of 33Kv outdoor vacuum circuit breakers(feeder protection), with 33KV CT, 33KV PT & their CR panel should have 3O/C+1E/F numerical communicable relay with IEC protocol of 61850 or 60870 having trip relay, ammeter, KV meter for use in the 33/11Kv primary substations under the distribution networks of CESU along with all fittings and accessories as specified here under and in conformity to the guaranteed technical particulars enclosed herewith. All vacuum circuit breakers must be certified by ISO 9000 and type tested at any accredited laboratory/ CPRI. The scope of supply shall also includes G.I supporting structure for the circuit breaker & 33kv CT, 33KV PT, operating mechanism,



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local/remote control cabinet, relay control panel, foundation bolts, all the accessories and auxiliary equipment as detailed below and special tools for satisfactory installation and operation.

Basic Technical Requirements

Sl. No.	Particulars	Requirements
1	Service type	Outdoor
2	No. of poles	3
3	Nominal system voltage	33Kv
4	Highest system voltage	36Kv
5	Rated normal current at 50 ° C	
i.	For Bus-bar of circuit breaker	1250A
ii.	For interrupter	2000A
iii.	For outgoing feeders	
6	Rated short circuit breaking current(rms) for 3sec.	25KA
7	Rated short circuit making current(peak)	62.5KA
8	Rated short time current withstand capability for 3 sec.	25KA(panel)/25KA(interrupter)
9	Rated insulation level :	
i.	One minute power frequency withstand voltage to earth(wet and dry)rms	70KV
ii.	Impulse withstand voltage to earth with 1.2/50μ sec,wave of +ve and -ve polarity(peak)	170KV
10	First -pole - to clear factor	1.5
11	Rated operating sequence (for auto reclosing)	0-0.3 sec.- CO-3 min.-CO
12	Maximum break time	3 cycles
13	Rated out of phase breaking current	25% of the symmetrical short circuit breaking current
14	Maximum pole scatter	10 mili seconds
15	Rated auxiliary supply for spring charge motor , lamp and heater circuit	230V-A.C
16	Rated supply voltage for trip/ close coil	24V-D.C
17	Minimum creepage distance(mm)	900mm
18	Minimum protected creepage distance(mm)	580mm
19	33KV Outdoor CT (Live tank) Along with GI structure and with bi-metallic terminal connector.	Ratio : 200-100/1-1-1A Class: 0.5/5P10/PS Burden : 15/15/-
20	33KV Outdoor PT (Live tank) Along with GI structure and with bi-metallic terminal connector.	Ratio : 33kv/√3 / 110v/√3 Class : 0.5 Burden : 100VA
21	Outdoor type Control Relay Panel for transformer protection	
i	3O/C+1E/F numerical communicable relay with IEC protocol of 61850 or 60870	1no.
ii	Multi Function Meter	1no.
iii	Master trip relay	1no.



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33kv outdoor VCB for transformer protection

Scope of supply: The scope of this order includes for design, engineering, manufacture, testing , inspection before dispatch packing, forwarding, transportation, inspection during transit, delivery to site/ stores of 33Kv outdoor vacuum circuit breakers(transformer protection), with 33KV CT & their CR panel should have 3O/C+1E/F numerical communicable relay with IEC protocol of 61850 or 60870 having differential relay, trip relay, ammeter, KV meter and 3element 24V DC voltage relay for OTI , WTI and BUCHOLTZS relay , protection as additional features for use in the 33/11Kv primary substations under the distribution networks of CESU along with all fittings and accessories as specified here under and in conformity to the guaranteed technical particulars enclosed herewith. All vacuum circuit breakers must be certified by ISO 9000 and type tested at any accredited laboratory/ CPRI. The scope of supply shall also includes G.I supporting structure for the circuit breaker & 33kv CT, operating mechanism, local/remote control cabinet, relay control panel, foundation bolts, all the accessories and auxiliary equipment as detailed below and special tools for satisfactory installation and operation.

Basic Technical Requirements

Sl. No.	Particulars	Requirements
1	Service type	Outdoor
2	No. of poles	3
3	Nominal system voltage	33Kv
4	Highest system voltage	36Kv
5	Rated normal current at 50 ° C	
ii.	For Bus-bar of circuit breaker	1250A
ii.	For interrupter	2000A
iii.	For outgoing feeders	
6	Rated short circuit breaking current(rms) for 3sec.	25KA
7	Rated short circuit making current(peak)	62.5KA
8	Rated short time current withstand capability for 3 sec.	25KA(panel)/25KA(interrupter)
9	Rated insulation level :	
i.	One minute power frequency withstand voltage to earth(wet and dry)rms	70KV
ii.	Impulse withstand voltage to earth with 1.2/50μ sec,wave of +ve and -ve polarity(peak)	170KV
10	First -pole - to clear factor	1.5
11	Rated operating sequence (for auto reclosing)	0-0.3 sec.- CO-3 min.-CO
12	Maximum break time	3 cycles
13	Rated out of phase breaking current	25% of the symmetrical short circuit breaking current
14	Maximum pole scatter	10 mili seconds
15	Rated auxiliary supply for spring charge motor , lamp and heater circuit	230V-A.C
16	Rated supply voltage for trip/ close coil	24V-D.C
17	Minimum creepage distance(mm)	900mm



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18	Minimum protected creepage distance(mm)	580mm
19	33KV Outdoor CT (Live tank) Along with GI structure and with bi-metallic terminal connector.	Ratio : 200-100/1-1-1A Class: 0.5/5P10/PS Burden : 15/15/-
19	Outdoor type Control Relay Panel for transformer protection	
i	3O/C+1E/F numerical communicable relay with IEC protocol of 61850 or 60870	1no.
ii	Numerical communicable differential relay with IEC protocol of 61850 or 60870	1no.
Iii	Multi Function Meter	1no.
Iv	Master trip relay	1no.
V	Auxiliary relay for trfr protection	1no.

11KV INDOOR SWITCHBOARD

1. SCOPE

- 1.1 This specification covers design, engineering, manufacture, testing, erection, inspection before dispatch packing, forwarding, transportation, insurance during transit, delivery to site/ stores of 11KV indoor Vacuum Breakers for use the 33/11KV primary substations under the distribution networks of CESU. The Indoor switchboard shall comprising of 2 outgoing feeder panel + 2 Incomer panel + 1 Buscoupler panel.
- 1.2 All vacuum breakers must be manufactured by ISO 9000 certified Organization and shall have been type tested at International reputed laboratory/ CPRI/NABL approval laboratory within five years as on the date of bid opening.
- 1.3 **The scope of supply includes the provision of type tests at International reputed laboratory/ CPRI/NABL approval laboratory within last 5 Years.**
- 1.4 **The Dimension of Type Tested VCBs can only be accepted.**
- 1.5 The scope also includes the circuit breaker and current and potential transformers, supporting structures, operating mechanism, control cabinet, relay control panel, foundation bolts, all the accessories and auxiliary equipment mandatory spares and special tools for satisfactory installation and operation.
- 1.6 Description of the switchgear panels for 11 KV VCB:
Indoor switchgears should be provided in a cubicle, which shall be erected inside a building. Separate switchgear panels for feeder & transformer of 11 KV are to be considered. Care should be taken during manufacturing of the same as the equipment like VCB, Disconnecter switches, CT & VT are to be installed in the panel individually. Vibration is inevitable as mechanical operation for closing the VCB & disconnectors may cause problem and its performance will be affected.

The circuit breakers switchgear panels to be supplied against this specification shall be required to control the LV side of 33/11 KV power transformers in the primary sub-stations and also the incoming 11 KV feeders or the outgoing feeders in these sub-stations. The switchgear panels shall be suitable for 3 phase 50Hz solidly grounded neutral system and shall have normal current carrying capacity of 1250 Amp and symmetrical short circuit breaking capability as mentioned hereunder.



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Basic Technical Requirements

SI. No	Particulars	Requirements
1	Service type	Indoor
2	No. of Poles	3
3	Nominal system voltage	11 KV
4	Highest system voltage	12KV
5	Rated normal current at 50 °C	
i)	For Bus-bar of Circuit Breaker	1250A
ii)	For Interrupter	2000A
iii)	For Outgoing Feeders/ For Incomer & Bus Sections	2000A
6	Rated short circuit breaking current (rms)	25KA
7	Rated short circuit making current (peak)	63KA
8	Rated short time current withstand capability for 3 sec	25KA(Panel)/25KA
9	Rated Insulation Level	
i)	One minute power frequency withstand voltage to earth	28KV
ii)	Impulse withstand voltage to earth with 1.2/50psec,	75KV
10	Rated operating sequence (for auto reclosing)	0-0.3 Sec- CO-3 min-CO
11	Maximum break time	3 cycles
12	Rated out of phase breaking current	25% of the symmetrical short
13	Rated Auxiliary supply for spring charge motor, lamp &	230V A.C
14	Minimum creepage distance (mm)	As Per IS
15	Minimum protected creepage distance (mm)	As Per IS
16	Maximum Pole Scatter	10 Milli Seconds circuit breaking
17	Rated Supply Voltage for trip/close coil heater circuit	24 volt DC



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Basic technical requirement for CT's

Ratings: The CTs shall conform to the following ratings and other particulars of the circuit breakers:

SI. No	Particulars	Requirements	
1	Requirement	The CTs in the 11 KV Indoor VCB switchgear panel should have three cores as follows: Core-1:Instrumentation and Metering Core-2:Combined over current and earth fault protection Core-3:Differential Protection (for transformer panels only)	
2	Transformation Ratio	For TFR and Bus coupler 400-200/1-1-1-A	For feeder ratio 200-100/1-1
3	Rated Burden (VA)	Core:1: 15 VA , Core:2: 15 VA, Core:3:--	Core:1: 15 VA , Core:2: 15 VA,
4	Class of Accuracy	Core:1: 0.5 , Core:2: 5P10 Core:3: PS	Core:1: 0.5 , Core:2: 5P10 Core:3: --
5	Instrument Factor	Core- 1:- <10	Core- 1:- <10
6	Short Time rating	25 KA rms for 3 seconds	



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BASIC TECHNICAL REQUIREMENTS VTs

The 11KV Indoor voltage transformers are required to meet the following basic technical requirements (Reference standards: IEC:186, IS:3156 and associated standards listed in the specification):

SL. NO	Particulars	Requirements
1	Type	Single phase or three phase
2	Nominal system voltage, phase to phase	11 KV
3	Application	Instrumentation, Metering and Protection
4	Number of secondary windings	1
5	Rated normal burden*	50VA
6	Rated primary voltage	11000/√3
7	Rated secondary voltage	110V/√3-110V/√3
8	Class of accuracy	0.5

The CR Panel (Instrument Chamber) should be mounted on top of the VCB Panel.

Control panel (**inbuilt**) with protective relay and meter shall be provided by the supplier suitable for above breakers. The equipment shall have protection scheme with the following relays:

- (i) Numerical relays should be reputed make with following features.
IED relays for protection as per clause no.26.
- (ii) Self reset type Master trip relay (24V DC)
- (iii) One alarm bell scheme with bell (24V DC).
- (iv) 8 Window Facia for Incomer
- (v) 4 Window Facia for Feeder.

N.B:-

- 1) IED RELAY suitable for both 1A & 5A CT secondary(site selectable) with IEC-61850 protocol or 60870

The following additional technical requirements are mandatory:

1	Master Relay	Self Reset Type
2	LR Switch	Required in each Panel
3	Test Terminal Blocks	TTB for Metering & TTB for Protection to be given



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**CONCEALED CONDUITS IN SLAB/WALL COLUMNS ETC.
FOR ELECTRICAL MAIN/SUB MAINS/POINT WIRING**

Specification for the conduit pipe system will be as under :-

- a) Heavy duty Regid P.V.C. conduits and corresponding accessories with IS : 9537 (Part-III).
- b) Special deep junction boxes.
- c) The rectangular junction boxes shall be made out of 16 gauge M.S. sheets and painted with two coats of ready mixed oil paint of approved shade over a coat of red oxide primer. The box shall have a cover of 16 gauge, which can be fixed to the box with screws, suitable tapped holes shall be provided in corner of the box.
- d) Make of conduits to be used should be of ISI marked and of PRECISION/AKG/JINDAL/ GARWARE make.
- e) The Contractor shall be responsible for drawing the wire for various purpose through concealed conduit. If any chokage found in any concealed conduit, the contractor will be responsible to clear the conduit. If the chokage persists, the contractor are responsible to draw the wire in substitute route by mean of P.V.C. casing & capping. In this case no payment will be made on this account.
- f) The conduit will be laid as per our approved drawing. No variation will be allowed until and unless we agree upon this.
- g) The work shall be carried out through a Licenced Electrical Contractor to be approved by the Consultant. The contractor shall give a list of 3 or 4 licenced electrical contractor alongwith their credential through whom he can get the above work executed. The work shall, however, be entrusted to the contractor selected out of the list by the Consultant
- h) The contractor have to take approval of the material Prior to use. The approved material will be displayed at site.

i) INSTALLATION OF CONDUIT :

All conduits including bends, unions, junction boxes, etc. shall be cleaned before they are fixed in position. Conduits which are to be taken in the ceiling slab shall be laid on the prepared shuttering work of the ceiling slab before concrete is poured. The conduits shall be properly turned and screwed into the sockets, bends, junction boxes, outlet boxes and shall be made watertight by using bituminous hemp yarn at the screwed ends. The conduits in ceiling slab shall be straight as far as possible, to facilitate easy drawing of wires through them. Before the conduits are laid in the ceiling, the positions of outlet points, point control junction boxes shall be set out clearly so as to minimise offsets and bends.

Conduits recessed in walls shall be secured rigidly by means of steel hooks/staples at not more than 0.6 meter intervals before conduit is concealed in the walls. All chases, grooves shall be neatly made to proper dimensions to accommodate the required number and size of conduits. The outlet boxes, point control boxes, inspection and draw boxes shall be fixed as and when conduit is being laid. The recessing of conduits in walls shall be so arranged as to allow at least



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12 mm. Plaster to cover the same. All grooves, chases, etc. shall be refilled with cement mortar and finished up to the wall surface before plastering of walls is taken up. Where conduits pass through expansion joints in the buildings, adequate expansion fittings or other approved devices shall be used to take care of any relative movement. Wherever conduits terminate into points control boxes, distribution boards, etc, conduits shall be rigidly connected to boxes, boards, etc. Running joints in conduits wherever necessary shall be rigidly held in aligned position. After conduits, junction boxes outlet boxes etc. are fixed in position their outlets shall be properly plugged with PVC stoppers or with any other suitable materials so that water, mortar, vermins or any other foreign material do not enter into the conduits system.

Draw box junction box, point control boxes, etc. shall be provided with bushes of PVC or rubber, after the conduit ends are properly filed to remove the burrs and sharp edges. Concealed conduit laying above false ceiling shall be executed in a similar manner described above. Wherever called for, open conduit system shall be adopted with conduits being fixed on to the wall surfaces, ceilings etc. with saddles clamps and screws.

Wherever surface conduit system is specified, conduit shall be fixed by mean of G.I. saddles. Conduit shall be run in square and symmetrical lines with proper drawing and ventilation. Before surface conduits are installed, the exact route shall be marked as site and the approval of the Employer's Engineer shall be obtained.

Conduit shall be concealed wherever specified in ceiling, walls, etc. as required. The conduits shall be laid in ceiling slab before pouring of Concrete. Care shall be taken to ensure that conduits are not displaced during the process of pouring and consolidating the Concrete.

The following precautions shall be observed while installing the conduits:

- a) As far as possible bending shall be done at site in a proper manner.
- b) Where a number of conduits converge, a large M.S. box shall be used to avoid crossing of conduits. Where conduits are installed in straight runs, draw boxes will be provided at centres not greater than 15 meters on straight runs and at very change in direction. No boxes will be provided in voids where access cannot be readily obtained.

The rate for rigid P.V.C. conduit sleeves shall include for recesses and holes etc. in brick work for electrical conduits as shown on drawings and as directed on site and making good the same.

Date :



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TECHNICAL SPECIFICATION FOR ELECTRICAL WORKS

SPECIFICATION FOR ELECTRICAL INSTALLATION WORKS IN L.I.C.I. BLDGS.

SUBJECT TO THE GENERAL CONDITION OF CONTRACT IN FORCE

(A) GENERAL

1. The installations shall generally be carried out in conformity with the Code of Practice for electrical wiring installation (system voltage not exceeding 650 V. viz I.S. 730. 1963 or the latest revision thereof.
2. **Definition:**
As given in I.S. Code of Practice shall apply.
3. **Pressure and frequency of supply** :
All current consuming devices shall be suitable for 433 V., 3phase, 50cycle A.C. supply.
4. **System of wiring** :
 - i) The wiring shall be carried out as per schedule. Power wiring must be in separate PVC conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution board at convenient centers and without isolated fuses. All conductors shall run as far as possible along the walls and ceilings so as to be easily accessible and capable of being thoroughly inspected. The contractor shall arrange beforehand the balancing of circuits in consultation with Electrical Engineer of Consultant
 - ii) Within one month of taking over of the installation, the contractor shall submit to Consultant 3sets of completion drawings of the Electrical Installation incorporating all modifications made from time to time including cable & conduit lay-outs to the satisfaction of the Electrical Engineer of Consultant & the wiring plans shall be deemed to be "Drawings" within the meaning of the term as used in the general conditions of contract.
5. **Conductor** :
The conductors shall be of copper or otherwise stated in tender and shall be either PVC insulated or PVC insulated PVC sheathed. The minimum sections of conductors used for wiring of light and plug points shall be 1.5 sq mm. Single core wires shall only be used.



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6. Cables:

- i) All cables including flexible cables used shall be ISI approved and confirming the ISI specifications.
- ii) Twin flexible cable shall be of minimum section area of 14/0.0076 and PVC insulated.
- iii) Wires as per specification of materials.

7. Fall of Potential:

The cross sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in pressure between the main fuses and their furthest point shall not exceed two percent, with all the consuming devices in use.

8. Rating of Lamps and Fans:

In estimating the current to be carried by any conductors glow lamps are to be rated, as of 4 and 1.25 watts per candle power for carbon and metallic filament lamps respectively where the conditions are known, otherwise at 40 watts except in the case of gas filled lamps. Ceiling fans are to be rated 60 watts; table fans at 60 watts unless actual values, are known or specified.

9. Test :

The installation with fittings complete shall before current is switched on satisfactorily pass the following tests:

The whole of the lamps and appliance having been connected to the conductors and all switches and fuses being 'on', a pressure not less than twice the intended working pressure subject to a limit of 500 volts shall be applied and the insulation resistance of the whole or any part of the installation to earth must not be less in Mega ohms than 25 divided by the number of points as defined above. With all lamps and appliance removed from the circuits a similar test between poles may be demanded, provided that during the rainy season half the above test value will be accepted. Where any appliance referred to is a motor larger than one-half B.H.P. the insulation resistance of that particular circuit must be greater than one Meg ohm.

10. Joints and Looping Back :

No joints shall be allowed in conductors. Neutral shall be looped from point to point whereas the live wires shall be looped in the switch board only from switch to switch.



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11. Switches:

- i) All main switches (other than those of iron clad pattern) carrying over ten amperes shall be fitted for back connections.
- ii) All switches and circuit breakers shall be constructed in accordance with the I.E.E. 'wiring rules' 8th, edition no 67, or its latest version, provided also that springs shall be either of phosphor bronze, or if of steel, shall be copper or nickel plated; & that handles shall be so fastened that do not tend to unscrew or become loose (see clause 16).

12. Control at point of Entry of Supply:

There shall be one main switch and one main fuse on each pole of each main circuit (other than the neutral conductor of a 3-wire circuit) at the point of entry of the supply. The switches must be linked.

13. Distribution Boards:

- i) Main distribution board shall be metal clad and shall be provided with an iron clad switch and fuse on each pole of the circuit (MCCB / Switches).
- ii) Branch distribution board shall be provided with one fuse/ MCB for each circuit and one common neutral bar. Maximum number of points to be wired on each circuit shall be 6.
- iii) Switches and fuses of opposite polarity shall be mounted on separate bases with a shield of non-ignitable insulating material between the bases when placed one above the other.
- iv) In wiring a branch distribution board the total number of points shall be divided as far as possible evenly between the numbers of ways of the board. A spare circuit shall be left for future extensions.
- v) MCB / Fuses shall be of approved materials and each circuit shall be clearly numbered from left to right in conspicuous figures to correspond with the wiring plans.
- vi) Two spare fuse carriers / MCB per main branch board shall be supplied for replacements.

14. Passing through the walls

- I) Except as laid down in clause 87 where conductors pass the walls, one of the following alternative methods shall be used.

A hole of suitable area shall be made in the wall through which the casing or conductor shall be carried so as to allow of an air-space of not less than one inch on three sides of the casing or conductors as the case may be or the conductors shall be carried in approved heavy gauge solid drawn or lap welded conduit tube on porcelain ducts. Where the supply is alternating current, the conductors of the circuit must be bunched.



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- ii) Where a wall tube passes outside a building so as to be exposed to the weather, the outer end shall be bell mounted and turned downwards.

15. Branch Switches (see clause – 11) – In installation supplied from a three wire system, all branch switches shall be placed on the outer wires, switches (Other than those for multiple control) controlling not more than 10 amperes shall be of the Modular type switches shall be 'ON' when knob is down. Where the specified position of branch switches is altered, any such alterations of position after fixing will be paid for.

16. Ceiling Rose and Wall Sockets – Three pins Ceiling roses, and wall sockets shall not contain fuse terminals. Wall sockets shall comply with the requirements of the Bureau of Indian Standards.

17. Fittings. Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings, these must be free from sharp angles or projecting edges and of such a size as will enable them to be wired with the conductors used for the final sub-circuits without removing the braiding taping or outer covering. As far as possible all tubes or channels should be for sufficient size to permit of 'looking back'. Where with approval of the Electrical Engineer of Consultant 'Electrolytic copper' wire is used for wiring fittings. The sub-circuit leads must terminate in a ceiling rose or connector from which this wire will be carried into the fittings. Flexible wire must not be used for wiring fittings, except portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas fitted lamps shall be adequately ventilated.

18. Lamp holders-Lamp holders for use on brackets, etc. shall have not less than a half inch female nipple and all those for use with flexible pendants shall be provided with cord grips. All cases must be solid and substantial thin case export type not being admissible. Edison screw holders will not be accepted for lamps below 100 watts.

19. External and Road lamps ; External and Road Lamps shall have weather proof fittings of approved design so as to effectually prevent the admission of moisture. An insulating distance piece of moisture proof materials must be inserted between the lamp holder nipple and that of the fitting. Flexible cord conductors and cord grip lamp holders must not be used where exposed to the weather. In verandahs and similar exposed situations rod pendants or ceiling plates shall be used.



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20. Lamps: All glow lamps unless otherwise specified in the special conditions of contract shall hung at a height of nine feet above the floor level. Metal filament lamps shall be made of drawn wire only.

21. Fans and Regulators

- (I) (a) All ceiling fans shall be suspended from a hook or shackle and insulated from the same. All joints in the suspension rod shall be screwed and all joints or bolts in connection therewith shall be additionally secured by means of split pins.
- (b) The canopy and wood block at the top of the suspension rod shall effectually hide the suspension.
- (c) The leading in wire shall be not smaller than 3/22 S.W. G. and shall be protected from being cut.
- (d) All fans shall be free from sparking, noise oil throwing and excessive heating.
- (ii) (a) All fans shall be hung nine and half feet above the floor or as directed by the supervising officer.
- (b) All fans shall be capable of running at full speed for one month without additional oiling and shall not overheat after eight hours continuous run at full speed.
- (c) Each fan shall have a speed regulator of Electronic type.

22. Attachment of Fittings and Accessories :

- i) In other than conduit wiring all ceiling roses, wall sockets, switches, regulators, brackets, pendants and accessories attached to walls or ceiling shall be mounted on suitable PVC Base plate.

23. Interchangeability :

Similar parts of all the switches, lamp holders, distributing boards, ceiling roses, brackets, pendants fan and all other fittings of the same type shall be interchangeable.

B. CONDUIT SYSTEM

1) Conduit to be continuous – Conduit shall be of approved pattern and manufacture and in accordance with the specification of the Bureau of Indian Standards & relevant IE rules.

2) Bunching of Wires – The wires of a circuit may be bunched together in a conduit, and if the supply is alternating current, they must be bunched



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- 3) Junction in Conduit** – The lengths of conduit shall be joined by means of push fit joints or other approved joints. The greatest care shall be taken in preparing the conduit that no sharp edges or burrs are left which could damage the Insulation. The Elec. Engineer with a view to ensuring that the above proviso has been carried out, may require (if he should consider if necessary) that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed.
- 4) Fixing of Conduit** – The PVC conduit shall be fixed to the surface of walls, secured to plugs, arranged as in clause 15 by saddles and round-headed screws. No conduit shall be buried beneath the surface of the masonry unless so specified or approved by the Electrical Engineer, Consultant.
- 5) Bends of Conduit** – The conduits shall be brought round the angles of walls by means of bends or elbows as may be directed.
- 6) Outlets**- All outlets for fittings, switches, etc. shall be equipped with an approved outlet box.
- 7) Conductors** – All conductors used in conduit wiring shall be stranded
- 8) Erection and Earthing of conduit** – The whole system of conduit shall be erected and completed before the conductors are drawn in. In conduit system, the pipe must be continuous when passing through walls or floors, and no other form of insulating or protecting tube is required.

Specifications for the Concealed Conduits in slab / wall columns etc. for electrical main / sub main / point wiring; will be as under :

- i. Rigid PVC conduit of Medium class ISI marked and corresponding PVC conduit accessories.
- ii. Special deep junction boxes – 75 mm deep to be laid in the slab / ceiling.
- iii. The rectangular junction boxes wherever provide shall be made out of 16 gauge M.S. Sheets and painted with two coats of ready mixed oil paint of approved shade over a coat of red oxide primer.
- iv. Make of conduits to be used should be of ISI marked and as per list of Electrical Materials.
- v. **The electrical installation work shall be carried out through a Licensed Electrical Contractor. The name of licensed electrical contractor shall be get approved from the competent authority well in advance before commencement of the work.**



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vi. INSTALLATION OF CONDUIT:

All conduits including bends, unions, junction boxes, etc. shall be cleaned before they are fixed in position. Conduits which are to be taken in the ceiling slab shall be laid on the prepared shuttering work of the ceiling slab before concrete is poured. The conduits shall be properly fixed into the sockets, bends, junction boxes, outlet boxes and shall be made watertight by using proper sealant recommended by the manufacturer. The conduits in ceiling slab shall be straight as far as possible, to facilitate easy drawing of wires through them. Before the conduits are laid in the ceiling, the positions of outlet points, point control junction boxes shall be set out clearly so as to minimize offsets and bends.

Conduits recessed in walls shall be secured rigidly by means of steel hooks/staples at not more than 0.6 meter intervals before conduit is concealed in the walls. All chases, grooves shall be neatly made to proper dimensions to accommodate the required number and size of conduits. The outlet boxes, point control boxes, inspection and draw boxes shall be fixed as and when conduit is being laid. The recessing of conduits in walls shall be so arranged as to allow at least 12 mm plaster to cover the same. All grooves, chases, etc. shall be refilled with cement mortar and finished up to the wall surface before plastering of walls is taken up by the Contractor. Where conduits pass through expansion joints in the buildings, adequate expansion fittings or other approved devices shall be used to take care of any relative movement. Wherever conduits terminate into points control boxes, distribution boards, etc, conduits shall be rigidly connected to boxes, boards, etc. Running joints in conduits wherever necessary shall be rigidly held in aligned position. After conduits, junction boxes outlet boxes, etc. are fixed in position their outlets shall be properly plugged with PVC.

Stoppers or with any other suitable materials so that water, mortar, vermin or any other foreign material do not enter into the conduits system.

Draw box junction box, point control boxes, etc, shall be provided with bushes of PVC or rubber, after the conduit ends are properly filed to remove the burrs and sharp edges. Concealed conduit laying above false ceiling shall be executed in a similar manner described above. Wherever called for, surface conduit system shall be adopted with PVC conduits being fixed on to the wall surfaces, ceilings, etc., with saddles, clamps and screws.

Conduit shall be run in square and symmetrical lines with proper drawing and ventilation. Before surface conduits are installed, the exact route shall be marked at site and the approval of the Employer's Engineer shall be obtained.



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Conduit shall be concealed wherever specified in ceiling, walls, etc. as required. The conduits shall be laid in ceiling slab before pouring of Concrete. Care shall be taken to ensure that conduits are not displaced during the process of pouring and consolidating the Concrete.

The following precautions shall be observed while installing the conduits:-

- a. As far as possible bending shall be done at site in a proper manner.
- b. Where a number of conduits converge, a large M.S. box shall be used to avoid crossing of conduits. Where conduits are installed in straight runs, draw boxes will be provided at centers not greater than 15 meters on straight runs and at every change in direction. No boxes will be provided in voids where access cannot be readily obtained.

The rate for rigid P.V.C. conduit sleeves shall include for recesses and holes, etc. in brick work for electrical conduits as shown on drawings and as directed on site and making good the same.

Section-I

Specifications for LT (1.1 KV Grade) Cables

1 Scope:

This specification covers supply, testing at works, supply at site, installation, termination, jointing, connection, testing at site, commissioning and handing over of 1.1 KV grade Cables.

2 System :

The 1.1 KV grade cables are to be used in under ground distribution system with normal system voltage of 415 V, 50 Hz, 3 phases, 4 wire systems.

3 Applicable standards:

Cables to be supplied under this specifications shall be with Copper or Aluminum conductor as specified, in drawings or Bill of Quantities, PVC insulated and PVC sheathed, armored and with an outer PVC protective sheath, heavy duty type and shall confirm to,

IS 1554 (Part I) 1976: PVC insulated electric cables.

IS 1753: Aluminum conductors for insulated cables.

IS 3961: Recommended current ratings for cables.



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4 General requirements:

- 4.1 All cables shall be new without any kinks or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on surface of the cable at distance not exceeding 1 M.
- 4.2 Procurement of cables shall be on the basis of the actual site measurements and the quantities given shall be regarded as a guide. Before procurement of the cables, the contractor shall submit the detailed measurement sheet, based on site measurement showing the various cable lengths and after approval of the same place orders for the cables.
- 4.3 Cables shall be tested at factory as per IS requirement. The tests shall incorporate routine tests, type tests and acceptance test. The Contractor shall produce the certificate for type test.
- 4.4 The cables shall be of one of the makes mentioned in the list of approved materials and with ISI mark.
- 4.5 The cables shall be supplied and delivered at site in original cable drums with manufacturer's name, cable size, type and length all clearly indicated on each drum.
- 4.6 The unit rate shall include loading, unloading, transport, storage, handling, unwinding the cable from cable drums and laying in the cable trench or erected on cable trays etc.
- 4.7 The cables shall be laid by skilled and experienced labour.
- 4.8 Where the cable route intersects roads, streets or pathways, RCC spun pipes shall be laid in the trenches to serve as cable ducts. The pipes shall be joined by RCC spun collars. The RCC pipes shall project at least 150 mm on either side of road crossing.
- 4.9 The cable loops shall be kept at both ends of the cable length. Minimum 3 meters long loop shall be provided.
- 4.10 The contractor shall take care to see that the cables received at site are apportioned to various locations to ensure maximum utilization and cable joints are avoided. This apportioning shall be got approved before the cables are cut to lengths. Straight joints are permitted only under exceptional circumstances.



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5 Storage and loading, unloading of cables. :

- 5.1 Cable drums shall not be stored one above the other. Sufficient space between cable drums shall be left for air circulation and the drums shall stand on battens placed directly under the flanges.
- 5.2 Cable drums shall be stored preferably on a plain ground without having any hard stones or any other sharp materials projecting above the ground surface. The drums shall be stored preferably in the shed or otherwise they shall be covered by tarpaulin.
- 5.3 Drums shall be stored and kept in such a way that bottom cable end does not get damaged.
- 5.4 Drums shall be rotated only in the direction marked on the drum.
- 5.5 Loading and unloading shall be done with material handling equipments only.

6 Erection and laying of cables:

6.1 General:

- 6.1.1 All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of service.
- 6.1.2 When cables pass through holes in metal work, precautions shall be taken to prevent abrasion of the cables on any sharp edge. Cables passing through walls, ceiling or floor shall run through sleeves of Hume pipes of adequate dia. & after pulling of the cables both ends of the sleeve shall be sealed with fire resistance material to prevent spread of fire.
- 6.1.3 In every vertical channel, duct, trucking or cable trench, containing cables and exceeding three meters in length, internal barriers shall be provided so as to avoid heating of the air at the top of the unit.
- 6.1.4 In every vertical cable shaft, cable trench or any passage of cable through wall, ceiling, floor etc. Barriers against spread of fire and smoke shall be provided.
- 6.1.5 In fire hazard areas extra care shall be taken to prevent spreading of fire in case of cable failure. Cables in these areas shall be covered by glass wool or embedded in sand in appropriate trenches. The cabling in such areas shall be done as per FIA approval and IEE regulations.
- 6.1.6 Communication cables should be laid away from the power cables to avoid electromagnetic interference. Minimum clearance of 300 mm shall be maintained.
- 6.1.7 Control and power cables shall be laid on separate trays.



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- 6.1.8 The maximum number of power cables on a tray should be limited to six.
- 6.1.9 Every cable shall be installed where it will not be exposed to direct sunlight, rain, dripping water, oil or any corrosive substance.
- 6.1.10 The cables shall be erected and laid by either of the following methods and as specified in Bill of Quantities or specifications or drawings.

6.2 Cables laid in excavated trenches:

- 6.2.1 The cables for external electrification work shall be laid in specially prepared cable trenches as specified under the section for cable trenches.
- 6.2.2 While laying cable in the trench the cable end shall be pulled with pulling eye only after mounting the drum on the jacks.
- 6.2.3 Care shall be taken in laying cables to avoid forming kinks. The drums shall be unrolled and cables run over wooden rollers, placed at intervals not exceeding 2 Mts.
- 6.2.4 High voltage cables are to be laid separately from other cables. HV, MV cables shall not be laid in the same trench and /or alongside of water main.
- 6.2.5 The cables shall not be laid directly in such soil, which is corrosive, and having components, which react with the insulating layer or amour of the cable. In such case it should be laid in pipes or concrete trenches.

6.3 Cables laid in built-up trenches:

- 6.3.1 For the cable route passing through the area which is proposed to be covered with concrete/tiles etc. the cables shall be laid in the R.C.C./brick masonry cable trenches as specified in the items. This arrangement shall be generally inside the building.
- 6.3.2 For the area outside the building but covered with concrete /tiles etc. the cables shall be laid through R.C.C. pipes laid in ground with brick chambers at both ends. The chambers shall be covered with C.I. heavy-duty covers if the area is prone for vehicular traffic otherwise medium duty C.I. covers should be provided.



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- 6.3.3 Cables laid in the built-up cable trenches within the building shall be raised so as not to lay at the trench bottom. Cables shall be either secured to the wall by saddles or laid on hot dip galvanized angle iron brackets or cable trays, ladder, rack, trough etc.
- 6.3.4 Where cables are clamped to the wall a minimum clearance of 100 mm shall be maintained between wall and cable and minimum 150 mm vertical clearance shall be maintained between two cables. Where cables are laid on cable brackets, the brackets shall not be fixed more than 500 mm apart to avoid sag in the cables. Where cables are laid on cable tray /ladder /troughs /racks, minimum 300 mm distance shall be observed between adjacent tier of tray/ladder /troughs /racks, and cable shall be fixed minimum 25 mm away from wall and minimum 150 mm distance shall be observed between two adjacent cables. Cable shall be properly fixed with the tray /ladder /troughs /racks with cable tie or saddles.
- 6.3.5 The dimensions of the trenches shall be determined depending upon the maximum number of cables that is expected to be accommodated. Wherever specified, trenches shall be filled with fine sand and covered with RCC or steel chequered trench covers.
- 6.3.6 Where cables are to be installed under floors or above suspended ceilings or below ceiling, they shall be laid on a cable tray and shall be run in such positions that they are not liable to be damaged by contact with the floor or the ceiling or their fixture. The cable tray shall be properly fixed with tie rod to the ceiling. The concrete inserts for fixing the tie rod shall be put in place while casting the slab. The cable tray route shall be co-coordinated with other services. While laying the cables on the tray minimum 150 mm distance shall be observed between two adjacent cables. At least 25 % space shall be kept spare for any future installation.
- 6.3.7 The cable reaching for the motors in the mechanical room or plant room or machine room or service area shall be laid on cable tray. The cable reaching to motors shall be protected by rigid galvanized conduits up to a height of 300 mm above the floor. Above that height, the cable shall be protected by means of oil tight flexible metallic conduits fixed to the terminal box of the motor. The connection between the rigid conduit and the flexible conduit shall be done by a screwed coupling of an approved type. The flexible conduit shall be properly fixed with the terminal box of the motor by means of double hexagonal check nut.

6.4 Duct System:

Wherever specified cables shall be laid in underground ducts. The duct system shall consist of a required number of reinforced Hume pipes with simplex joints. Wherever asbestos cement pipes are used, the pipes shall be encased in concrete of 75 mm thick. The ducts shall be properly



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anchored to prevent any movement. The top surface of the cable ducts shall not be less than 60 cm below the ground level. The duct shall be at a gradient of at least 1:300.

The ducts shall be provided with inspection manholes at all direction changes and at required regular intervals for drawing the cables. The manholes shall be of reinforced concrete either cast-in-situ or precast. The manhole covers shall be cast iron and machine finished to ensure a perfect joint. The manhole covers shall be installed flush with the ground or paved surface. The ducts shall be properly plugged at the ends to prevent entry of water, rodents etc. Suitable duct markers shall be placed along the run of the cable ducts. The duct markers shall at least be 15 cm square embedded in concrete, indicating the voltage, number of ducts and the direction of run of the cable duct. Suitable cable supports made of angle iron shall be provided in the manholes for supporting the cables. Proper identification tags shall be provided for each cable in the manholes.

6.5 Cables on Trays / Racks:

6.5.1 Cable shall be laid on cable trays/racks wherever specified. Cable racks/trays shall be of ladder, trough or channel design suitable for the purpose. The nominal depth of the trays/racks shall be 150 mm. The width of the trays shall be as per the design shown on drawing.

The cable trays shall be made of steel or Aluminum as specified. The trays/racks shall be completed with end plates, tees, elbows, risers, and all necessary hardware. Steel trays shall be hot dip galvanized. Cable trays shall be erected properly to present a neat and clean appearance. Suitable cleats or saddles made of Aluminum strips with PVC covering shall be used for securing the cables to the cable trays. The cable trays shall comply with the following requirements.

- a. The tray shall have suitable strength and rigidity to provide adequate support for all contained cables.
- b. It shall not present sharp edges, burrs or projections injurious to the insulation of the wiring/cables.
- c. If made of metal, it shall be adequately protected against corrosion or shall be made of corrosion resistant material.
- d. It shall have side rails or equivalent structural members.
- e. It shall include fittings or other suitable means for changes in direction and elevation of runs.



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6.5.2 Installation of cable trays/racks:

- a. Cable trays shall be installed as a complete system. Trays shall be supported properly from the building structure. The entire cable tray system shall be rigid.
- b. Each run of the cable tray shall be completed before the installation of cables.
- c. In portions where additional protection is required, non-combustible enclosures to be used.
- d. Cable trays shall be exposed and accessible.
- e. Where cables of different system are installed on the same cable tray, non-combustible, solid barriers shall be used for segregating the cables.
- f. Cable trays shall be grounded by two nos. earth continuity wires. Cable trays shall not be used as equipment grounding conductors.

7 Cable trenches (excavated):

- 7.1 The cable trenches shall be excavated 60 cms below the finished ground level and shall have a minimum width of 300 mm for laying of single cable. When more than one cable are laid in the same trench, the width of the trench shall be increased such that the spacing between the cables is 200 mm and the end cables are at minimum 100 mm from the side of the trench. At the turning of the cable route the trench shall be dug with radius equal to 15 times the cable diameter.
- 7.2 The trenches shall be cut square with vertical sidewalls and with uniform depth. Suitable shoring and propping may be done to avoid caving in of trench walls. The floor of the trench shall be rammed and leveled. The bottom of the cable trench shall be prepared with 100 mm sand bed for laying the cables.
- 7.3 The cables shall be laid in trenches over the rollers. After the cable is laid and straightened it shall be covered with sand, and bricks shall be placed on top and at the side of the cable.
- 7.4 Wherever specified, half round RCC pipes shall be placed above the cables.
- 7.5 The cable trench then shall be refilled with excavated materials after removing the stones and other sharp materials and the refilled materials shall be compacted with light ramming.
- 7.6 Approved Cable markers made of Aluminum or CI with 15 cms crown shall be provided along the route of cables at a spacing of 25 - 30 meters and also at both ends of crossings or at the cable turning point. The class, type, No. of cables shall be indicated on markers.
- 7.7 Cable shall be laid in Hume pipes at all road crossings and in GI pipes at the wall entries or at the crossing of the drains/gutters.



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8. Cable jointing:

- 8.1 The straight joint in cable shall be avoided as far as possible by correctly apportioning the cable lengths. If unavoidable following precautions shall be taken while jointing.
- 8.2 Cable jointing shall be done as per the recommendations of the cable manufacturer. Jointing shall be done by qualified cable jointer. The location of the cable joint shall not be where the cable takes a bend also where the soil is loose and shows signs of subsidence.
- 8.3 Cable jointing boxes shall be of appropriate size suitable for PVC insulated cables of particular voltage ratings and shall be of approved make.
- 8.4 Jointing of cables in the joint boxes and the filling of the compound shall be done in accordance with the manufacturer instructions and in an approved manner. All straight or T joints shall be done in epoxy mould boxes. All terminal leads of conductors shall be heavily soldered up to at least 50 mm length.
- 8.5 All cables shall be joined colour-to-colour and tested for insulation resistance and continuity before commencing the jointing. The seals of cables shall not be removed until preparations for jointing are completed. Joints shall be finished on the same day, as commenced and sufficient protection from the weather shall be arranged.
- 8.6 Joints shall be made by means of suitable solder for conductor, the conductors being firmly bolted into the connections or ferrule and the whole end soldered with proper solder and flux or resin. Conductors shall be properly insulated with high voltage insulating tape and by using separators of approved size and pattern. The joints shall be completely filled with epoxy compound (with necessary tapping) to ensure proper filling of the box.
- 8.7 Epoxy compound shall be prepared as per manufacturer instructions. Oil, water or any other liquid shall not be added to the mixture and which shall be used within 30 minutes of mixing. The surface on which epoxy is to be used shall be free from dust, rust, oil, grease and shall be dry. Joint shall not be moved or disturbed until the epoxy has completely hardened.

9 Cable Termination. :

- 9.1 All cable terminations for conductors' upto 4 sq.mm may be insertion type and all higher sizes shall have tinned copper compression lugs.
- 9.2 Cable termination shall be done in cable end box or in terminal box or in pillars etc. The end terminations shall be insulated with a minimum of six half lapped layers of PVC tape.
- 9.3 Cable terminations are to be made with flange type brass cable glands so as to grip inner and outer PVC sheaths and also the cable armour. Cable gland shall be bonded to earth.



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- 9.4 The cable conductor ends are to be connected by crimping tinned heavy-duty copper lugs. Hydraulic crimping tool shall be used.
- 9.5 Every connection at a cable termination shall be mechanically and electrically sound and protected against mechanical damage and any vibration liable to occur shall not impose any harmful mechanical damage to the cable conductor.

10 Testing of cable before laying and commissioning:

All tests shall be carried out in accordance with relevant IS codes of practice, IE rules and specifications.

- 10.1 100% cable drums shall be checked for continuity and cross continuity tests to ensure that there is no internal damage to the cable during transportation.
- 10.2 Prior to burying of cables, insulation resistance shall be measured with 500 V megger between the cores and all the cores to earth (amour) and results shall be recorded.
- 10.3 On completion of cable laying work, all the tests such as insulation resistance test, continuity test, sheathing continuity test, earth test etc. shall be conducted in the presence of the Architects.
- 10.4 After the cables are installed, before commissioning it shall be tested for high DC voltage test. The recommended volts and duration of the test between each core and metallic amour (earth) at 3 KV DC is for 5 minutes. During high voltage test all electrical equipments related to the cable installation must be earthed and adequate clearance shall be maintained from the other equipments and from work to prevent flash over.

SECTION – II

Specifications for Earthing and Lightning Protection

1 Scope:

This specification covers supply of necessary materials, and erection at site, of complete earthing system including earth pits at the locations indicated, earth conductors from earth pit to the respective equipments, switchgears, pillars etc. and making connections, testing at site, commissioning and handing over.

2 Applicable standards:

The entire work of earthing system, shall confirm to IS 3043, Indian Electricity Act and Rules and relevant regulations. The work of Lightning protection shall conform to IS 2309.



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3 General requirements:

- 3.1 The earthing shall generally be carried out in accordance with the requirements of Indian Electricity Rules 1956 as amended from time to time and relevant regulations. Following IE rules are particularly applicable. IE Rule Nos. 32, 51, 61, 62, 67, 69, 88(2) & 90.
- 3.2 All earth connections shall be carefully made, visible for inspection, and the testing of individual earth electrode shall be possible.
- 3.3 All materials, fittings etc. used in earthing shall conform to IS specifications and in the absence of which the approval of competent authority shall be obtained.
- 3.4 The earthing electrode shall be at a minimum distance of 2 metres away from the outer face of the building wall. A minimum clearance of twice the depth of the electrode shall be maintained between two earthing stations.
- 3.5 A brick masonry chamber to facilitate easy identification and for carrying out periodical tests and inspection shall be constructed on top of the earth pit.
- 3.6 All metal conduits, trunkings, cable sheaths, HT and MV switchgears, Transformers, distribution boards, meters, light fixtures, fans, and all other metal parts forming part of the work shall be bonded together and connected to earthing network as specified.
- 3.7 Earthing system shall be mechanically robust and the joints shall be capable of retaining low resistance even after passage of fault currents.
- 3.8 Joints shall be soldered, tinned and double riveted. All the joints shall be mechanically, electrically continuous and effective. Joints shall be provided against corrosion.

4 Earth Electrodes:

- 4.1 The materials of earth electrode and earth conductors shall be galvanised iron unless specified otherwise in Bill of Quantities, specifications or drawings.
- 4.2 The earth electrodes shall be free from paint, enamel, grease etc.
- 4.3 The earth electrode shall be embedded as far as practicable in a moist soil and below permanent moist level.
- 4.4 The earth electrode shall not be installed in the proximity of a metal fence.



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5 Types of earth electrodes:

The earth electrodes shall be either a pipe electrode or plate electrode, the details of which are as given in the following sections of specifications, drawings and BOQ.

6 Pipe electrode:

- 6.1 Pipe electrode shall consist of 2.5 meter long single piece G.I. pipe of min. 40 mm dia. as specified and shall be cut tapered at the bottom. 12 mm dia. holes shall be drilled with 75 mm spacing between the holes and in a staggered manner as indicated in IS 3043.
- 6.2 The electrode shall be buried vertically in a specially prepared earth pit of size 35 cm x 35 cm and the earth pit shall be filled with alternate layers of charcoal, salt and fine washed sand for a minimum thickness of 150 mm. A funnel with wire mesh inside shall be fixed to the top of the GI pipe for watering purpose.
- 6.3 The earth conductor of 25 x 3 mm GI strip shall be connected to the electrode just below the funnel with proper terminal lugs and check nuts and the other end of earth conductor shall be connected to the equipotential bus of the equipments.
- 6.4 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of the masonry shall be constructed on top of the GI pipe to house the funnel and the earth connection. The approximate size of the chamber shall be 300 mm x 300 mm and 300 mm deep.
- 6.5. The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.
- 6.6 The top of the masonry chamber shall be 50 mm above the finished ground level.

7 Plate Electrode:

- 7.1 The plate electrode shall consist of either copper plate of size 60cm x 60 cm x 3.15 mm or GI plate of size 60 cm x 60 cm x 6.3 mm, and as specified in the BOQ or drawings.
- 7.2 The electrode shall be buried vertically in a specially prepared earth pit, which shall be dug up to required depth, from the ground level. The earth plate shall be placed in the earth pit with its face vertical and embedded in the alternate layers of coal and salt for a minimum thickness of 15 cms.



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- 7.3 The earth conductor shall of same material as of the earth electrode. For copper earth electrode copper strips shall be provided as conductor and for GI earth electrode GI strips shall be used as earth conductor. The size and material of the earth conductor shall be as specified separately in the Bill of Quantities or drawings. The earth conductors shall be connected to the earth electrode (plate) with G.I. nut bolts, check nuts and washers and welded at the edges and shall be brought up in the masonry chamber at the ground level.
- 7.4 The earth conductor shall be extended via the earth link provided in the masonry chamber. This link shall be connected to earth conductors from the earth plate and earth conductor going to equipments with two Nos. of nut bolts, check nuts and washers (all of GI) to make secured connections. This link can be removed for testing the earthing.
- 7.5 A 20 mm dia. G.I. pipe shall be provided from the masonry chamber to the top of the earth plate for watering purpose. The G.I. pipe shall be provided with a funnel at the top with wire mesh inside.
- 7.6 A masonry chamber with a cast iron cover hinged to the cast iron frame embedded in the top portion of masonry shall be constructed on top of GI pipe to house the funnel & the earth connection. The approx. size of the chamber shall be 300mmx300mmx300mm deep.
- 7.7 The earth conductor from electrode shall be taken out of the masonry chamber through a protecting pipe embedded in the masonry.
- 7.8 The top of the masonry chamber shall be 50 mm above the finished ground level.

8 Earth conductor:

All earthing conductors shall be of high conductivity copper and or GI as specified and shall be protected against mechanical injury or corrosion. The connection of earth continuity conductors of earth bus and earth electrodes shall be strong and sound and shall be rigidly fixed to the walls, cable trenches, cable trays or conduits and cables by using suitable clamps made of non ferrous metals.

- 8.1 The cross-sectional area of earthing conductor shall not be smaller than half that of the largest current carrying conductor, subject to the minimum size being not less than 1.5 sq.mm for copper and 2.5 sq.mm for Aluminium conductors and the upper limit being 70 sq.mm for copper and 120 sq.mm for Aluminium. The size of the galvanised iron earth continuity conductors may be equal to the size of the current carrying conductors with which they are to be used.



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8.2 As a guideline the following sizes of earth continuity conductors shall be used for earthing installation

8.2.1 Size of earth conductors for lighting and power circuits.

Cross sectional area of current carrying Cu conductor	cross sectional area of earth continuity Cu conductor
Size in sq.mm	Size in Sq.mm
1.5	1.5
2.5	1.5
4.0	2.5
6.0	4.0

8.2.2 Size of earth conductors from main switchboard to sub main switches or distribution boards.

Cross sectional area of current carrying conductor Copper/Alum.	Cross sectional area of earth continuity conductor Copper/Alum.
Size in sq.mm	Size in sq.mm
4	2.5
6	4
10	6
16	10
25	16
35	16
50	25
70	35
95	50
120	70

8.2.2 The size of an earth continuity conductor contained in a flexible cable or flexible cord shall be equal to that of the current carrying conductor.



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9 Earth connection:

- 9.1 All metal clad switches and other equipment carrying single-phase current shall be connected to earth by a single connection. All metal clad switches carrying three-phase medium voltage and high voltage shall be connected with earth by two separate and distinct connections.
- 9.2 The earthing conductors inside the building, wherever exposed shall be properly protected from mechanical injury by running the same in G.I. pipe of adequate size. Earthing conductors outside the building shall be laid 600 mm below the finished ground level.
- 9.3 The over lapping of strips at joints where required shall be minimum 75 mm. The joints shall be revetted in an approved manner. Lugs of adequate capacity and size shall be used for all termination of wires above 6 sq.mm size and bare copper wire above 2.5 mm dia. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substance and properly tinned.

10 Connection of earthing conductor:

The earthing conductors are broadly divided in the following categories:

- 10.1 Main earthing conductor shall be taken from the earth electrode to the earth bus/connection at the main switchboard.
- 10.2 Sub-main earthing conductor shall run from the main switchboard to the sub-distribution boards.
- 10.3 Final earthing conductor shall run from the sub distribution boards to the final distribution boards.
- 10.4 Circuit earthing conductor shall run from the final distribution board to the exposed metal of the equipment to be earthed. This may run directly from final distribution boards or through earth leakage circuit breaker.
- 10.5 Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to switch boards at which they originate or at the commencement of the run by an earthing conductor.
- 10.6 Earthing conductor enclosed with the current carrying conductors within the flexible cord shall be used only in case of equipments connected by flexible cord.
- 10.7 Lighting fittings, switches and accessories shall also be provided with an earthing conductor even though they may be rigidly secured / fixed with metallic conduit.



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10.8 The electrical resistance of earthing conductors shall be low enough to permit passage of fault current necessary to operate a fuse, protective device or a circuit breaker.

11 Prohibited Connection:

Use of following as earth conductor is not recommended, and strictly prohibited for earthing an installation or even as a link in an earthing system. Neutral conductor, sprinkler pipes or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures or armour of cables and conductors, metallic conduits and lightning protection system conductors are all prohibited to be used as earth conductor.

12 Earth Resistance:

The earth resistivity of the soil where the earthing stations are located shall be submitted to the Architect before the earthing work starts and the approval shall be taken. If the earth resistance is too high and multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

13 Testing:

On completion of the entire installation, the earthing network shall be tested for their resistance to earth in accordance with IS 3043. The contractor shall provide all meters, instruments & labour required for the test. The test results shall be submitted in triplicate to the Architects for approval. The following tests shall be conducted.

- a. Earth resistance of electrodes
- b. Impedance of earth continuity conductors.
- c. Effectiveness of earthing.

14 Lightning Protection:

Lightning protection network shall be provided for the specified buildings and locations for protection against lightning strikes. The network shall essentially consist of Air-termination units, down conductors, roof conductors, test terminals and earth electrodes etc. The entire system shall conform to IS requirements.

14.1 Air-terminations:

- a) An air-termination shall consist of a 1200 mm long, 25 mm dia 14 SWG Cu tube with 100 mm dia Cu sphere fixed at the top of the tube. The Cu sphere shall be fixed with 5 nos. 125 mm long and 12.5 mm dia threaded Cu spikes.



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- b) The complete assembly shall be fixed at a highest possible location and shall project at least 1500 mm above the network on which it is fixed.
- c) All air termination shall be effectively secured against overturning by means of rod brackets and additional supports as required, which shall be permanently and rightly attached to the building. The method and nature of fixing should be simple, solid and permanent.

14.2 Down Conductors and Roof Conductors:

- a) GI strip of specified size shall be used as down / roof conductors and the conductors shall be without sharp bends, upturns and kinks.
- b) As far as possible, the joints shall be avoided in down/roof conductors. In down conductor below ground level there shall be no joint. However in a total system where joints are unavoidable, the jointing shall be with approved method only. The joints shall be mechanically and electrically effective. The joints may be clamped, screwed, bolted, but preferably welded. The length of overlap at the joints shall not be less than 200 mm. Contact surface at joint shall be cleaned and then inhibited from oxidation with suitable non corrosive compound.
- c) The conductors shall be adequately protected against mechanical damage but for which metal pipes shall not be used.

14.3 Test Links and Testing:

Each down conductor will be provided with a testing point in a position convenient for testing but inaccessible for interference. No connection other than one direct to an earth electrode shall be made below a testing point. Testing points shall be with Copper. The ohmic resistance of the lightning protective system with air termination but without earth connection shall be measured and should be a fraction of an ohm. Earth resistance shall be measured in accordance with IS: 3043.

14.4 Earth Terminations and Electrodes:

Each down conductor shall have an independent earth termination. It should be capable of isolation for testing purposes. Earth electrodes shall be constructed and installed in accordance with IS: 3043.



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SECTION – III

Specifications for MCB DB, MCB and RCCB

1 Miniature Circuit Breaker Distribution boards:

- 1.1 Miniature circuit breaker distribution boards shall conform to IS 2675, IS 8623 and shall be suitable for operation on three phase, 4 wire, 415 V, 50 Hz, AC supply or single phase, 2 wire, 230 V, 50 Hz, AC supply.
- 1.2 The MCB distribution board shall be in sheet steel enclosures with removable type cover with additional door for protecting accidental operation.
- 1.3 Enclosure and door shall be made out of 16 SWG CRCA sheet steel and powder coated and of approved shade. The interior shall be off white finish. The DB shall be totally enclosed with dust and vermin proof construction and shall be of double door type. The DB boxes shall be as supplied by the original manufacturer.
- 1.4 Where distribution boards are specified to be complete with an isolator as incomer, the isolator shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.
- 1.5 Where distribution boards are specified to be complete with MCB + ELCB as incomer, the MCB + ELCB shall be double pole for SP and N distribution boards and 4 pole for TP and N distribution boards.
- 1.6 Bus bars shall be tinned copper. The internal connections in the DB shall be by using stranded copper conductor, PVC insulated wire with copper lugs crimped at both ends. Neutral busbar and earth busbars shall also be provided in the enclosure. Neutral busbar shall have equal rating of phase busbars.
- 1.7 Distribution boards shall be provided with circuit identification by means of directory on the front cover. Upon completion of the works, the contractor shall provide and fix accurate framed circuit lists for all distribution boards. These shall consist of perspex envelopes, fixed securely by an approved method on the inside face of each distribution board front cover into which shall be inserted a neatly typed list of circuits, indicating the number of circuits, phase, cable, size, number of points connected, circuit rating and the loading. The contractor, shall also provide and fix by means of brass screws tapped into the D.B. cover, labels, with black letter on a white background for all distribution boards, MCB + ELCB, Isolators etc. The engraving on the labels



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and the inscription on the circuit lists shall be approved by the Architects before the work is carried out.

- 1.8 All incoming terminals shall be fully shrouded.
- 1.9 The conduit entry plates shall be removable type and shall be provided at top and bottom. All the conduits shall be properly terminated using glands, grips, checknuts, female adapters with bush etc.
- 1.10 Wiring shall be terminated properly using crimping type copper lugs/sockets. Identification ferrules shall be provided on all wires. Each circuit shall have an independent neutral.
- 1.11 Two No. Earth terminals shall be provided on each Distribution Board.
- 1.12 Distribution boards shall be installed surface mounted or recessed mounted as specified and erected at the locations shown.

Surface mounted DB shall be mounted on a suitable size frame made out of GI ZED section. The hole fasts of the frame shall be grouted in the wall with cement mortar and the frame shall be painted with two coats of red oxide and two coats of enamel paint of approved shade. The DB shall be mounted on this frame with proper size nut bolts.

Recessed mounted DB shall be erected in the chase/cut portion of the wall. The cutting of the walls shall be done while constructing the wall and shall be of adequate size to comfortably accommodate the DB. The cut portion shall be smoothened and made plain and shall be fine finished. The DB shall be fixed in this chased portion with suitable clamps and bolts. The top cover of the DB cabinet shall be projecting out of the wall surface and free from any obstruction so as to open the same smoothly.

2 Miniature Circuit Breakers:

- 2.1 MCB's shall be manufactured in accordance with IS 8828 having a short circuit breaking capacity category 10 kA at both 240 volts 50 Hz. and 240/415 V, 50 Hz and complying with the test requirements for both reference calibration temperatures of 20 degree C and 40 degree C.
- 2.2 All miniature circuit breakers shall be rated to withstand the fault currents of the circuits they protect without causing any interference in any other protective device associated with the distribution system. At the same time the design of the circuit breakers shall be such that, it will



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protect the circuit for which it is intended and not cause or allow other protective devices to operate when fault conditions apply.

- 2.3 Miniature circuit breakers shall be capable of carrying its full rated current continuously without tripping out.
- 2.4 All the miniature circuit breakers shall be fitted with a magnetic undelayed tripping mechanism. These shall have overload and short circuit elements.
- 2.5 Time current characteristic of the MCB shall match with that of HRC fuses.

3 Residual current operated circuit breakers (RCCB)

- 3.1 RCCB's shall be manufactured in accordance with IS 12640 and IS 8828 having a short circuit breaking and earth fault protection up to 9 KA at both 240 Volts 50 Hz and 240/415 V, 50 Hz and complying with the test requirements as per IS 2640.
- 3.2 RCCB shall be designed to interrupt the circuit during an earth fault, overload or short circuit. All RCCB shall be high sensitive and calibrated to trip the power supply when the residual current is more than 50 % of its calibrated rating. This means that a 30 mA sensitivity RCCB should trip when the residual current is in the range of 15 to 30 mA and a 300 mA RCCB should trip when the residual current is in the range of 150 to 300 mA.
- 3.3 The RCCB's shall be truly current operated, which means that it shall be totally independent of the main voltage for tripping. RCCB must operate for nominal voltage well below the maximum safe value of 10 volts. RCCB shall interrupt the circuit within 30 milisec at a leakage current of 30 mA.
- 3.4 RCCB shall be provided with a neutral advance mechanism. RCCB shall be functioning even in the event of failure of neutral and/or any one or two of phase supply conductor. RCCB shall be provided with trip free mechanism ensuring that the device cannot be reclosed / reset if the fault persists. RCCB shall be functioning even in the case of interchange of load and supply side connections.
- 3.5 Test button shall be provided to check the correct operation of the unit.
- 3.6 RCCB shall be designed for a very long life of a minimum of 20,000 operations and shall be capable of withstanding inrush current of 4 to 8 times the rated current. For the proper functioning the RCCB should not require any connection of earthing on the device.



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3.7 The device should have high tripping accuracy of less than 5% of rated tripping current. The RCCB shall be provided with clear indication to show whether the tripping is due to current leakage or overload/short circuit.

3.8 The MCB section of RCCB shall be provided with arc chambers and vents are also to be provided to release the arcing products in the atmosphere, so as to increase contact lift and to prevent damage to the insulation. The self-extinguishing thermoset plastic material shall be used for body and shall have a modular construction. The device should be vibration proof.

4 Moulded Case Circuit Breakers (MCCB)

MCCB's used shall be suitable for 440 V, AC, 50 Hz supply and shall be capable of withstanding electrical and mechanical stress due to short circuit capacity as specified for individual requirement. The MCCB shall be compact in size, dust and vermin proof with quick make and break operating mechanism. The construction shall be such as to ensure maintenance and current setting adjustment without removing the MCCB from the panel. The MCCB shall be suitable for interlock with panel door on which it is mounted.

SECTION - IV

Specifications for Medium Voltage Distribution Panel Boards

1 Scope:

This section shall cover supply, assembly, installation, connection, testing and commissioning of medium voltage distribution panel boards as described in this specifications, drawings and schedule of quantities.

2 System:

All the medium voltage distribution panel boards shall be suitable for operation on three phase, 4 wire or single phase, 2 wire with normal system voltage of 415/240 volts, 50 Hz, A.C. supply with solidly grounded neutral system.

3 Weather condition at site:

The panel boards shall be suitable for continuous operation and designed to withstand heaviest conditions at site.

- a) Temperature range: 40 to 45 ° C
- b) Relative humidity: 50 to 80 %
- c) Weather: Dusty



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4 **Applicable IS Standards:**

The panel boards to be supplied under this specification shall confirm to latest editions of relevant Indian Standards and Indian Electricity rules and regulations. The following Indian Standards shall be complied with.

IS 4237: General requirements for switch gear and control gear for voltage not exceeding 1000 V.

IS 2208: HRC cartridge fuse links upto 610 V.

IS 2705: Current transformers

IS 1248: Electrical Indicating Instruments.

IS 375: Switch gear bus-bars, main connection and auxiliary wiring, marking and arrangement for.

IS 2147: Degree of protection provided by enclosures for low voltage switchgear and control gear.

IS 2675: Enclosed distribution fuse boards and cutouts.

IS 2557: Danger notice plates.

IS 1567/4047: Specifications for switch fuse units.

IS 3072 (I): Installation and maintenance of switchgears.

TECHNICAL CONDITIONS ELECTRICAL

5 **General:**

5.1 **Shop drawing:**

Prior to fabrication of the panel boards, the contractor shall submit for the approval of the Consultant, the shop / vendor drawing and design calculations indicating type, size, short circuit rating of all the electrical components used, busbar size, internal wiring size, panel board dimension, colour, mounting detail etc. The contractor shall submit manufacturer's catalogues of the electrical components installed in the panel boards.

5.2 **Inspection:**

At all reasonable times during production and prior to transport of the panel boards to site, the contractor shall arrange and provide all the facilities at manufacturer's plant for inspection and testing and any stage inspection agreed upon.

5.3 **Test certificates:**

Testing of panel boards shall be carried out at factory or at site as specified in Indian Standards in the presence of Consultant. The test results shall be recorded on prescribed forms. The test



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certificates for the test carried out at factory or at site shall be submitted in duplicate to the Architect for approval.

6 Cubical type Panel boards:

6.1 Construction:

6.1.1 Structure

The panel board shall be metal enclosed sheet cubical, compartmentalised suitable for indoor or outdoor installation having dead front, floor mounting type. All M.S. sheets used in the construction of panel boards shall be 16 SWG (1.6 mm) thick unless specified otherwise in the item and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam welded, all welding slag ground off and welding pits wiped smooth with plumber metal.

The panel boards shall be totally enclosed, completely dust and vermin proof. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof. All doors and covers shall be lockable and fully gasketed with foam rubber or neoprene rubber strips.

All panels and covers shall be properly fitted and secured with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with bolt and nuts. Self-threading screws shall not be used in the construction of panel boards. Suitable base channels (min size 75 mm x 75 mm x 5 mm thick) shall be provided at the bottom. A Clearance of 300 mm between the floor of the panel board and the bottom of the lower most units shall be provision Panel boards, if necessary shall be preferably arranged in multitier formation. The panel boards shall be of adequate size with a provision of spare space (as jointly decided with the Architect) to accommodate possible future additional switchgear. The size of the panel boards shall be designed in such a way that the internal space is sufficient for hot air movement, and the electrical component does not attain temperature more than 40 degree Celsius. Opening for natural ventilation shall be provided and shall have screens or grills made of brass or stainless steel wire mesh.

The panel boards shall be provided with removable sheet steel plates at top and bottom with knockout holes of appropriate size and number in conformity with the number, and size of incoming and outgoing conduits /cables.

The panel boards shall be designed to ensure maximum safety during operation, inspection, connection of cables, maintenance and repairs etc. with busbar system energised. Means shall



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be provided to prevent shorting of power and /or control terminals due to accidental drop of maintenance tools etc. inside the panel board. Partitions between feeder compartments, busbar chamber, cable alleys, vertical panels etc. shall be provided to take care of this aspect. The panel boards shall be sufficiently rigid to support the equipment without distortion under normal and short circuit condition; they shall be suitably braced for short circuit duty.

For buses and cables, access shall be limited from front and top only. All other equipment shall be mounted on the front side, (unless specified otherwise for any specific panel) and shall be accessible from the front. All joints and connections shall be made by cadmium plated high tensile steel bolts, nuts and washers secured against loosening.

It shall be possible to insert any new cable and to connect all load side wiring with the busbar energized, without any special precautions. Opening of the busbar chamber shall be possible with special tools only.

6.1.2 **Protection clause:**

All the outdoor panel boards shall have protection clause of IP 55. The complete board shall be double jacketed with insulation material to withstand outdoor temperature. All the indoor panel boards shall have protection clause IP 52.

6.1.3 **Powder coating:**

All sheet steel work shall undergo a seven tank process of degreasing pickling in acid, cold rinsing, phosphatising, passivating and then treated with powder coating treatment. The finishing shall be of shade as approved by the Architect. The interior surface shall have similar finish.

6.1.4 **Circuit compartments:**

Each switch fuse units and meters shall be housed in a separate compartment and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duly inter locked with the breaker/switch fuse units in "ON" and "OFF" position. However it shall be possible to bypass this interlock for inspection purpose.

6.1.5 **Instrument compartment:**

Separate and adequate compartment shall be provided for accommodating instruments, indicating lamps, control contactors /relays, and control fuses etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker/switch fuse units busbar and connections.



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6.1.6 **Busbars and wiring:**

The busbars shall be of three-phase four wire system with separate neutral and earth bar. The busbar and interconnection between busbars and various components shall be with high conductivity, hard drawn, electrolytic copper strips.

The busbar shall be of rectangular cross section designed to withstand full load current for phase busbars and full rated current for neutral busbars and shall be extensible on either side. The busbar shall have uniform cross-section through out the length. The rating of the busbars shall be as specified in BOQ and/or drawings.

The busbars and interconnections shall be insulated with color coded insulation tapes/covers. The busbars shall be supported on unbreakable, non-hygroscopic insulated supports at sufficiently close intervals to prevent sagging and shall effectively withstand electromagnetic stresses in the event of short circuit. The busbars shall be housed in a separate compartment. The busbar shall be isolated with 3 mm thick hylum sheet to avoid any accidental contact. All busbars connection shall be done by drilling holes in busbars & connecting by chromium plated brass bolt and nuts. Additional cross section of bus bars shall be provided in all distribution boards to cover up the holes drilled in the busbars. Spring and flat washers shall be used for tightening the bolts. All interconnections between busbars and circuit breakers/switches and between circuit breakers/switches and cable terminals shall be through solid copper strips of proper size to carry full rated current. These strips shall be insulated with insulating tapes/covers.

All interconnections in the panel shall be with Cu busbars for switchgears of ratings 63 A and above. For switch gears below 63 A, flameproof Cu wires to be used with lugs crimped at both ends.

All busbars shall be tinned copper strips of the given cross section. Unless otherwise specified all bus bars are to be designed taking maximum current density of 800 Amp per sq inch.

All busbars are to be covered with heat shrinkable PVC sleeves of red, yellow, blue and black colours to indicate various phases and neutral bar clearly.



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6.1.7 **Terminals:**

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the terminal blocks. No direct connection of incoming or outgoing cables to internal components of the panel board is permitted. Only one conductor may be connected in one terminal. Adequate no of spare terminals of required size shall be left in each compartment.

6.1.8 **Wire ways:**

A horizontal wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

6.1.9 **Cable compartments:**

Cable compartments of adequate size shall be provided for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate proper supports shall be provided in the cable compartments to support cables. All outgoing and incoming feeder terminals shall be brought out to terminal blocks in the cable compartment.

6.1.10 **Earthing:**

Tinned copper earth bars of suitable size shall be provided for the entire length of the panel. Provision shall be made for connection from this horizontal earth bar to the earth pit on both side of panel board. The earth continuity conductor of each incoming and outgoing feeder shall be connected to the vertical earth bar.

All non-current carrying parts and the framework of panel board shall be connected to this earth bar. All doors and movable parts shall be connected to earth bus with flexible copper connections. Armour of the cable shall be properly connected with earthing clamp, and the clamp shall be bonded with the earth bar.

6.1.11 **Name plate, labels and directory:**

A nameplate with switchgear designation shall be fixed at the top of the panel board. A separate nameplate giving feeder details shall be provided for each panel.

Engraved nameplates shall be of 3-ply (red-white-red or black-white-black) lamincoid sheets. Size of the letters shall be 5 mm. Nameplates shall be fastened by screws and not by adhesive. Size of letter for Main nameplate shall not be less than 20 mm.

Engraved PVC labels shall be provided on all incoming and outgoing feeders. Single line circuit diagram showing the arrangements of circuit inside the panel board shall be pasted on inside of



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the panel door and covered with transparent laminated plastic sheet. PVC labels shall be provided for spare circuits also.

Panel boards shall be provided with a directory indicating the area or loads served by each circuit breaker, the rating of breakers, size of conductors, etc. The directory shall be mounted in metal holder with a clear plastic sheet on inside surface of the front door.

6.1.12 Danger notice plates:

Danger notice plates with symbol as per IS shall be provided on panel boards.

6.1.13 Fuse puller etc:

One set of fuse puller (for various amps of fuses), panel keys and special tools etc. shall be supplied with each panel board.

6.1.14 Internal components:

The panel boards shall be equipped complete with all type of required number of circuit breakers, switch fuse units, contactors, relays, fuses, meters, instruments, indicating lamps, push buttons, equipment, fittings, busbars, cable boxes, cable glands etc., and all the necessary internal connections/wiring as required and as indicated on relevant drawings.

Components necessary for proper complete functioning of the panel boards, but not indicated on the drawings and specifications shall be supplied and installed.

All part of the panel board carrying current including the components, connections, joints and instruments shall be capable of carrying their specified rated current continuously, without temperature rise exceeding the acceptable values of the relevant specifications at any part of the panel boards.

The derating of the different items resulting from the prevailing conditions like room temperature shall be allowed for while selecting the components.

All units of the same rating and specifications shall be fully interchangeable.

1. Switches:

Switches shall be air break type as per IS 4047. The switch operating handle shall be front mounted and interlocked with the door when the switch is in ON position. The live parts shall be shrouded with suitable insulating barrier so as to prevent accidental contact with the live parts after opening the cubicle front door.



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2. Fuses:

All power and control fuses shall be link type. Screw type fuses are not acceptable. All fuse links shall be HRC type and shall generally conform to IS 2208. Rewirable fuses are not acceptable. All fuses shall be readily accessible for replacement. It shall not be necessary to remove any piece of equipment or to disconnect wiring before replacing fuses using fuse puller.

3. Control switches:

Ammeter selector switches shall have make before break feature on its contacts. The selector switches shall generally have four positions for reading three phase currents and neutral. The voltmeter selector switch shall also have four positions and the fourth shall be OFF position. Remote trip /off selector switch shall be lockable in OFF position.

4. Indicating lamps:

The indicating lamps shall be LED type.

5. Measuring and Indicating instruments:

All measuring and indicating instruments shall be Digital type, in square pattern moving from 90 deg. scale, 96mm x 96mm, flush mounting type. Instrument shall be of accuracy class 1 as per IS 1248. Ammeters for motor and other feeders shall be graduated for full load current of motor with a compressed scale at the end for at least 6 times full load current. The KW meter and PF meter shall be suitable to measure unbalanced loads on 3-phase 4 wire system. PF meter shall be in 0.5 - 1 - 0.5 range. CT's shall be resin cast, with class 1 accuracy and 15 VA burden. The energy meters shall be CT operated electrolytic type.

6. Push buttons:

Push buttons shall be suitable for panel mounting type and comprise of a contact element and an actuator. The contacts shall be of silver alloy and of 10 A continuous current rating. Each push button shall be provided with 1 NO + 1 NC contacts, but if required 2 NO + 2 NC contacts be provided. Colour of the knob shall be as per IS.

7. Packing and transport:

The bigger size panel boards shall be shipped to site in wooden crates. They shall be wrapped with polythene sheets before being placed in crates to prevent damage to the finish. Crates shall have skid bottoms for handling. All panels shall have one set of two silica gel bags, which shall be checked periodically both while in storage and while in service. The smaller size panel boards shall be transported to site with polythene sheets wrapped all along and wooden frame to cover the same.



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8 Storage at site:

The panels shall be stored in a well ventilated, dry place and suitable polythene covers shall be provided for necessary protection against moisture.

9 Installation:

The panel boards shall be installed at the location as indicated in the drawings. The contractor shall submit for approval a shop drawing indicating room size, panel size and method of installation prior to installation.

The cubicle type panel board shall be installed on suitable foundation. Foundation shall be as per the dimensions supplied by the panel manufacturer. The foundation shall be flat and level. Suitable grouting holes shall be provided in the foundation. Suitable MS base channel shall be embedded in foundation on which the panel can be directly installed. If the panel is provided with an angle iron pedestal or base plate the same shall be grouted firmly in the floor. The panel boards shall be properly aligned and erected in plumb and bolted to the foundation by bolt parallel to the walls.

After installation of the panel boards, various components of the boards shall be checked and be put in working order. The cables laid through cable trench or on cable trays/racks etc. shall be terminated on the bottom plate or top plate as the case may be, by using siemens type brass compression glands. The individual cables shall then be led through the panels to the required feeder compartments for necessary terminations. The cables shall be clamped to the supporting arrangement. The switchboard earth bus shall be connected to the local earth grid. Connection of cables shall be by crimping type Cu lugs using hand operated or hydraulic crimping tool as per cable sizes

10 Testing:

1) Testing at factory:

Panel boards shall be inspected at factory at pre-assembly stage and any modifications or changes as suggested shall be incorporated. The panel boards shall be again inspected and tested at the factory after assembly of all components and completion of all inter-connections and wiring. The tests shall include all routine and type tests as per relevant ISS.

2) Testing and pre-commissioning checks at site:

Panels shall be commissioned only after the successful completion of the following tests. The tests shall be carried out in the presence of the Architect.



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2.1 Precommissioning checks:

- 1) Check all panels are aligned in line and properly erected in plumb.
- 2) All withdrawals portions shall be capable of smooth extraction and isolation.
- 3) All main and auxiliary bus bar connections shall be checked and tightened.
- 4) All wiring terminations and bus bar joints shall be checked and tightened.
- 5) Wiring shall be checked to ensure that it is according to the drawing.
- 6) Before fitting the covers, all chambers, compartments, cable alleys etc. shall be checked for complete cleanliness and removal of foreign matter if any, particularly the tools used for erection, cut pieces of cable armour etc. Covers shall be properly fixed with all fixing screws in places.
- 7) All mechanical interlocks shall be checked and all fuses and links shall be inserted.
- 8) Earthing connections shall be checked.
- 9) Operational checks on all circuit breakers or switchgear shall be carried out, both mechanically and electrically to check that correct indications are provided for closed and open positions.
- 10) The panels shall be checked to ensure that moisture ingress has not taken place during transit and storage.

2.2 Testing at site:

- 1) Insulation of the main circuit, that is, the insulation resistance of each pole to the earth and that between the poles shall be measured.
- 2) All wiring shall be tested for insulation resistance by a 1000 volts megger.
- 3) All relays and protective devices shall be tested for correctness of settings and operation by introducing a current generator and an ammeter in the circuit.
- 4) Insulation test shall be carried out both before and after high voltage test.
- 5) A high voltage test with 2.5 KV for one minute shall be applied between the poles and earth. Test shall be carried out on each pole in turn with the remaining poles earthed, all units racked in position and the breakers closed. Original test certificate shall be submitted along with panel.



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SPECIAL CONDITIONS REGARDING INSPECTION OF WORK

1. INSPECTION OF WORK :

All works in course of execution or after execution in pursuance of the Contract, shall at all times be open to the inspection and supervision of the Employer and Consultant or his authorized representatives and the Contractor or his responsible agent, duly accredited in writing, shall at all such times, be present to receive writing, shall at all such times, be present to receive instructions/orders. The work during the progress or any time before settlement of the final bill, is also liable to be inspected by Chief Technical Examiner of the Central Vigilance Commission, New Delhi, on behalf of the Employer and this shall be also considered as an inspection by the Employer for all purpose.

2. PRECEDENCE FOR ACCEPTANCE :

If the contradiction or variance is observed in different components of the tender's the details clearly given in -

- a) "General Preamble" shall have the precedence over the relevant details given in General "Specifications".
- b) "Trade Preambles" shall have the precedence over the relevant details given in "General Specifications"
- c) The description of an item of the "Schedule of Quantities" shall have the precedence over the relevant details given in "General preambles", General "Specification" and "Trade preambles".



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SEWERAGE TREATMENT PLANT

SPECIAL CONDITIONS WITH REGARD TO DRAWINGS FOR SERVICES & PHOTOGRAPHS OF SEWAGE TREATMENT PLANTS

GENERAL TERMS & CONDITIONS

SITE INFORMATIONS

Tenderers are advised to visit the site and make a through study of the site condition,. The space available is narrow and congested located very near to the foundation of existing building. It , is , therefore, imperative on the part of the contractor to visit the site and assess the suitability and adequacy of the space for installation of Sewage Treatment Plants. The Sewage Treatment Plant have to be provided within the area earmarked and available. Secondly, the entire Sewage Treatment Plant along with its mechanical , electrical and civil installation have to be placed underground so that vehicular movement over the space is possible. The systems shall also work on Aerobic process.

DRAWINGS FOR SERVICES

The contractor shall have to submit two sets of services drawings and original tracings of 'As Built' Sewage Treatment Plants at site. All the drawings shall have complete information about the invert levels, horizontal and vertical pipes, location of manholes, chambers, traps etc., direction of flow, inlets and outlets etc. These drawings shall be enclosed with the inventory lists of civil, electrical and mechanical works.

The above drawings shall be got endorsed from the Employer's Engineer/ Consultant. The quoted rates shall include for the above job also.

PHOTOGRAPHS OF THE SEWERAGE TREATMENT PLANTS

- 1) The contractor shall submit 3 sets of the prints with negatives of the photographs size 4" x 6" to LIC HFL Care Homes Ltd on the following stages :
 - a) Excavation stage
 - b) Installation stage
 - c) Commissioning and operational stage
- 2) One or more photographs shall be taken to have complete clear views of the project as directed by Consultant in charge. The further stage of work shall proceed only on confirmation of such photographs seen by Consultant and a written site instructions obtained in this regard. The photographs can be submitted in digital form.
- 3) the quoted rates shall include for the same and no extra is payable to contractor on this account.



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SCOPE OF WORK

LIC HFL Care Homes Ltd. has developed a elderly citizen's residential unit at Aiginia and Ghatikia at Bhubaneswar comprising of 240 Flats named as " LIC HFL Care Homes Project". There is a proposal to install one number of Sewage Treatment Plant for safe disposal of sewerage to storm water drain after treating the same in most professional manner. The contractor shall accommodate the sewage treatment plants in the stipulated space as available in the site. Hence, it is required on the part of the contractor to visit the site before participating in the tender.

DESIGN DATA

TYPE OF WASTE WATER: The influent is the product of the waste waters from different activities such as :

- a) Domestic sewage from the toilets & bathrooms.
- b) Oil, Grease and food waste from Pantries /Kitchen etc.
- c) **Toilets : 466 nos. and 241 Kitchens.**
- d) **Capacity : 200 KLD**

Design basis :

Inlet Parameter

BOD : 800mg/lit
COD : 600mg/lit
SS : 300mg/lit
O&G : 50mg/lit
PH : 7 to 8

Outlet Parameter

BOD < 20mg/lit
COD < 100mg/lit
SS < 80mg/lit
O&G < 10mg/lit
PH : 7 to 8

It may clearly be understood that the owner wants to make re-use of treated effluent. The water after above treatment shall go for horticulture purposes. The water from the tertiary treatment shall be re-used. Hence, it is imperative that the contractor ensures that the effluent is usable for above purposes.



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It is to be noted sewerage Treatment Plant shall be installed for Housing project ; the inlet parameter as mentioned above may vary. Further, the treated water coming out of STPs shall either be reused or discharged to storm water drain , hence disinfection through chlorination should be carried out and therefore outlet parameter shall satisfy the norm of Central Pollution Control Board. The stipulation of outlet parameter as prescribed by Central Pollution Control Board when the discharged water shall be reused or diverted to storm water drain shall supersede the outlet parameter mentioned above.

GENERAL REQUIREMENTS:

1. The tender should quote the price for STP inclusive of everything.
2. Rate quoted should be inclusive of all type of Civil works, Electrical Works, Mechanical Works including the supply of materials. In other words the tender should carry out everything to supply, install, test, commission and run the sewage treatment plants. The contractor should carry out necessary tests at its own cost to prove that outlet parameter satisfies Central Pollution Control Board norms for treated water fit for re-use or to drain to the storm water drain.

During the visit of representatives of Orissa Pollution Control Board, Bhubaneswar Municipal Corporation, Bhubaneswar Development Authority and Ministry of Environment of Forest, Government of India, the contractor shall be present to explain in details about the STP to the representative. Any test as required by the aforementioned Authorities shall be carried out by the contractor at its own cost and if any NOC is required to be obtained from above mentioned authorities pertaining to STP, it shall be the responsibility of the contractor to obtain the same.

3. The defect liability period shall be one year from the date of virtual completion of work. During the defect liability period the contractor shall rectify any defects or malfunctioning of the sewerage treatment plant. In addition to above the contractor shall test the outlet parameter in every three months during the defect liability period to ensure that treated water coming out of STP is satisfying the Central Pollution Control Board norms for water to be re-used or to be drained to the storm water drain. It is to be noted that during defect liability period the contractor shall promptly attend to the defect so that nuisance due to malfunctioning of STP can be avoided. The contractor has to train regarding operational aspect of the STP to the person nominated by Employer and Consultant.
4. The contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions and alignment of all part of the works.
5. List of approved agencies from which work is to be carryout are as per details below :-



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- a. M/s Shivam Water Treaters Pvt. Ltd., Regd. Office- Shivam House, 3 Kahan Krupa, Vansa Bus Stop, Dr. Jivraj Metha Hospital Road, Vansa, Ahmadabad , Gujarat.
- b. M/s Maharashtra Engineer & Co., A-12, Rukmani Complex , Juna Bilaspur, Bilaspur , Chhattisgarh.
- c. M/s Brookefield Technologies Pvt. Ltd., E-1381, 5th Cross, 6th Main, AECS layout, ITPL Road, Brooke fields, Bangalore, Karnataka.
- d. M/s Sintex Industries Ltd. Plastic Division, 230-A, AJC Bose Road, Kolkata.
- e. M/s Unitech Water Technologies Pvt. Ltd., Kailash Bhawan, 2nd floor, 32/1 Gariahat Road(S), Kolkata.

6. **DECLARATION BY THE TENDERER**

The rate has been quoted having visited the site after being convinced that the space available at site is adequate for installation of STP. The working condition has been ascertained and the difficulties associated with working very near to the foundation of existing buildings are understood. We undertake to carryout adequate safety measures to protect the foundation of the buildings. The type of STP, we undertake to install and for which we have quoted work on principle of aerobic process. We are attaching herewith sufficient **documents/brochure/certificate in order to establish that of** STP for which we have quoted work on the aerobic process and the process shall not emit any foul gases like Methane and or Hydrogen Sulphide. The type of STP for which we have quoted shall be installed underground with all its allied equipments and the space above STP can be utilized for vehicular movement/parking.

DESCRIPTION OF TREATMENT PROCESS

- 1.0 Sewage generated from different process will be collected into underground holding tank for storage & Equalization purpose. Adequate precaution is necessary to ensure screening of big size particles (Size above 10mm & non-compressible solids viz., plastic bottles, polythene bags, glasses, stones etc.) before entering into the equalization / collection pit. There shall be suitable arrangement for cleaning & lifting the coarse material along with settled sand from the platform near the screen chamber. From the collection tank the sewage / wastewater will be pumped via submersible solids handling pumps into aeration Tank on a controlled rate via a flow-regulating box.
- 1.1 In the aeration tank of required capacity, wastewater will be mixed with microorganisms in the presence of dissolved oxygen. Microorganisms will assimilate organic impurities. The mixed



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liquor suspended solids (MLSS) will be maintained at levels of 3500 mg/lit to 4000 mg/lit. Air is supplied into aeration tank with two positive displacements (roots type) air blowers (1 working + 1 standby) located out side the tank. Submerged air diffusers will provide mixing and oxygen for the needs of microorganisms. The blowers will be sized to maintain dissolved oxygen level in the aeration tank of approximately 2-4 mg/lit.

- 1.2 From the aeration tank mixed liquor will flow by gravity into adjoining clarifier tank. The solids will settle in the clarifier tank. A sludge return pump will provide for pumping the settled sludge from the clarifier tank back to the aeration tank. Clarifier tank will also be provided with skimmer system to pump floating scum back to the aeration tank to keep the clarifier surface clean.
- 1.3 An overflow weir with scum baffle will be provided in the clarifier to take treated wastewater out of the clarifier.
- 1.4 From the clarifier, treated wastewater will flow by gravity into adjoining chlorine contact tank / clarified water tank. In this tank chlorine will be added in the form of calcium or sodium hypochlorite solution by a suitable chlorinator. A free residual chlorine level of 0.1 – 1 ppm will be maintained.
- 1.5 Treated water after Chlorination from the chlorine contact tank will be clear, odorless, low BOD (**<20mg/lit**) , low suspended solids and can be used for many non-potable applications like horticulture purpose etc. or can be disposed directly to public/natural drain.
- 1.6 Treated water after Chlorination is further filtered through Pressure sand filter and an activated carbon filter for further reduction of suspended solids to make it suitable for recycling for irrigation purpose. Filtered water shall be stored in a separate tank for supply to the garden hydrant system.
- 1.7 On line UV system will be provided on the discharge point.
- 1.8 Excess sludge from the clarifier tank will be taken periodically into sludge holding tank. In the tank sludge will be aerated for self-stabilization. Air will be shut off periodically and superannuate water will be transferred to the aeration tank creating stabilized sludge. The final sludge may be dried and shall be collected in HDPE bags and disposed off profitably by selling in the market or using as manure for horticultural purposes. Sludge loading arrangements shall also be provided for direct disposal of sludge to sludge tankers/trolleys.



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- 1.9 Filtered water is collected into treated water tank from where it will be transfer through hydro-pneumatic pump to gardening.

GENERAL DESIGN INSTRUCTIONS

1. SCOPE OF WORK

- 1.1 The contractor will execute the entire work on a item rate basis for supply & installation of all electro-mechanical components, execution of all civil works, commissioning, start-up and getting successful test result from authorized lab / agency, based on accepted shop drawings & detailed calculations. The contractor shall be completely responsible for the design of all components, structural details & supervision of the civil works at no extra cost.
- 1.2 The contractor shall bear responsibility for the characteristics of the final effluent and shall make any addition/alterations to the equipment or plant, if the same fails to meet the required standard, without any extra cost.
- 1.3 Work under this contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required together with shop drawings and required details to construct, erect and commission, a Sewage Treatment Plant, completely in accordance with the specifications and drawings enclosed with this tender generally comprising but not limited to the items mentioned in the following sections.
- 1.3.1 Construction of all elements of the plant including Civil works excavation for pipelines, gravity lines, manholes chambers (except approach road) as per requirement, within the battery limit.
- 1.3.2 Interconnecting piping between all units, valves, gates and all other appurtenances and devices as required.
- 1.3.3 All mechanical equipments duly protected against corrosion.
- 1.3.4 All electric drives, motor control centers, power and control cable (except main incoming feeder and lighting)
- 1.3.5 All instrumentation, control cabling, panels complete in all respects.
- 1.3.6 All units are shown on the contract drawings. These drawings are enclosed for guidance of the contractor. The contractor shall work out detailed layout and flow scheme with levels. The



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contractor may suggest minor changes in the proposed flow scheme, ensuring that the basic design data conforms to as given as Section-II of this contract documents.

1.3.7 Getting clearance/certificate from **Pollution Control Board** and any other regulatory body as per requirement.

1.4 Without restricting to the generally of the foregoing the work shall consist of :-

1.4.1 Design & construction of all civil works, to consists of :-

- a) Screen/Grit Chamber followed by oil & grease separator
- b) Collection pit
- c) Equalization tank
- d) Aeration tank in two compartment
- e) Secondary clarifier
- f) Chlorination tank
- g) Clarified water tank
- h) Filtered treated water tank
- i) Sludge holding / aerobic digester tank
- j) Control building
- k) Filter press & chemical dosing room
- l) Testing Laboratory
- m) Equip. Foundations
- n) Sludge drying bed with shed
- o) Staircases, doors, windows, ventilators, handrails, guard etc. complete with all necessary appurtenances and accessories.

1.4.2 Mechanical Equipment

Supply, erection, commissioning and testing of all mechanical equipments, generally comprising of :

- a) Bar Screen with frame and lifting arrangement
- b) Air blowers with motor and related accessories.
- c) Air distribution assembly
- d) Mech. Arrangements for secondary clarifier
- e) Raw effluent lift pumps, equalized sewage lifting pump, Sludge return pump, filter feed pump & treated effluent pump.
- f) Agitator (air mixing) for equalization tank



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- g) Multigrade sand filter
- h) Activated Carbon Filter
- i) Filter Press & Sludge transfer/handling arrangements
- j) All Pipe-line and valves
- k) Chlorine dosing pump
- l) Nutrient dosing pump
- m) Drainage sump pumps for STP plant room area
- n) Any other equipment required for functioning of STP or as per Clients' requirements.

1.4.3 **Electrical Equipment**

Design, supply, erection, commissioning and testing of all electrical equipments generally comprising of :

- ii) Electric motor for all equipments as required.
- iii) Motor control center complete with all internal wiring and accessories.
- iv) Electrical cables with cable tray from M.C.C. panel to all electric motors and units with local switch.
- v) Electric earthing for motors stations as per I.E.E. rules.
- vi) All internal lighting & exhaust system etc.

1.4.4 **Piping work**

Laying of all piping work as per detailed designs and generally for :

- a) All above mentioned civil structure and tanks.
- b) For the interconnection of the various equipments, sludge sump, pump house and control room.
- c) All interconnecting piping between various units bypass etc.
- d) Effluent piping within limits as shown on the drawings.
- e) Piping required for providing water supply & drainage for the Testing Laboratory.

1.4.5 **Instrumentation & Laboratory Equipment**

Supply, erection, commissioning and testing of all Instrumentation & testing equipments, as mentioned below :



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SPECIFICATION FOR INSTRUMENTATION & LABORATORY EQUIPMENT

1. Work under this section shall consist of providing detailed design, materials, labour and equipment for all Instrumentation and testing apparatus for laboratory if required.

Without restricting to the generality of the foregoing the instrumentation & testing apparatus shall consist of :-

- a) pH Testing Kit
- b) Conductivity Meter
- c) BOD Incubator
- d) COD Digester
- e) Vacuum Pump
- f) Distillation column
- g) Deep fridge
- h) Oven
- i) Required glassware
- j) Turbidity meter (Nephelometer)
- k) Dissolved oxygen meter
- l) SS / Hardness Testing Apparatus
- m) Bulk Flow-meters
- n) Energy Meter
- o) Pressure Gauges
- p) Level Gauges

- 2.0 Contractor shall verify/check all levels and other information given in the tender/drawings & from site. No extra payment shall be admissible for any variation in levels or other site data.

2.1 To be submitted on award of work

- 2.1.1 Contractor shall submit detailed working/shop drawings of all civil works including dimensions, details of foundations, cut-out and openings, load requirements and working drawings necessary and required for the execution of the work.

- 2.1.2 All structures designed based on information given in this document below ground shall be subject to strict architectural control. The specifications, shape, layout and external finishes shall be as per the prior approval of the Consultant.



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TECHNICAL SPECIFICATIONS FOR SITC OF FIRE FIGHTING SYSTEMS

SECTION-1:: BASIS OF DESIGN

1. BASIS OF DESIGN :

The fire fighting system for the project is designed keeping in view the following:

- 1.1 Provision of fire fighting systems such as fire hydrants, hose reel, portable fire extinguishers and manual fire alarm system.
- 1.2 Layout: The execution of works and materials used shall be as per the latest relevant I.S. specifications. Wherever reference has been made to Indian Standard or any other specifications, the same shall mean to refer to the latest specification irrespective of any particular edition of such specification being mentioned in the specifications below or schedule of quantities.

2. CONCEPT OF THE SYSTEM :

The following services have been envisaged for the complex:

- 2.1 Fire fighting system for the complex comprises of hydrant system connected with down comer, Hose Reels, Portable Fire Extinguishers and Fire Alarm system.
- 2.2 Following components shall be included in the water supply system for efficient functioning.
 - i) Automatic air vent at convenient locations.
 - ii) Drain valve.
 - iii) Flow meter.
 - iv) Pressure gauge.

3. WORKMANSHIP:

The workmanship shall be best of its kind and shall conform to the relevant IS specifications mentioned below and elsewhere in this document in every respect or latest trade practices and shall be subject to approval of the owner's site representative. All materials and/or workmanship which in the opinion of the site representative of Consultant is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and /or workmanship forth with.



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4. MATERIALS:

All materials shall be best of their kind and shall conform to the latest Indian Standards. The materials to be used at site shall be of approved quality as per samples and approved by the Consultant

As and when required by the site representative of Consultant the contractor shall arrange to test the materials and / or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials or portion of work are found to be defective or unsound by the site representative of Consultant, the contractor shall replace the defective materials from site, pull down and re-execute the works at his own cost to the satisfaction of site representative of Consultant. In order to substantiate that, the materials used are as specified the contractor shall furnish the site representative of Consultant with original invoice on demand.

SECTION-2 : FIRE PROTECTION SYSTEM

1. SCOPE:

The scope of this section consists of but is not limited to supply, installation, testing and commissioning of the fire protection system. The philosophy of the system is as mentioned below.

- a) The fire suppression system shall comprise of fire hydrant system, hose reel, connected to down comer being pressurized through independent terrace pumps on individual blocks.
- b) Water from terrace tank shall feed water to the hydrant landing valves & hose reels on each floor through down comer.
- c) The fire hydrant system shall remain pressurized under gravity all times and during emergency situation the terrace pump shall start automatically at a pre set pressure to boost the pressure for fire fighting.
- d) Each of the down comers shall be provided with an electric driven terrace pump. The starting of the pump shall be both manual and automatic and stopping shall be manual.
- e) Contractor shall ensure Hydro Testing for the complete system.
- f) The contractor shall obtain necessary approval of the drawings and the schemes from Local Fire Prevention Officer without any cost to the Consultant
- g) The contractor shall design and after approval of site representative of Consultant display near each staircase landing at all floors a glass covered framed floor plan clearly showing the locations of all landing valves, hose reels, manual alarm points & hand appliances (fire extinguishers), as well as the Do's and Don'ts for the personnel. The routes to reach the



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EXITs shall be clearly marked and directional sign posted to guide the population of the concerned floor for escape to safe locations. EXIT signs shall be of "auto glow" type which shall glow during dark. The dimensions, lettering size and color code etc shall be directed by the site representative of Consultant

2. PIPING WORK::

2.1 GENERAL REQUIREMENT:

- a) All materials shall be of the best quality conforming to the specifications and sample subject to approval of the site representative of Consultant.
- b) Pipes shall be routed in such a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.
- c) Pipes shall be securely fixed to walls and ceilings by suitable clamps and supports (galvanized) at intervals specified elsewhere in this document.
- d) Valves and other fittings shall be so positioned that they are easily accessible for operation and maintenance.
- e) Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmen like manner.
- f) Pipe accessories such as gauges, meters, control devices etc shall have the same working pressure rating as the associated pipe work.
- g) All pipe work shall be free from burrs, rust and scale and shall be cleaned before installation.
- h) All personnel engaged on welding operations must possess a certificate of competence issued by appropriate authority.

2.2 PIPING:

- a) Pipes of following types viz, 100 mm nb, 80 mm nb, 65 mm nb, 50 mm nb, 25 mm nb are to be used for the fire suppression net work.
- b) Mild steel black pipes as per IS:1239, part-II, heavy grade (for pipes of sizes 100 mm nb and below) shall be used and suitably lagged on the outside to prevent soil corrosion. Wherever pipes are crossing floors and wall or the like suitable tape coat of 3 mm thick shall be provided.
- c) Pipes required to be hung shall be by means of expandable anchor fastener of approved make and design. The hangers and clamps shall be fastened by means of galvanized nuts and bolts. The size / diameter of the anchor fastener and the clamps shall be suitable to carry the weight of water filled pipe and dead load normally encountered.



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- d) The selection and design of the hanger & support shall be capable of carrying the sum of all concurrently acting loads. They shall be designed to provide the required supporting effects and allow pipe line movements as necessary. All guides, anchor braces and structural steel to be attached to the building/structure trenches etc shall be provided. Hangers and components for all piping shall be approved by the owner's site representative/ consultant.
- e) The entire piping system shall be hydro tested for leakages at 2 times the operating pressure or 1.5 times shut-off pressure, whichever is highest including testing for water hammer effects.

2.3 PIPING INSTALLATION AND SUPPORT:

- a) Piping shall be properly supported on, or suspended from, on stands, clamps, hangers as specified and as required. The contractor shall adequately design all the brackets, saddles, anchor, clamps and hangers and be responsible for their structural stability.
- b) Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction.
- c) Down comers shall be supported by hangers or brackets so as to permit free expansion and contraction.
- d) Down comers shall be supported at each floor with galvanized steel clamps.
- e) To permit free movement of common piping support shall be from a common hanger bar fabricated from galvanized steel sections.
- f) Pipe hangers shall be provided at the following maximum spacing.

PIPE DIA (MM)	HANGER ROD DIA (MM)	SPACING BETWEEN SUPPORTS (M)
Up to 25	6	2
32 to 50	10	2.7
80 to 100	12	2.7
125 to 150	16	3.6

- g) The end of the steel rod shall be threaded and not welded to the threaded bolt.
- h) All pipe work shall be carried out in a proper workman like manner, causing minimum disturbance to the existing services, buildings, roads and structure.



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- i) Pipes passing through walls & floor shall be provided with 3 mm thick wrapping and coating of tape coat. The contractor shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate or as specified / approved by Consultant.
- j) All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed to avoid entry of foreign materials. Where reducers are to be made in horizontal runs, eccentric reducers shall be used for the piping to drain freely. In other locations concentric reducers may be used.
- k) Automatic air valves shall be provided at all high points in the piping system for venting.

3. FIRE BRIGADE CONNECTION:

- a) Two way fire brigade connections shall be fitted to each down comer with two 63 mm instantaneous inlets in a glass fronted wall box at a suitable position at street level, so located as to make the inlets accessible from the outside of the building.
- b) The size of the wall box shall be adequate to allow hose to be connected to the inlets, even if the door cannot be opened and the glass has to be broken.
- c) Each box shall have fall of 25 mm towards the front at its base and shall be glassed with wired glass with "FIRE BRIGADE INLET" painted on the inner face of the glass in 50 mm size block letter.
- d) Each such box shall be provided with steel hammer with chain for breaking the glass.

4. SYSTEM DRAINAGE:

The system shall be provided with suitable drainage arrangement with drain valves complete with all accessories.

5. VALVES:

Sluice Valve:

- a) Shall conform in design and materials of construction to PN 1.6 of IS : 780-1984
- b) Shall be ISI marked.
- c) Shall be installed in a masonry pit with C.I. cover.

Non-return Valve :

- a) Shall be conforming in design, dimensions and materials to PN 1.6 of IS : 5312(Part –I)-1984.
- b) Shall be ISI marked.

Landing Valve :

- a) Shall be single headed conforming to IS : 5290 type A.
- b) Shall be ISI marked.



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6. Hoss Reel Assembly :

- a) Shall be conforming to type A of IS : 884-1985
- b) Shall be consisting of following components :
 - i) HUB
 - ii) Swinging type.
 - iii) Pipe with fitting.
 - iv) Wall bracket.
 - v) Hose reel.
 - vi) Nozzle
 - vii) Stop valve.

7. Hose Pipe :

Shall be 63mm dia. Reinforced rubber lined hose conforming and tested to IS : 636 – 1988 and a pair of GM coupling wired on to each length of hose. For indoor control percolation type.

8. Branch Pipe & Nozzle :

- a) Shall be conforming to IS : 2871 – 1983
- b) Shall be ISI marked.

9. Hose Boxes :

Shall be made of 16G MS sheet with glass front hinged door with lock and key of adequate size and shall be capable of accommodating two lengths of hose and one branch pipe with nozzle.

10. MANUAL FIRE ALARM SYSTEM:

- a) Manual Fire alarm system shall be provided in each floor of the buildings conveniently to alarm the occupants in case of fire.
- b) The system includes manual call points break glass type or pull type which when actuated will trigger dual tone electronic hooter to alert the occupants of the building.
- c) Manual call points shall be installed in such a way that one shall not travel more than 22.5 mtr to actuate the same during fire emergency. These shall be looped together and then connected to the fire alarm panel located in the security room.
- d) The address of each detector shall be indicated on the fire alarm panel.
- e) Supply and installation of the earthing conductors, control and power cabling for the complete fire alarm system shall be in the contractor's scope.
- f) Performance tests shall be conducted at site for manual call points and hooters to prove that the individual components shall satisfy all specific requirements



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11. Hand Held Fire Extinguishers:-

- a) Work under this section shall consist of furnishing all labour, materials, appliances and equipment necessary and required to install fire extinguishing hand appliances conforming to IS-15683-2006 and distribution of fire extinguishers shall conform to IS-2190.
- b) Contractor shall install fully charged and tested fire extinguishers of following type :
 - (i) Co2 type-4.5 kg capacity,(body conforming to IS-7285, control valve conforming to IS - 3224.
 - (ii) ABC type Dry Powder extinguishers -5 kg capacity.
 - (iii) Water Co2 type -9 ltr capacity.
- c) Hand appliances shall be installed in easily accessible locations with the brackets fixed to the wall by suitable anchor fasteners.
- d) Each appliance shall be provided with an inspection card indicating the date of inspection, testing, date of refilling, due date of refilling and date of hydro test and other relevant data. All appliances shall be fixed in a true workman like manner truly vertical and at correct locations.

12. ELECTRIC FIRE PUMP:

The electric booster pump shall be motor driven, mono block type capable of discharging 900 LPM water giving pressure of 2.0 kg / cm sq. The pump shall be coupled to TEFC motor of 5 HP (3.7 KW) and complete set shall mounted on common base frame (KIRLOSKAR) Model: KDI - 527++ Mono block Pump shall be preferred. It shall be provided with pump controller for auto & manual start with provision of manual stop. Supply installation testing and commissioning of control & power cabling as required for establishing automation of the pumping system shall be in the scope of the contractor.

13.SPEAKERS :

In each floor there should be a speaker which shall be connected to the amplifier in the stilt floor control room of respective building. Connections of each floor cable shall be connected with the split switch box of the amplifier system to make all zones/floors independent. In case of any emergency the security person will announce either to particular floor or to the total building selecting respective/all switching device.

SECTION-3: COMMISSIONING AND GUARANTEE:

1. Scope:

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section. Contractor shall provide all tools & plant required for execution of the works in this contract.



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2. Pre commissioning:

On completion of the installation of all pump, piping, valves, pipe connections, fire alarm systems, the contractor shall proceed as follows :

- a)** Prior to start-up and hydro testing entire installation shall be cleaned, flush the pipe lines to clear of dirt and debris.
- b)** Check all clamps, supports and hangers provided for holding pipes.
- c)** Check all hydrant valves dry and wet for their proper functioning and then close those.
- d)** Fill up the pipes with water to conduct hydro test and hold the pressure for 24 hours to detect any leakage.
- e)** Operate the pump continuously for 30 minutes (with temporary piping back to the tank)
- f)** Test auto operation of the pump.
- g)** Operate the fire alarm system and reset those to normal.

3. Final Acceptance tests:

Following commissioning and inspection of the entire installation, and prior to issue of completion certificate, the contractor shall carry out final acceptance tests in accordance with a programme to be agreed with the representative of Consultant.

If the results of the acceptance tests show that systems and equipment fail to perform to the efficiencies or other performance figures as given in the specification, the contractor shall adjust, modify and if necessary replace the equipment to obtain required performance without further payment.

4. Warranty & Handover:

The contractor shall warrant that all plants, materials and equipment supplied and all workmanship performed by him to be free from defects whatsoever nature before handing over to Employer and submit the guarantee certificate.

The contractor shall also hand over all maintenance and operation manuals, all certificates and all other documentation as per the terms of the contract to the site representative of Employer.

Besides the works mentioned above, the contractor will obtain "No objection Certificate" from the Fire Service Authority, Govt. of Odisha, on behalf of Employer for the above fire fighting installation of the building and quoted amount to include to carry out this work..



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GENERAL CONDITIONS FOR MAINTENANCE OF FIRE FIGHTING SYSTEMS DURING DEFECT LIABILITY PERIOD.

- i. Quarterly checking up keeping and replacement of the any component or sub-components of the system for proper operation of the system.
- ii. During the Defect liability period the contractor will responsible to keep the Fire Fighting & Fire Alarm system in perfect running condition including fitting of parts accessories, repair etc,
- iii. In case of any defect cropped up, it shall be attended within 04 hours of getting information over telephone as and when is required.
- iv. The contractor has to give proper authorization of engineer / supervisor responsible for maintenance of units and has to provide their contact number so that we can contact them as and when required.
- v. In case the services rendered by the contractor are not found satisfactory, during any time of defect liability period, Employer will engage some other agency to carry out the work at contractors' risk & cost and the amount spend shall be recovered from Security Deposit.
- vi. Safety controls should be tested and replaces in case of malfunctioning.
- vii. Arranging demonstration at least once in every six month.
- viii. Any defect in electrical items and control wiring of fire fighting systems should be attended.
- ix. The replacement of all the parts if any should be original, genuine make and old replaced should be shown or handed over to Employer. The material whichever needs to replace, should take prior approval from the Competent Authority.
- x. Ensuring proper working entire Fire Fighting & Fire Alarm systems.

Agreed and confirmed

.....
Signature of company with seal and date



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Technical Specifications for Supply, Installation, Testing and Commissioning of 125 KVA 100KW, Three Phase, 4 wire, 415 Volt, 50 Hz Silent DG Set with Acoustic Enclosure, for LIC, HFL, Care Home Project at Bhubaneswar.

SCOPE OF WORK:-

The scope of work includes Supply, Installation, Testing and Commissioning of 125 KVA, Three Phase, 4 wire, 415 Volt, 50 Hz, Silent DG Set with Acoustic Enclosure to supply alternate power supply to specified loads, supply and laying of required inter connecting cables for the associated electrical works with suitable switches for controlling the power supply to the required loads. All accessories, materials required to complete the job in all respect are deemed to be included in the scope of contract, whether specifically mentioned or not. Preparation of necessary drawings for submission to the Government Inspecting Authorities and obtaining safety certificate and no objection certificate from the pollution control board as necessitated for commissioning of the said D G Set including carrying out all defect rectification works as pointed out by the civic bodies shall also be the responsibility of the contractor. Make of the DG Set: - Kirloskar Green/Cummins India/Crompton Greaves/Mahindra & Mahindra Ltd/Ashok Leyland.

Make of Alternator : Kirloskar /Stand ford /Crompton.

Make of Enclosure : Jakson /Bhaskar/Genesis

Engine :-

The Diesel Engine shall generally conform to BS 5514 or ISS 10000. The engine shall be continuously rated and capable of delivering full rated output at an altitude of not more than 100 meters above sea level and the ambient conditions ranging between 25°C to 40°C, humidity of 100% and permissible limits of operating temperature rise.

The engine shall be suitably rated after allowing for necessary derating factors according to ISS or continuous output of the alternator of 125 KVA/100 KW. The engine shall be capable of delivering the required HP at 1500 RPM to make up full output of the alternator. It shall be 4 four strokes, six cylinders, turbocharged, water cooled, electric start, industrial type engine with radiator. The engine must be suitable to start manually from the control panel. The engine shall have the following accessories along with the standard accessories supplied by the manufacturer:-

- 1) Fly Wheel of suitable diameter and weight.
- 2) Fly Wheel Housing.
- 3) Flexible coupling with guard.



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- 4) Crank Case Breather.
- 5) AIR Cleaner/Filter.
- 6) Radiator & Fan.
- 7) Air intake manifold.
- 8) Exhaust Silencer (Residential Type).
- 9) Fuel Pump.
- 10) Speed Governor.
- 11) Fuel Filter.
- 12) Lubricating Oil pump.
- 13) Lubricating Oil Filter.
- 14) Lubricating Oil Cooler.
- 15) Fuel Injection pump and Nozzles.
- 16) Starter Motor, 24 Volt DC.
- 17) Turbo Charger.
- 18) Battery Charger.
- 19) Over Speed Trip Mechanism

Engine Instrument Panel

This shall consist of the followings:-

- 1) Push type switches for starting & stopping of engine.
- 2) Tacho Hour Meter.
- 3) Water Temperature Gauge.
- 4) Oil Temperature Gauge.
- 5) Oil Pressure Gauge.
- 6) Toggle Switch.
- 7) Safety Control Indications for the followings:-
 - i) Over speed trip.
 - ii) High Water Temperature.
 - iii) Low Lub.oil pressure.

Exhaust Pipe:- Exhaust pipe shall consist of suitable bends, flanges etc including flexible piping, thermal insulation with asbestos/glass wool with Aluminum cladding, clamps, supports etc. Attention must be given to silencing of the engine exhaust noise with residential type silencer. Required supporting structure/clamps shall be considered as a part of scope of work.



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Additional Exhaust pipe for emission control as per requirement of local environmental clearance authority: -

- (1) The exhaust pipe of the DG Set shall be taken up to the above of the top most floor of the tallest building at least 1.50 mtrs above the terrace floor with hinged Aluminium rain water cap fitted on top or as directed at site.
- (2) Minimum nos of bends in exhaust pipe shall be provided.
- (3) The bends provided shall be at least 150% of the internal diameter of the pipe to maintain the required back pressure.
- (4) The exhaust pipe shall be connected to the silencer of the DG Set through a flexible bellow.
- (5) The diameter of the exhaust pipe shall be increased by minimum 38 mm after every 5.0 mtrs of running length to maintain the back pressure. Only MS/ERW pipes shall be used and the exhaust outlet shall be in the direction of prevailing wind as far as possible.
- (6) The exhaust pipe is to be rigidly fixed on to the surface of the wall of the building with a minimum gap of 100 mm between wall and the exhaust pipe with the help of suitable size MS clamps embedded/fixed in masonry or RCC works and making good to the damages as per existing finishes.

Engine Starting System:- The engine shall be of electric start with the help of batteries consisting of starter motor and solenoid. The batteries offered shall be of suitable Amp-Hr capacity of reputed make. Heavy duty Prestolite automobile type DC Copper cable of adequate capacity with Positive and Negative copper terminals of suitable length shall be considered as a part of scope of work.

Battery Charger:- The battery charger shall be of suitable capacity with trickle/bust charges facility with transformer, Full Wave bridge rectifier, ammeter, volt meter, selector switches suitable for operation on 230 Volt, Single Phase, AC power supply. It shall form a part of DG Set.

Common Base Frame:- The base frame shall be common for both Engine and the Alternator, fabricated out of MS Channels and be steady to withstand the total load and vibration.

Fuel Tank:- Inbuilt fuel tank of 230 liters capacity should be fabricated with suitable thickness MS plate. The fuel tank shall include Fill Valve, outlet valve, air vent, provision for fuel return pipe, level indicator. The engine suction pipe should be at least 50 mm above the bottom of the tank. The tank must be painted with anti corrosive epoxy base paint. This should be considered as an integral part of the system and mounted suitably.

Alternator:- 125 KVA/100KW ,0.8 PF,415 Volt, Three Phase,4 Wire,50Hz,1500RPM,AC Generator, Self Excited, self regulated, brushless type, incorporated with static excitation system with automatic voltage regulator with alternator mounted solid state electronic AVR, generally conforming to ISS 4772,BS 4999 or its latest version. The alternator shall be protected drip proof type fitted with



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ball/roller bearings. The class of insulation adopted shall be class F/H. Mechanical protection shall confirm to IP : 215. The terminals of the alternator shall be brought to a terminal box with supporting insulators and should be suitable to receive 3.5 core, 150 sqmm, XLPE insulated Aluminum conductor armoured cable or suitably rated Copper cable and shall confirm to IP 44/IP54/55 Degrees of Protection. The alternator shall be painted thoroughly with same colour of the engine by the alternator manufacturer only at their factory.

A) Unbalance: - 30% maximum between any two phases.

B) Over load capacity: - 10% for One Hour, 50% for Two minutes, Short Circuit for Three Seconds.

All the fabricated MS structure, stands, supports, etc are to be painted with two coats of synthetic enamel paint including a coat of anticorrosive red oxide primer paint matching with the colour of the engine as per manufacturers' standard. All surplus and waste materials are to be removed from site.

The DG Set shall be complete in all respect and shall include all accessories and materials, which are necessary for efficient operation of the DG Set and the scope of works includes supply and installation of all accessories and materials required for the associated electrical works. The supply of all such accessories and materials shall be deemed to be within the scope of this tender, whether specifically mentioned or not.

The DG Set as mentioned above with the acoustic enclosure shall be inspected by the representative of LIC HFL Care Home Ltd (Electrical Engineer) for necessary testing etc. prior to despatch of the same from the manufacturer's site without fail.

The successful tenderer shall submit 03(three) sets of as built drawings such as room layout(including detailed foundation particulars for DG Set, Acoustic enclosure, AMF panel, schematic control wiring, individual equipment drawing, parts, manual, instruction for operation and maintenance by LIC HFL Care Homes, Bhubaneswar.

ACOUSTIC ENCLOSURE

1. The enclosure shall be modular construction, compact, efficient environment friendly for outdoor and indoor use, ensuring optimum noise level of approximately 75db (A) +- 5%db (A) sound allowance or better at 1 meter distance from the enclosure, with a reasonably quiet background or shall comply with the latest norms & standards of pollution control board.

2.

- (a) Silent DG set enclosure wall shall be fabricated and assembled with the provision to be assembled and dismantled easily as per site condition.
- (b) There should not be any protruding parts.
- (c) The enclosure fabricated shall be out of CRCA sheet of 14 SWG.



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- (d) The sheet metal components are hot dip seven tanks penetrated and pure polyester based power coated to withstand extreme weather conditions. All nuts and bolts hardware are Zinc coated.
- (e) Fuel tank at the base of the silent DG. Set is having required capacity.
It is provided with breather and drain plug.
- (f) The fuel level can be indicated with the help of fuel gauge meter.
- (g) There is provision for filling the fuel from outside as in case of automobiles with locking arrangements.
- (h) Battery is accommodated in a separate tray in the container.
- (i) There is provision for drain plugs for draining oil/diesel.
- (j) The doors with high quality EPDM gaskets to avoid leakage of sound.
- (k) The door handles are lockable type.
- (l) Sound proofing of enclosure is done with high quality rock wool or mineral wool fiber glass wool conforming to IS 8183, of 50 mm thickness and density at 96KG/m³.
- (m) The rock wool is further covered with fiber glass cloth and perforated powder coated sheet.
- (n) Thermally insulated exhaust pipes and a special residential silencer shall be provided with the DG to control exhaust noise/flutter.
- (o) Specially designed attenuators to be provided to control sound at air entry to the flutter enclosure and exit from the container.
- (p) To make system vibration free, engine and alternator (single bearing) shall be mounted on specially designed anti vibration pad.
- (q) Adequate ventilation shall be provided to meet air requirement for combustion and heat removal. If required a blower shall be provided to meet total air requirement and air changes.
- (r) Temperature of enclosure shall not exceed beyond 5°C of ambient temperature.
- (s) The blower runs 2/3 minutes after stopping of D.G. Set.
- (t) The enclosure shall be provided with high enclosure temperature safety device.
- (u) There will be provision of emergency shutdown from outside the enclosure.
- (v) Insulated louvers shall be provided for fresh air entry and hot air outlet for noise prevention.

CONDITIONS OF CONTRACT FOR SUPPLY , INSTALLATION ,TESTING &COMMISSIONING OF DIESEL GENERATOR SETS.

1) IMPORTANT LICENCE : The LIC HFL Care Homes Ltd will not issue any document to the agency to import any part of the equipment to the worksite.



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2) FREE SERVICE ATTENDANCE: The agency shall include their free servicing of the generating sets and accessories offered for a period of 12 months (one service per month). The servicing shall be carried out at regular intervals. The required lubricating oil filter, coolants, Grease will be supplied by the tenderer at his cost. A service report is to be submitted at the end of each service. Free services are to be carried out after giving one week advance notice regarding the date when servicing is proposed to be carried out. In addition to the regular services, the agency shall have to attend the breakdown calls if any during the guarantee period at free of cost to LIC HFL Care Homes Ltd. All expenses involved for the servicing of DG Set servicing of the DG set or attending breakdown calls will have to be borne by the agency. The agency should mention the name and address of the Vendor for servicing of the D.G Set.

3) PERMISSION FROM AUTHORITIES

The successful tenderer shall make all arrangements to obtain written permission and approval if necessary from local municipal body and Odisha Electricity Board/Chief Electrical Inspector to Govt. of Odisha, Central Electrical Authority, environmental clearance authority in respect of smoke nuisance and alternate power generation. Professional charges for preparation of layout drawing and submission to chief electrical Inspector to Govt. of Odisha, Central Electrical Authority should be included in the price quoted by you. However the inspection charges deposited with the authorities shall only be reimbursed on submission of treasury challan.

4) DELIVERY : The generating set/s with auxiliary equipments to be delivered free of cost at our site and no separate charges will be paid by us for delivering including loading & unloading charges for the generating set at factory or at site.

5) FIRST FILLING LUBRICANT AND TOOL KIT:

The first filling of fuel, oil in tank and other lubricant required for the generating set including the charging of batteries filling with distilled water are to be provided by the successful tenderer at free of cost to LIC HFL Care Homes Ltd. The necessary tool kit for servicing of the generating sets and special tools, if any also to be supplied to LIC HFL Care Homes Ltd free of cost at the time of handing over the set in working condition..

I/We agree to the conditions mentioned above.



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GUARANTEED TECHNICAL PARTICULARS

(To be filled in by the tenderer)

(A)	FOR ENGINE	
1	Manufacturer's Name & Address	
2	Engine Model	
3	Type	
4	Type of Cooling	
5	Aspiration	
6	Bore/Stroke	
7	Displacement	
8	Compression Ratio	
9	Engine Speed (RPM) (Max over speed capacity – RPM)	
10	BHP Output	
11	No. Of Cylinders	
12	Fuel consumption in lit/hr at	
13	Lubricant oil consumption in lit/hr	
14	Oil pressure at idle speed	
15	Oil pressure at rated speed	
16	Maximum oil temperature	
17	Battery charging system volt/amp	
18	Cranking Motor - Volt	
19	Battery Capacity	
20	Exhaust gas Flow CFM/Lit/Sec	
21	Exhaust gas temperature	
22	Heat rejection to coolant BTU/Min (KW)	
23	Heat rejection to Exhaust BTU/Min (KW)	
24	Engine water flow USGPM Lit/Sec	
25	Cooling Fan Air flow with Radiator	
26	Fan CFM Lit/Sec	
27	Fan HP	



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(B)	FOR ALTERNATOR	
1	Maker's Name	
2	Type of Frame	
3	Rated continuous maximum KVA to IS 4722-1968 or latest version (or) BS 4999 at NTP condition	
4	Power Factor (Lagging)	
5	Rated K. Watt at specified PF.	
6	Governing specification	
7	Type of enclosure	
8	Speed in R.P.M.	
9	Frequency in Hz	
10	Rated voltage	
11	No. of phases	
12	Current carrying capacity of A.C. winding in Amps	
13	10% overload capacity for hours	
14	50% overload capacity for Secs	
15	Temperature rise of windings	
16	Class of insulation	
	Main Stator	
	Main Rotor	
	Excite Stator	
	Excite Rotor	
17	Efficiency at rated p.f. % for	
	100% Full load	
	75% Full load	
	50% Full load	
18	Voltage regulation from	



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	No. Load to full load and at	
	PF. from 0.8 lagging to unity	
19	Damper winding fitted on poles	
20	Radial clearance between Exciter stator and Rotor	
21	Peripheral speed of rotor	
22	Critical speed of rotor	
23	Direction of rotation	
24	Method of lubrication	
25	Type & make of excitation unit	
26	Excitation at rated load & Power factor of exciter	



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SPECIAL CONDITIONS:

1. PHOTOGRAPHS OF THE WORK

- 1.1 The contractor shall submit 3 sets of the prints with negatives of the photographs size 4" x 6" and also video graphs in the form of CD to LIC HFL Care Homes Ltd., on the following stages:
- j. Before commencement of the work.
 - k. During progress of work.
 - l. Completion before handing over the building.
- 1.3.1 One or more photographs shall be taken to have complete clear views of the work site as directed by Engineer in charge. The further stage of work shall proceed only on confirmation of such photographs seen by Consultant and a written site instructions obtained in this regard.
- 1.3.2 The quoted rates shall include for the same and no extra is payable to contractor on this account.

2. INSPECTION OF WORK

All work in course of execution or after execution in pursuance of the Contract, shall at all times be open to the inspection and supervision of the Employer' Engineer or Consultant or his authorised representatives and the Contractor or his responsible agent, duly accredited in writing, shall at all such times, be present to receive instructions/orders.

3. PRECEDENCE FOR ACCEPTANCE

If any contradiction or variance is observed in different components of the tender, the clarifications given below shall be taken in to account:

- (a) 'General Preambles' shall have the precedence over the relevant details given in General "Specifications".
- (b) "Trade Preambles" shall have the precedence over the relevant details given in "General Preambles" and "General Specifications".
- © The description of an item of the "Schedule of Quantities" shall have the precedence over the relevant details given in "General Preambles". General "Specifications" and "Trade Preambles".

4. DRAWINGS

The Contractor will receive from the Dy. Chief Engineer, LIC I , Jeevan Prakash Bldg. , Unit – 7 , Surya Nagar , Opp. To Raj Bhavan , Bhubaneswar - 751001 of the relevant drawings approved for the work.



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5. **SAMPLES**

The Contractor shall furnish for approval, with reasonable promptness, samples of all materials and workmanship. The Consultant shall check and confirm after obtaining necessary approvals from the competent authority of such samples with reasonable promptness only to conform with the design concept of the Works and for compliance with the information given in the contract documents. The work shall be in accordance with approved samples. The procedure for submission and approval of samples shall be as follows:

6. **USE OF SITE**

The Contractor shall not use any portion of the Site for purpose not connected with the works without the prior written approval of the Consultant. He shall maintain permanent and Site access roads free of spillage and shall not interfere with the flow of traffic. Also same shall apply to terraces and other developed areas.

7. **PROTECTION**

Adequate protection against any form of damage or deterioration shall be provided for in all sections of the Works. This shall include protective tapes castings, guardrails and the likes, which shall be provided if necessary. Particular care shall be taken to self-finished surfaces during the application of adjacent in-situ work. The contractor shall carry out all steps taken in pursuance of this clause, as directed and instructed by Consultant to his satisfaction.

8. **CLEARING OF WORKS**

Immediately prior to handing over the works, the Contractor shall thoroughly clean all buildings and external paved areas and generally clean the works to the approval of the Executive Engineer.

9. **SITE SUPERVISION**

- 9.1 It is to be noted that the Consultant is not obliged to check point-by-point, item-by-item of work on day-to-day basis. The contractor is expected to supervise the works by employing competent and experienced Engineers on his own. The Consultant shall inspect the work to check the quality of work and to ensure the work is according to drawings and specifications. Such inspection and supervision shall not relieve the contractor any of his obligation towards use of material, workmanship, sequence of working and completion in a stipulated period.

10. **SECURITY ARRANGEMENTS**

The contractor shall provide and maintain at his own expense all lights, guards, fencing and watch & ward when and where necessary as required for the protection of the works of for the safety and convenience of the employees or general public.



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11. TESTING OF MATERIALS

During the progress of work, tests as instructed for various materials shall be conducted.

For all materials, expense towards testing shall be borne by the contractor and his quoted rates shall include for the same and no claim on the account shall be entertained.

The Consultant may instruct Contractor to test any material to be incorporated in work even if it is not specifically mentioned. In all such cases testing charges alone excluding incidentals shall be reimbursed to the contractor provided test results are satisfactory. For all tests incidental charges such as cutting, loading, unloading, transporting, casting etc shall be at contractor's cost and shall be borne by him.

12. OTHER CONDITIONS:

- i) Labour may stay at site only after showing photo I Card issued by the agencies and duplicate of which is to be submitted to our office. Cooking is not allowed in the office premises.
- ii) Gate pass for daily labour may be issued.
- iii) Work can be executed at night also.
- iv) Every efforts should be made to restrict the movement beyond working area
- i) Materials can be taken away only after getting gate pass from Engg. Deptt.
- vi) If work is to be carried out at night, prior permission is to be obtained by the agencies.
- vii) Well co-ordination should be maintained with other vendors of Electricals etc. & other agencies.
- viii) Everyday, before the office starts the common area should be cleaned in all respect if this area is used anyway for the work.
- ix) Employer is no way responsible for issuing way bill or C-form to any agencies.

13. INTERPRETATIONS:

13.1 In construing these Conditions, the Specifications, the Priced Schedule of Quantities, Tender and Agreement, the following words shall have the meanings herein assigned to them except where the subject or context otherwise requires:

13.2 "Employer" LIC HFL Care Homes Ltd and his (their) heirs, legal representatives, assignees and successors.

13.3 Consultants: The term Consultant shall mean Life Insurance Corporation of India having their central office at Mumbai and coordinating office at Bhubaneswar. The addresses of central Office and coordinating office are as at under



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Central office

Executive Director (Engg)

LIC of India , 5th Floor, Central office (Engineering Department)

"Yogakshema", Mumbai-21.

Co - ordinating Office

Office of the Deputy Chief Engineer.

LIC of India, Engg. Deptt. , 1st Floor, Jeevan Prakash Bldg,

Surya Nagar , Unit - 7,

Opp. to Rajbhawan

Bhubaneswar -751001

Or in the event their ceasing to be Consultant for the purpose of this contract such other person/s as the employer shall nominate for the purpose.

- 13.4 The term "Site Engineer" / "Employer's Engineer" shall mean the person appointed and paid by the Employer, acting under the order of the Employer to superintend the work.
- 18.5 The Contractor shall mean the individual, firm or company whether incorporated or not, who is awarded the contract & shall include the legal representative of such individual or the persons composing such firm or company or the successors of such individual, firm or company & the permitted assignees of such individual, firm or company.
- 18.6 The "Site" shall mean the lands/buildings and/or other places on, in, into or through which work is to be executed under the contract or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.
- 18.7 "This Contract" shall mean the Articles of Agreement, these Conditions, the General Instructions to Contractor, General Preambles to Schedule of Quantities, Special Conditions, the priced Schedule of Quantities, the Specifications, the Appendices, the Drawings and other related correspondence.
- 18.8 "Act of Insolvency" shall mean any act of insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any amending Statute.
- 18.9 "Notice in Writing" or written notice shall mean a notice in written, typed or printed characters, sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.
- 18.10 Words importing persons include Firms and Corporations, words importing the singular only also include the plural and vice versa where the context so requires.



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- 18.11 The titles of the Clauses shall not affect or alter the meaning of Clauses and are solely for the purpose of facilitating reference.
- 18.12 Wherever the words "approved", "directed", "as required", "selected" or words of like effect are used, it is to be understood that the approval/direction, requirement or selection of the Employer / Consultant are intended unless otherwise specified.
- 18.13 The words "as described" shall mean the description in the Special Conditions, Specifications, General Instructions, Drawings etc. of this tender.
- 18.14 The words "allow" shall mean that the Contractor shall include in his rates for the particular matter referred to.
- 18.15 "Day Work" shall mean items of labour and/or materials which in the opinion of the Employer's Engineer are not capable of being evaluated by the accepted method of measurement and analysis.

N.B : PLEASE NOTE :

- i) EMPLOYER MEANS , THE DIRECTOR AND CHIEF EXECUTIVE OF LIC HFL CARE HOMES LTD.**
- ii) CONSULTANT MEANS , THE LIFE INSURANCE CORPORATION OF INDIA.**
- iii) All the works shall be carried out by experienced and licencete agencies. The Contractor shall take approval of sub agencies to whom they intend to execute the respective work from the Employer/ Consultant before execution of the work.**



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NO CLAIM CERTIFICATE CUM RECEIPT

(To be given on Contractor's letterhead)

" Received Rupees _____

(Rupees _____) being the amount against my/our final

bill dated _____ for _____ (Name of Work) in full and final settlement of bill.

Contractor

(Signature of Contractor on Revenue stamp)

Rubber stamp/seal of the contractor /company

Signature of the contractor

With date & office seal.



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**SCHEDULE OF QUANTITIES ARE ENCLOSED SEPARATELY
IN EXCEL SHEETS.**



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NOTE :

1. **The contractor shall submit the Time & Progress Chart before commencement of work separately as per completion period mentioned in the " Appendix to the conditions of contract".**
Default in compliance with the programme in the chart submitted by them in any of its section shall entail operation of liquidated clause No.19 under "Condition of Contract" in whole or part of the sole discretion of the Employer.
2. **With reference to Clause No.4 under "General instruction to Contract" unless the Contractor submits his version of time and programme Chart within 15 days of communication of acceptance of tender, this chart shall be deemed to be as agreed and submitted by him.**
3. **In consultation with Consultant and Employer, this time and progress chart can be amended to bring in conformity and extension of time granted by competent Authority during this currency of the contract.**
4. **Ancillary work should be started that all such work shall be completed before the date of completion mentioned in the Appendix to the condition of contract.**

Employer